

MANITOWOC

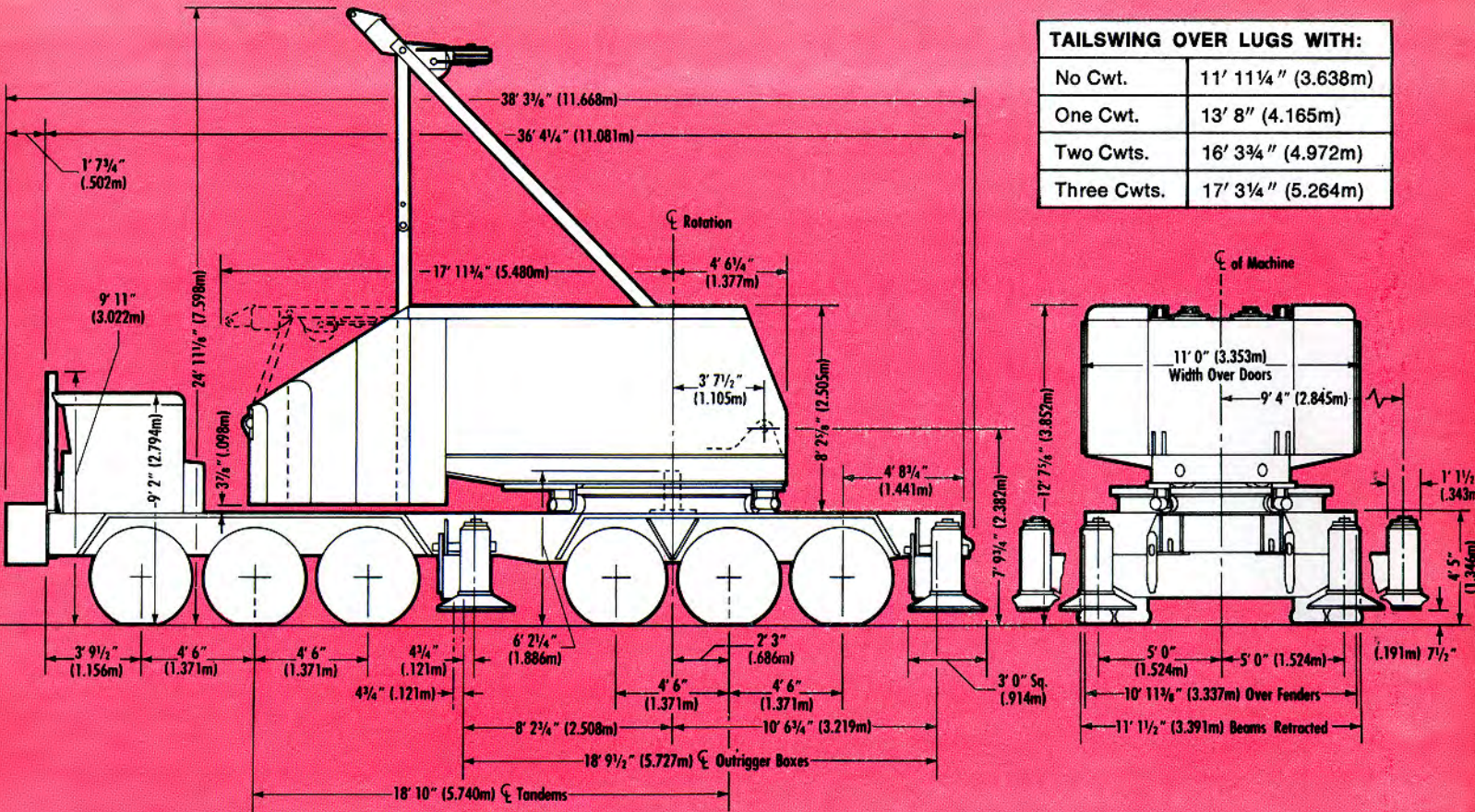
3900T

SERIES-2 SPECIFICATIONS

MEETS ANSI
Manitowoc
B30.5



OUTLINE DIMENSIONS



WEIGHTS

	POUNDS*
LIFTCRANE , complete with 33' No. 9A Hammerhead Boom, gantry and backhitch, boom hoist rigging and pendants, hoist wire rope, basic VICON® upperworks package, counterweights, and complete carrier	235,670
UPPERWORKS , complete with basic machinery, including drums, but not including gantry and backhitch, front end attachments or counterweights	54,240
CARRIER , with center post and roller path, less bumper counterweight (10,500 pounds) and, front and rear outrigger assemblies (9,725 pounds each)	64,120
SELF-REMOVING COUNTERWEIGHT (3-piece)	
Inner	30,000
Middle	31,200
Outer	12,800

	POUNDS*
BOOM NO. 9A	
BOOM BUTT: (less wire rope and pendants)....	4,270
HAMMERHEAD BOOM TOP: (equipped with boom point sheaves, and pendant links)	3,982
OPEN THROAT BOOM TOP: (equipped with lower boom point, sheaves, and pendants).....	7,113
Add for upper boom point and sheave.....	319
Total	7,432
BOOM INSERTS:	
Insert — 5' (with pendants)	940
Insert — 10' (with pendants)	1,363
Insert — 20' (with pendants)	2,341
Insert — 40' (with pendants)	3,535
GANTRY AND BACKHITCH	3,250

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

WEIGHT DISTRIBUTION FOR TRAVELING CHART ON PAGE 7.

CRANE POWER PLANTS

	MODEL	Cyl.	Bore	Stroke	Cu. In. Displacement	Net HP @ RPM (at flywheel)
BASIC	Cummins LTA-10-C325	6	4.921"	5.354"	610	310 @ 2000
OPTIONAL	Detroit Diesel 8V-71N	8	4.250"	5.000"	568	278 @ 2000
Air Compressor: 13.2 cfm.			Fuel Tank Capacity: 75 gallons.			
Tandem compressors (14.5 cfm each) required in place of single air compressor on all <i>non</i> -VICON models with any air controls other than boom hoist, boom stop and drum clutch controls.						

UPPER MACHINERY

ROTATING BED: One-piece, heavy reinforced steel fabrication with integral machinery side frames. Provides rigid deck for power plant, house rollers, rotating machinery, A-frame and boom hinge. Houses swing lock and swing gear.

HOUSE ROLLERS: 4
2 Front, antifriction bearing-mounted.
2 Rear, antifriction bearing-mounted.

HOOK ROLLERS: 6 Mounted on eccentric shaft for adjustment.
2 Front antifriction bearing-mounted.
4 Rear antifriction bearing-mounted.

A-FRAME: Supports gantry, independent boom hoist, and counterweight. Fabricated steel roof supports and vertical center legs; heavy bar front and rear legs. All joints bolt and pin-connected.

POWER TRANSMISSION, NON-VICON: Engine-mounted 3-stage torque converter transmits power through chain drive to horizontal swing drive shaft — the beginning power source for hoist, swing and independent boom hoist. Chain drives fully enclosed and run in oil. Speed and power output requirements vary with engine RPM which is controlled by hand and/or foot throttle. Consult factory for appropriate chain sprocket ratios.

POWER TRANSMISSION, VICON®: The VICON (Variable Independent CONTROL — Patented) system provides stepless variable control power transmission for various machine functions. Engine power is divided at transmission case and transmitted to two controlled torque converters. Through chain drives, rear converter powers horizontal swing drive shaft (which is beginning power source for independent boom hoist) while front converter supplies hoist power. Controls arranged to engage clutches while little or no torque is transmitted from power source, virtually eliminating clutch slippage and wear. Chain drives fully enclosed and run in oil. Since speed and power requirements vary, consult factory for appropriate transmission and chain sprocket ratios.

HORIZONTAL SWING DRIVE SHAFT: Alloy steel shaft, antifriction bearing-mounted. Swing clutches mounted on cast steel hub splined to shaft. Integral clutch spiders and bevel pinion, ball bearing-mounted. Bevel pinions, totally enclosed and oil spray lubricated, drive the intermediate vertical swing shaft. Sprocket on shaft provides drive for independent boom hoist. Forced-air cooling provided for non-VICON machines with clam combination.

SWING CLUTCHES: Single-disc clutches, splined to horizontal swing drive shaft, are manually applied by axial-pressure cam levers which apply clutch pressure evenly over entire friction area, providing very smooth swing action. Cam faces separated by antifriction roller bearings which take axial thrust to minimize friction. Clutch disc assembly easily removed for replacement of clutch facing.

INTERMEDIATE VERTICAL SWING SHAFT: Alloy steel, antifriction bearing mounted. Bevel gear splined to upper end driven by horizontal swing drive shaft bevel pinions. Spur pinion, splined on lower end, engages swing gear and drives vertical swing shaft.

VERTICAL SWING SHAFT: Alloy steel, antifriction bearing mounted shaft. Swing gear on top driven by spur pinion of intermediate vertical swing shaft. Pinion on bottom engages ring gear integral with roller path.

SWING BRAKE: External contracting, manual brake. Drum is splined to upper end of forged alloy steel shaft which is bushing mounted in the rotating bed slightly behind, above and to one side of the vertical swing shaft. Integral spur pinion on lower end of brake shaft engages swing gear. Foot pedal control latches for parking.

SWING LOCK: Heavy gear segment, manually controlled, engages swing gear. Operates independent of intermediate vertical swing shaft. High-tension spring link cushions engagement.

(Upper Machinery Continued on page 4)

(UPPER MACHINERY Continued . . .)

DRUM SHAFT ASSEMBLY: Heat treated, alloy steel drum shaft is mounted to side frames of rotating bed on heavy duty antifriction pillow blocks. Main hoist drums mounted side by side on drum shaft. Drum gear, with induction hardened teeth, is splined to left end of shaft. Drums and shaft turn on large antifriction bearings. Drive chain and drum gears fully enclosed and oil spray lubricated.

External contracting brake and internal expanding clutch for each hoist drum. Removable, cast iron combination brake/clutch flanges dissipate heat quickly. Air applied clutch standard; manual control available. Manual brakes standard on liftcrane; air applied optional. See chart page 4, for drum dimensions and spooling capacities.

VICON POWER LOWERING: Controlled power load lowering on both hoist drums for line pull over 6,000 pounds is basic to the VICON control system. It enables raising, holding or lowering a load by stepless variable torque output of hoist converter. Hoist clutches remain constantly engaged, making transfer of load from clutch to brake unnecessary during normal job cycle.

FULL RANGE VICON POWER LOWERING: Optional with VICON. Provides control over a full range of lowering speeds for any load from empty hook through maximum capacity. Engine driven hydraulic pump powers hydraulic motor which drives output shaft of hoist converter in reverse direction of rotation. Hydraulic circuit, with necessary control valve and relief system, permits full modulation of lowering control.

POWER LOWERING, NON-VICON: Optional. Available on right drum only; chain driven through special clutch mounted on horizontal swing drive shaft. Forward motion of drum clutch lever engages clutch and controls lowering speed by hydraulic retarder pressure.

FRONT AUXILIARY 3RD DRUM—LIGHT DUTY: Optional. Chain-driven from main drum shaft. Shaft is bronze bearing mounted on rotating bed in front of main drum shaft. Drum has integral brake and clutch spider, bronze bearing mounted to shaft. External contracting brake is spring applied

with automatic release upon clutch application; separate manual release provided. Single-disc clutch is air applied.

INDEPENDENT BOOM HOIST: Mounted on A-frame above swing clutches. Dual drums equalize line pull on boom hoist rigging. Heat treated alloy steel drum shaft. Bronze gear and alloy steel worm shaft driven by double-disc, air controlled, reversing clutches mounted on a splined shaft chain driven from sprocket on horizontal swing drive shaft. All rotating shafts turn on antifriction bearings. Worm gear set fully enclosed and runs in constantly circulating oil. Boom hoist brake on worm shaft is spring applied, and releases automatically on clutch operation. Auxiliary brake is manually applied from operator's station. Ratchet and pawl standard equipment.

GANTRY & BACKHITCH: Pin-connected. Fabricated folding gantry lowers into cab roof recess for low clearance travel. Link type, three-piece, backhitch anchored to cab rear. Antifriction gantry sheaves.

GANTRY LIFTING DEVICE: Electrically powered hydraulic unit partially raises gantry for erection to working position and lowers it into cab roof for travel.

AUTOMATIC BOOM STOP: Push rod contacts boom, actuating air line valve which automatically stops air supply to independent boom hoist clutch cylinder. Set to stop hoisting when boom reaches maximum angle determined by boom style. Standard on liftcranes.

TELESCOPIC BOOM STOP: Air cushioned, telescopic tube, pinned to boom and A-frame. Starts cushioning at 74° with positive physical stop at 85° from horizontal (68° and 80° for No. 9A-24 boom). Standard on liftcranes.

COUNTERWEIGHT REMOVAL: Counterweight easily removed by fixing boom position using pendants anchored to carrier. Gantry then raises or lowers counterweight through boom hoist power. Counterweight is pin-connected for easy handling.

Front bumper counterweight has lifting eye for "self-handling" by upperworks and is built to accommodate low level headlights.

DRUMS AND LAGGINGS

SPLIT DRUM SHAFT						Spooling Capacity		
Application	Drum	Dia.	Drum Width	Type of Lagging	Wire Rope Size	First Layer	Layers	Max. Capacity
Hoist	Right	19"	20 $\frac{3}{8}$ "*	None	1"	97' (80')*	8	1,050' (865')*
Whip	Left	21"	14 $\frac{3}{8}$ "	Plain	1"	75'	7	673'
Third Drum	Front Aux	12"	8"	None	1/2"	54'	8	485'

*Drum width: 16.8" when equipped with clutch-and-retarder power lowering.

FRONT END EQUIPMENT

NO. 9A HAMMERHEAD BOOM: Standard. 155-Ton maximum capacity. Allows maximum capacity lifts where overhead clearance is restricted. Basic 33' boom composed of 30' butt section and 3' hammerhead top with 5', 10', 20' and 40' inserts optional. All welded construction. Inverted angle chords and tubular lacing 100,000 psi yield steel. Heavy duty lower chords on butt, 5', 10' and 20' inserts. Boom sections 74" wide x 72" deep at pin-connected joints. Each insert matched with two pair of 1 1/4" diameter single-length pendants. Hammerhead top equipped with six 24" O.D. antifriction bearing sheaves. Rope guard integral with hammerhead. Top has lugs for attaching No. 123 or No. 124 jib assemblies. Maximum boom length 213'.

LOW-CLEARANCE TRAVEL LINK: Optional. Available only for hammerhead boom. Two pin-connected links, placed between upper chords just ahead of butt, reduce overall machine height to 13' 8" with gantry lowered for travel. Not to be used while making lifts.

OPEN THROAT BOOM TOP: Optional. 140-Ton maximum capacity. Standard hammerhead boom converted by inserting 30' tapered open throat top section. Lower shaft on boom top equipped with five 24" O.D. antifriction bearing sheaves. Forward shaft equipped with one 27" O.D. antifriction bearing sheave; two antifriction bearing sheaves optional. Rope guards on both shafts. Basic length 60'; maximum length 220'.

4 1/2° OFFSET BOOM TOP: Optional. Increases clearance from load to boom. Open throat top converted by inserting two pin-connected links between upper chords just behind boom top. Basic length 60'; maximum length 220'. Consult factory for capacity charts and information.

NO. 9A-24 LIGHT TAPERED BOOM: Optional. Provides for special long boom. Standard hammerhead boom converted by adding 50' lower top, 50' tapered top, two 10' heavy duty inserts and two 40' inserts. A 33' mast is also required. Top section equipped with integral lugs for attachment of No. 124 jib. Basic length 230'; maximum length 280'.

BOOM RIGGING: 10 or 12-part line (12-parts required for No. 9A-24 boom) reeved between gantry and equalizer. Controls boom angle with reeving from equalizer to dual independent boom hoist drums which power boom up and down. Equalizer connected to boom point by pairs of dual pendants, additional pairs of pendants matched to each insert.

EQUALIZER: Steel fabrication. Six horizontal sheaves, antifriction bearing mounted.

WIRE ROPE GUIDE: Mounted on upper side of boom top. Two antifriction bearing sheaves on hammerhead; two or three bushed sheaves on open throat top.

WIRE ROPE ROLLER GUIDE: Mounted on top side of boom butt and each insert. Induction hardened tubing, antifriction bearing mounted.

NO. 123 JIB: Optional. 20-ton maximum capacity; 30' length, extendible to 60' with 10' inserts. Jib offset angle adjustable to 5, 12 or 22 degrees for hammerhead; 0, 10 or 20 degrees for open throat top. All welded construction. Tubular chord and lacing members 100,000 psi yield steel. 30" wide x 30" deep at pin-connected joints. Top section has 24" O.D. sheave, cheek plates and anchor joint.

Maximum capacities with inserts: 40' — 15 tons; 50' — 10 tons; 60' — 5 tons. Consult jib lifting capacity charts for specific capacity when used on various boom lengths.

NO. 124 JIB: Optional. 10-ton maximum capacity; 30' length, extendible to 60' with 10' inserts. Jib angle adjustable to 5, 12 or 20 degrees for hammerhead; 0, 10, 20 or 30 degrees for open throat top. Tubular chord and lacing members 100,000 psi yield steel. 29 1/2" wide x 22" deep at pin-connected joints. Top section has 19 1/2" O.D. sheave and rope guard.

Maximum capacities with inserts: 40' — 7.5 tons; 50' — 5 tons; 60' — 2.5 tons. Consult jib lifting capacity charts for specific capacity when used on various boom lengths.

GENERAL

CAB: Fully enclosed operator's station located in right front corner of cab. Rubber mounted safety glass windows provide wide angle view from operator's station; hinged window in roof for high boom vision. Sliding doors at operator's station and on left side of cab. Insulated door behind operator's seat isolates machinery noise. Controls conveniently arranged for comfortable operation. Easily serviced pull-out battery box. Power plant radiator shutter.

Elevated operator's cab optional. Controls in elevated cab only, or both cabs as an option. Mounted above and forward of main cab, at 26' 6" eye level above ground.

CONTROLS: Manually controlled main drum brakes, with latched foot pedal. Manually controlled swing clutches and swing lock. Air assist swing brake on excavator combination.

Non-VICON — Graduated air controls for main drum clutches. VICON — Combination clutch and throttle controls for main drum clutches; first 10° hand lever movement engages clutch; further movement controls operating speed by increasing converter output.

SWING SPEED: Variable, 4.95 rpm maximum.

RINGER®: Model 3900T can be equipped as a RINGER for special applications. Consult factory for details.

TOWER CRANE: Upper can be fitted with 114' thru 164' of No. 9A tower and 100' thru 150' of No. 18 boom for use as a self-erecting, tower-boom combination. Longer towers requiring outside erection assist are available. Consult factory for capacities and special information.

CARRIER SPECIFICATIONS

CARRIER: 12 x 6 specially designed for the Model 3900T. See OUTLINE DIMENSIONS, page 2, for key dimensions.

FRAME: Stable, rigid, one-piece weldment of high-strength steel is engineered to support both static and dynamic loading. Front frame rails are wide-flanged beams; rear is box weldment. Easy access to drive train for repairs provided by "open throat" bracing. Two tow loops front and rear.

RING GEAR AND ROLLER PATH: Heat treated, cast alloy steel, welded to carrier frame. Roller path 105 $\frac{3}{4}$ " outside diameter. Machine-cut internal gear teeth.

CENTER POST: Machined from steel forging. Fixed to welded base on carrier with high-strength bolts. Provides pivot for rotating upperworks. Takes horizontal load only, no uplift. Pressure-lubricated bronze bushing in rotating bed.

OUTRIGGER BOXES: Fabricated, alloy steel plate; wedge-and-slot connected to carrier frame. Easily installed or removed using quick-connect couplings on hydraulic lines.

OUTRIGGER BEAMS: Full length, fabricated, reinforced box sections of 100,000-psi yield steel are moved horizontally by hydraulic rams, and held in maximum extended or retracted position by quick-release locking pins.

OUTRIGGER FLOATS: 36"x36" alloy-steel pads are held to outrigger cylinders with locking pins. Low profile floats optional.

HYDRAULIC OUTRIGGER CONTROLS: Simple push-pull control rods, located on either side of carrier near center axle of front tridem, directly actuate hydraulic valves which position each beam or jack independently. Once set, jacks are locked in place by two-way check valve system.

POWER PLANTS: Cummins NTC-350 standard; other engines optional.

ENGINE ACCESSORIES: 75-gallon fuel tank, 13.2 cfm air compressor, compression release, and full-flow oil filter. Bypass oil filter (Cummins only) on right hand frame rail. Dry type air cleaner. Exhaust pipe and guarded muffler mounted vertically on cab.

MAIN TRANSMISSION: Eaton RT00-11613. Thirteen speeds forward, two reverse. Forward gear ratios range from 12.12 : 1.00 to .62 : 1.00. Reverse ratios are 3.43 : 1.00 and 12.68 : 1.00.

AUXILIARY TRANSMISSION: Eaton-Fuller AT1202. Forward gear ratios are 1.00 and 2.036 to 1.00.

FRONT AND REAR SUSPENSION: Three-axle solid mounts with rubber-bushed torque rods.

STEERING GEAR: Ross, with Garrison hydraulic assist. Mounted directly on engine.

STEERING WHEEL: 21" diameter.

TURNING RADIUS (Centerline of outer front tire): 59'0" right; 56'0" left.

CLUTCH: Spicer 15 $\frac{1}{2}$ " two-plate.

SERVICE BRAKES: Bendix-Westinghouse internal expanding brakes on all wheels, with 13.2 cfm air compressor and BW air reserve tanks. Front brake shoes 16 $\frac{1}{2}$ " x 5". Rear brake shoes 16 $\frac{1}{2}$ " x 7".

PARKING BRAKES: Maxibrakes on all rear wheels. Normally released by auxiliary air tank; spring applied for parking or if main system loses air.

ENGINE BRAKE: Optional. Electrically actuated Jacobs brake, available only on Cummins engine.

UNIVERSAL JOINTS: Spicer Series 1710 and 1810.

FRONT AXLES (3): Eaton tubular model 24T2 with 103" track.

REAR AXLES (3): Rockwell planetary model EPRC-1356 with 100" track and 131 $\frac{3}{4}$ " overall width over the tires. Final drive ratio 12.76 : 1.

TIRES:

STANDARD — Eighteen 14:00 x 20 — 18-ply Load Range "L" (rock type) on/off highway.

OPTIONAL — Michelin 4-steel ply.

WHEELS AND RIMS: 10:00 x 20 type MD rims. Spoked wheels mounted on each front axle. Rear wheels integral with planetary hub.

ELECTRICAL SYSTEM: 12-volt, high-output system with 75-amp high-output alternator, high-output 24-volt starting system, and two 12-volt batteries in parallel.

LIGHTS AND HORN: Sealed beam headlights, stop/tail lights, clearance lights on all fenders, front and rear directional lights, and license plate lights.

FENDERS: All fenders are flat deck type with tread plates and deck cover plates providing a full length-and-width walkway.

CAB: One-man steel cab, offset to left side of chassis. Bostrom Viking seat with seat belts, hand throttle, LH and RH mirrors, air actuated windshield wiper with windshield washing system, heater and defroster.

INSTRUMENTS: Speedometer; electrical; oil pressure, and water temperature gauges; ammeter; low air pressure warning buzzer; tachometer with hourmeter; and low oil pressure and high temperature warning lights.

STANDARD EQUIPMENT: Tool kit with wheel wrench and bar; baffle and fan-enclosing shroud; vertical muffler behind cab with exhaust stack extending 18" above cab roof; bumper mounted boom rest.

FRONT BUMPER COUNTERWEIGHT: 10,500 pounds. Has integral lifting eye for easy removal.

CARRIER POWER PLANTS						Net Ratings @ RPM (at flywheel)	
MODEL		Cyl.	Bore	Stroke	Cu. In. Displacement	HP	Torque (Lb. Ft.)
BASIC	Cummins NTC-350 Diesel	6	5.50"	6.00"	855	350 @ 2100	1175 @ 1300
OPTIONAL	Detroit Diesel 8V-92TA	8	4.84"	5.00"	736	365 @ 2100	1187 @ 1000

Air Compressor: 13.2 cfm. Fuel Tank Capacity: 75 gallons.

WEIGHT DISTRIBUTION FOR TRAVELING

Weights are approximate and may vary between machines as a result of component variations. Shaded areas indicate components included in "Total Weight" columns.

Carrier only, complete with front and rear outriggers and front bumper counterweight = 94,070 pounds. Front tridem load = 45,420 pounds. Rear tridem load = 48,650 pounds.

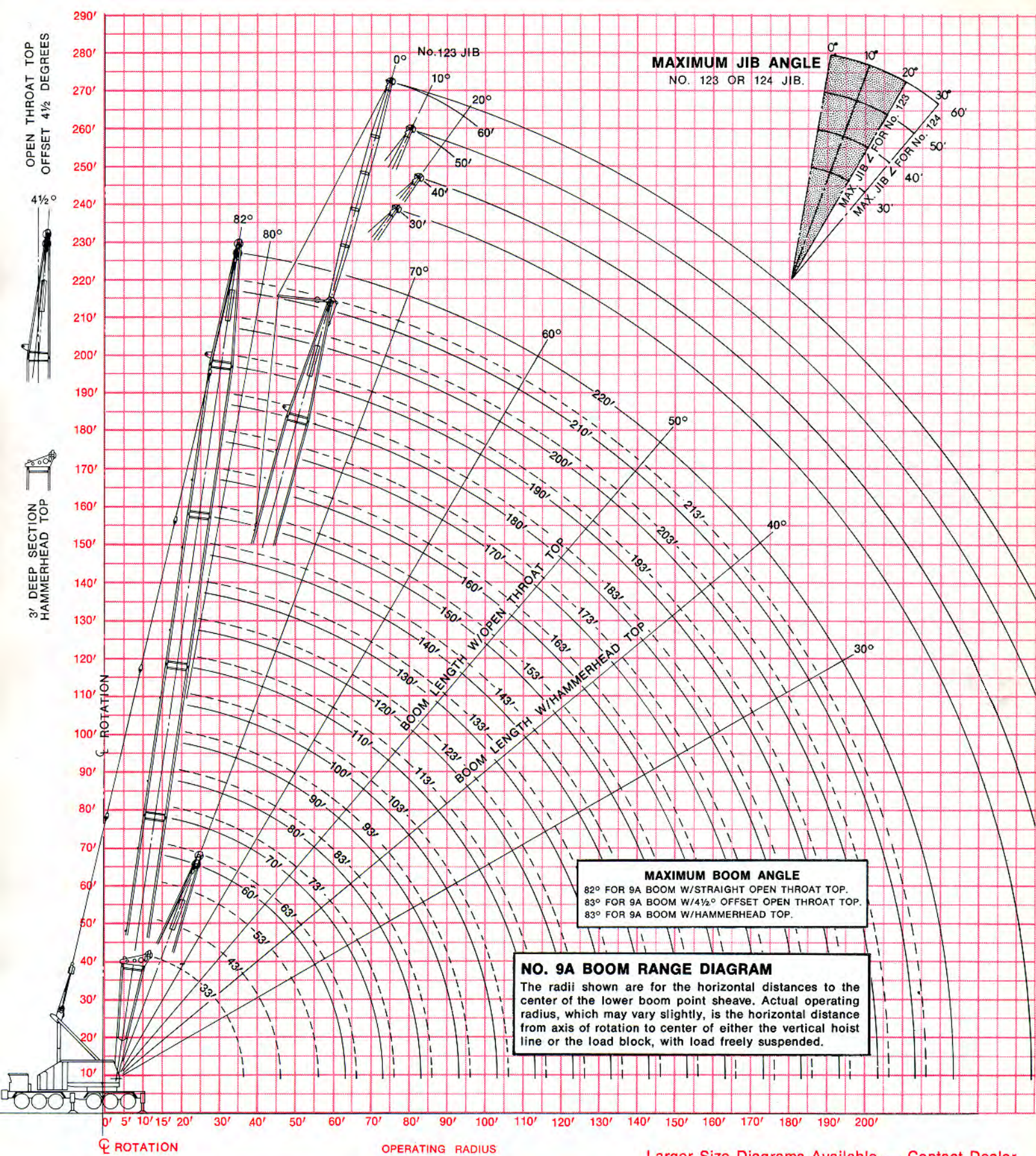
BOOM NO. 9A with Open Throat Top					Carrier (Only)	Upperworks	Gantry	Front Outrigger	Boom Butt	Rear Outrigger	Boom Top	Cwt. — Carrier Front Bumper	Cwt. — Crane — Inner	Cwt. — Crane — Middle	Cwt. — Crane — Outer	BOOM NO. 9A with 3' Hammerhead Top				
Upper Facing Rear			Upper Facing Forward													Upper Facing Rear			Upper Facing Forward	
Front Tridem	Rear Tridem	Total Weight	Front Tridem	Rear Tridem												Front Tridem	Rear Tridem	Total Weight	Front Tridem	Rear Tridem
107,020	129,410	236,430	17,820	218,610												112,830	122,840	235,670	11,830	223,840
12,510	290	12,800	-9,450	22,250												12,510	290	12,800	-9,450	22,250
94,510	129,120	223,630	27,270	196,360												100,320	122,550	222,870	21,280	201,590
25,800	5,400	31,200	-18,350	49,550												25,800	5,400	31,200	-18,350	49,550
68,710	123,720	192,430	45,620	146,810												74,520	117,150	191,670	39,630	152,040
22,120	7,880	30,000	-14,950	44,950												22,120	7,880	30,000	-14,950	44,950
46,590	115,840	162,430	60,570	101,860												52,400	109,270	161,670	54,580	107,090
15,580	-5,080	10,500	15,580	-5,080												15,580	-5,080	10,500	15,580	-5,080
31,010	120,920	151,930	44,990	106,940												36,820	114,350	151,170	39,000	112,170
-12,860	17,640	4,780	14,000	-9,220												-7,050	11,070	4,020	8,010	-3,990
43,870	103,280	147,150	30,990	116,160												43,870	103,280	147,150	30,990	116,160
-4,290	14,015	9,725	-4,290	14,015												-4,290	14,015	9,725	-4,290	14,015
48,160	89,265	137,425	35,280	102,145												48,160	89,265	137,425	35,280	102,145
-4,710	10,800	6,090	6,160	-70												-4,710	10,800	6,090	6,160	-70
52,870	78,465	131,335	29,120	102,215												52,870	78,465	131,335	29,120	102,215
5,410	4,315	9,725	5,410	4,315												5,410	4,315	9,725	5,410	4,315
47,460	74,150	121,610	23,710	97,900												47,460	74,150	121,610	23,710	97,900
2,110	1,140	3,250	-1,340	4,590												2,110	1,140	3,250	-1,340	4,590
45,350	73,010	118,360	25,050	93,310												45,350	73,010	118,360	25,050	93,310
16,630	37,610	54,240	-3,670	57,910												16,630	37,610	54,240	-3,670	57,910
28,720	35,400	64,120	28,720	35,400												28,720	35,400	64,120	28,720	35,400

NOTE: Maximum allowable axle loads for traveling vary with type of tires, tire pressure, and speed. Consult separate charts.



UNDECKING ARRANGEMENT:

Optional. Enables self-undecking of upper from carrier after counterweights are removed. Using a saddle with pivot support under the boom butt, upper "lifts itself" off carrier by leverage applied through hoisting on a weight tied over the 60' boom point. Carrier is driven out from under the saddle supported upper which is then lowered onto a suitable trailer. This allows favorable weight breakdown for both major components with minimum additional dismantling. Consult factory for further details.



MAXIMUM JIB ANGLE
NO. 123 OR 124 JIB.

MAXIMUM BOOM ANGLE
82° FOR 9A BOOM W/STRAIGHT OPEN THROAT TOP.
83° FOR 9A BOOM W/4½° OFFSET OPEN THROAT TOP.
83° FOR 9A BOOM W/HAMMERHEAD TOP.

NO. 9A BOOM RANGE DIAGRAM
The radii shown are for the horizontal distances to the center of the lower boom point sheave. Actual operating radius, which may vary slightly, is the horizontal distance from axis of rotation to center of either the vertical hoist line or the load block, with load freely suspended.

Larger Size Diagrams Available. — Contact Dealer

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



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