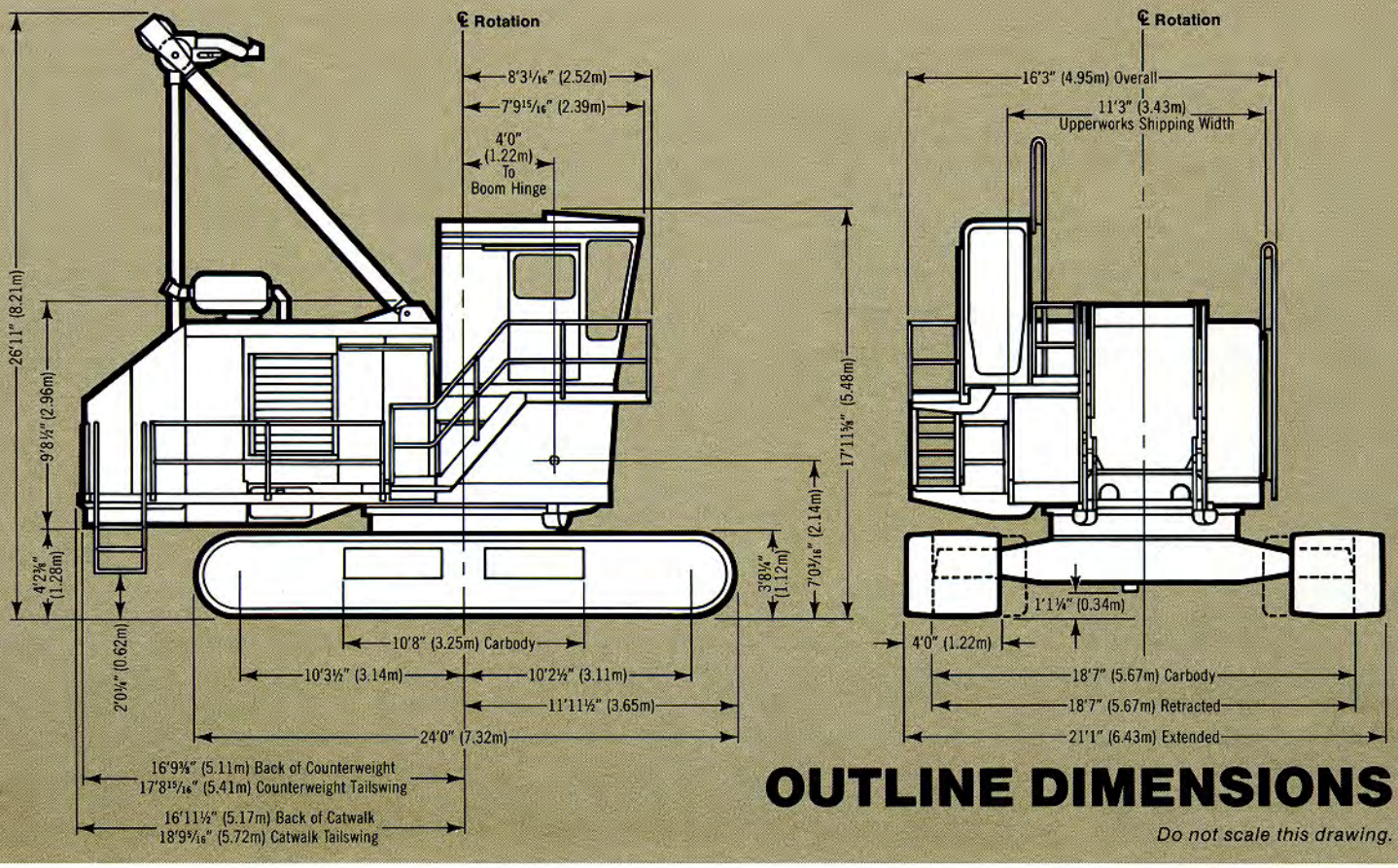
MANITOWOC'S 3950D OFFERS:

- **30,000-pound dragline capacity.**
- **Easiest shipment and assembly of any excavator in its class.**
- **Exclusive drum interlock system for faster cycling and higher productivity.**

Manitowoc

3950D
DRAGLINE



OUTLINE DIMENSIONS

Do not scale this drawing.

WEIGHTS

	Pounds*	Kilograms*
DRAGLINE (complete): lowerworks, upperworks, and 70′ (21.35m) basic boom	282,430	128,109
LOWERWORKS:		
Carbody, with travel mechanism, king pin, and roller path	40,605	18,435
Crawler Assemblies (2), with 48″ (1.22m) wide treads and drive chains, each assembly 34,440 lbs. (15,635 kgs.)	68,880	31,272
UPPERWORKS:		
Rotating Bed, complete with basic machinery, including drums, but not gantry, backhitch, front end attachments, counterweight, operator's module and catwalks	71,647	32,499
Gantry and Backhitch	4,879	2,215
Operator's Module	1,703	773
Catwalks	1,540	699
Removable Counterweight (2-piece):		
Inner	43,000	19,522
Outer	30,000	13,620
Total	73,000	33,142
Dragline Fairlead:		
Revolving Type	6,527	2,961
BOOM NO. 39A:		
Butt, 30′ (9.15m) less wire rope and pendants	5,213	2,367
Top, 40′ (12.20m) equipped with single-sheave upper point	5,760	2,615
Inserts:		
10′ (3.05m)	1,025	465
20′ (6.10m)	1,840	835
40′ (12.20m)	3,245	1,473
Wire Rope Guide	410	186

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

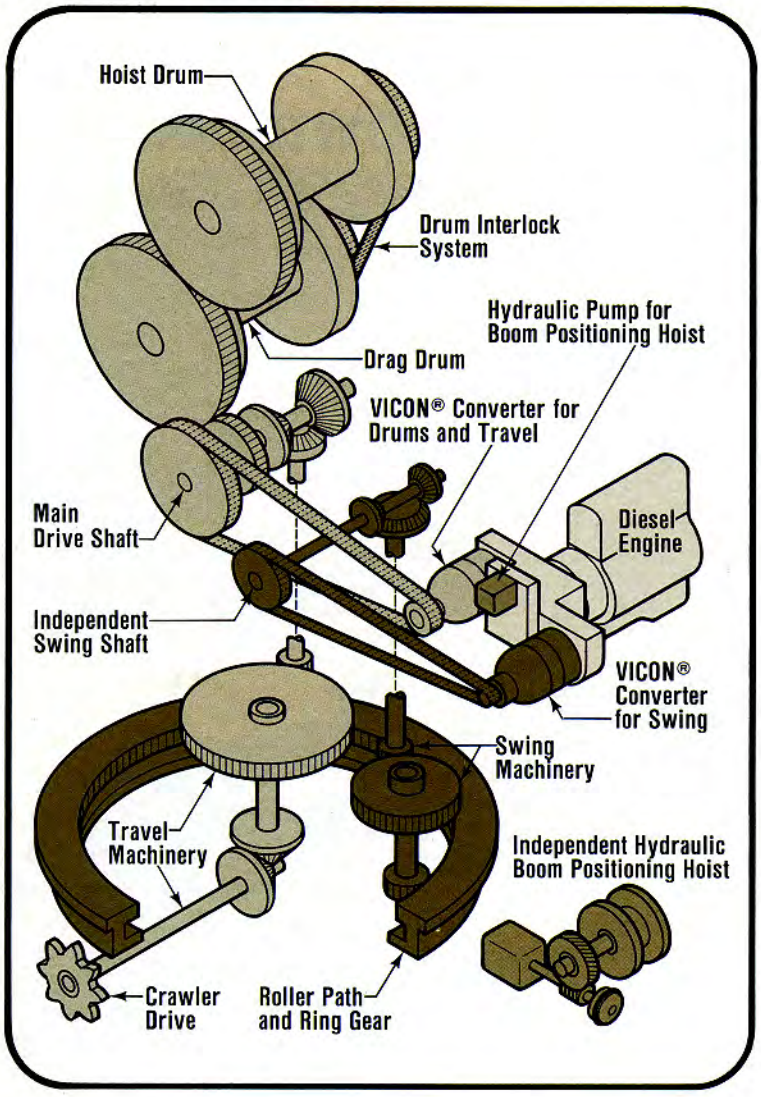
POWER PLANTS

	Model	Cylinder	Bore	Stroke	Cubic Inch Displacement	Net HP @ RPM (at flywheel)
BASIC	Cummins KT-1150-C450	6	6.250″ (159mm)	6.25″ (159mm)	1,150 (18,845cc)	420 @ 2,000
OPTIONAL	Caterpillar 3408 DITA	8	5.400″ (137mm)	6.00″ (152mm)	1,099 (18,009cc)	435 @ 2,000
	Detroit Diesel 12V-71N	12	4.250″ (108mm)	5.00″ (127mm)	852 (13,962cc)	420 @ 2,000
Air Compressor: 37.5 CFM. (1,062 Liters)					Fuel Tank Capacity: 211 Gallons (799 Liters).	

DRUMS AND LAGGINGS

TANDEM DRUM SHAFTS						
Application	**Drum**	**Diameter**	**Drum Width**	**Type of Lagging**	**Wire Rope Size**	**Single-Layer Spooling Capacity**
Drag	Front	27⅝″ (702mm)	29″ (737mm)	Grooved	1⅜″ (35mm)	121′ (36.9m)
Hoist	Rear	27⅝″ (702mm)	29″ (737mm)	Grooved	1⅛″ (29mm)	173′ (52.7m)

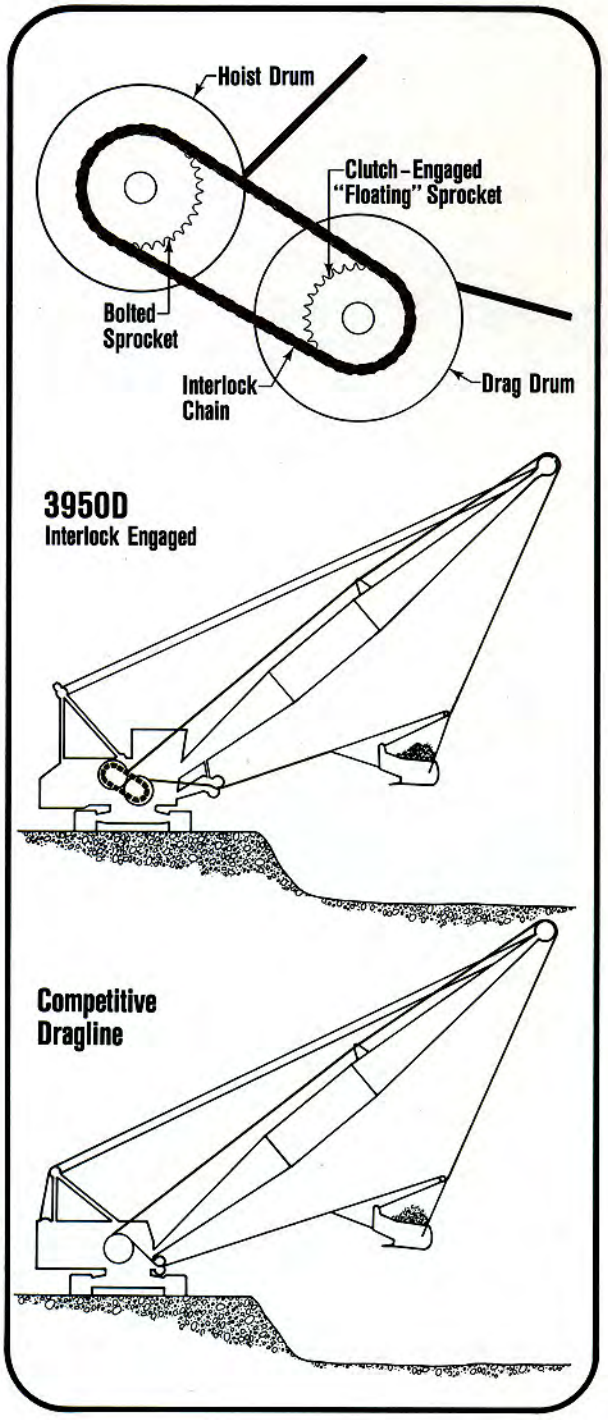
POWER TRAIN

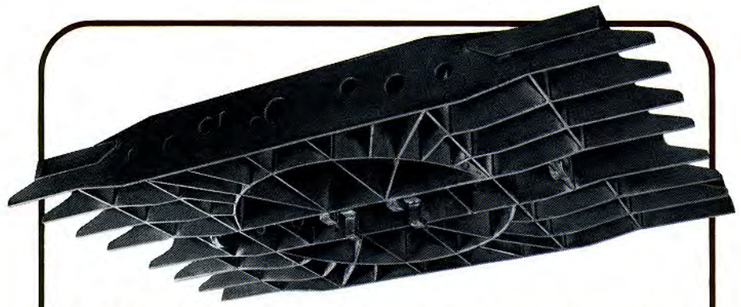


POWER TRANSMISSION, VICON®: Manitowoc's patented VICON (**V**ariable **I**ndependent **CON**trol) system provides stepless variable power transmission for major machine functions. Engine power is divided at transmission case to two controlled torque converters and a hydraulic pump. Front converter powers drums and travel machinery. Rear converter powers swing. Hydraulic pump powers independent boom positioning hoist. With VICON, clutches engage when little or no torque is transmitted from power source, virtually eliminating clutch slippage and wear. After clutch engages fully, controlled torque converter output is increased to provide infinitely-variable speed and torque.

DRAGLINE INTERLOCK

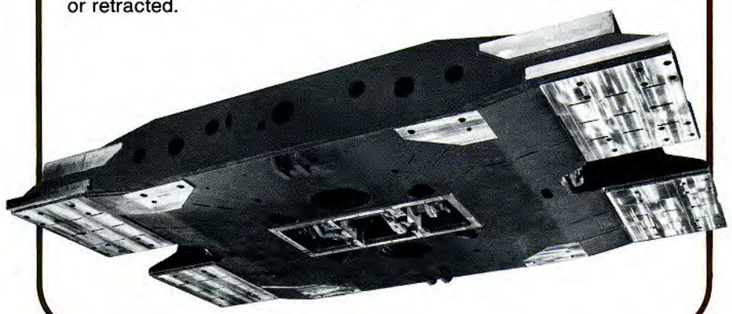
DRAGLINE INTERLOCK: Improves cycle speed, fuel economy, and parts life by eliminating drum brake riding. Interlock chain connects a sprocket floating on drag drum shaft with a sprocket bolted to hoist drum. Interlock is engaged when the operator applies a clutch that engages the floating sprocket to the drag drum. When engaged, interlock causes the drag and hoist drums to turn at the same speed in the same direction. As a result, drag rope pays out at same rate hoist rope spools in. Drag rope remains taut, bucket stays level, drag brake riding is eliminated. In addition, bucket tension on drag rope is transmitted through the interlock to hoist drum, reducing required hoist power and increasing hoisting speed for faster cycle times. Interlock also enables simultaneous lowering and in-hauling of bucket without hoist brake riding. Clutch may be disengaged at any time to cast.

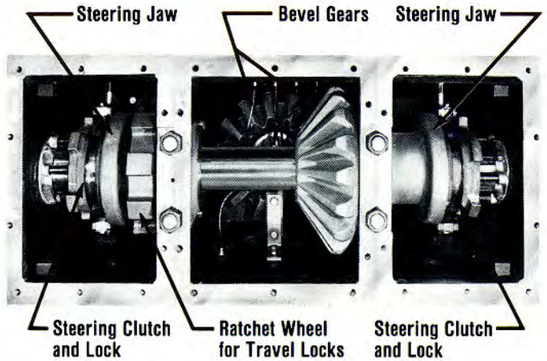




CARBODY: Single-piece, ribbed steel fabrication with integral side wings that transmit loads directly to crawler frames. Fabricated construction provides high strength-to-weight ratio. Carbody design transmits loads evenly from area beneath roller path to wings.

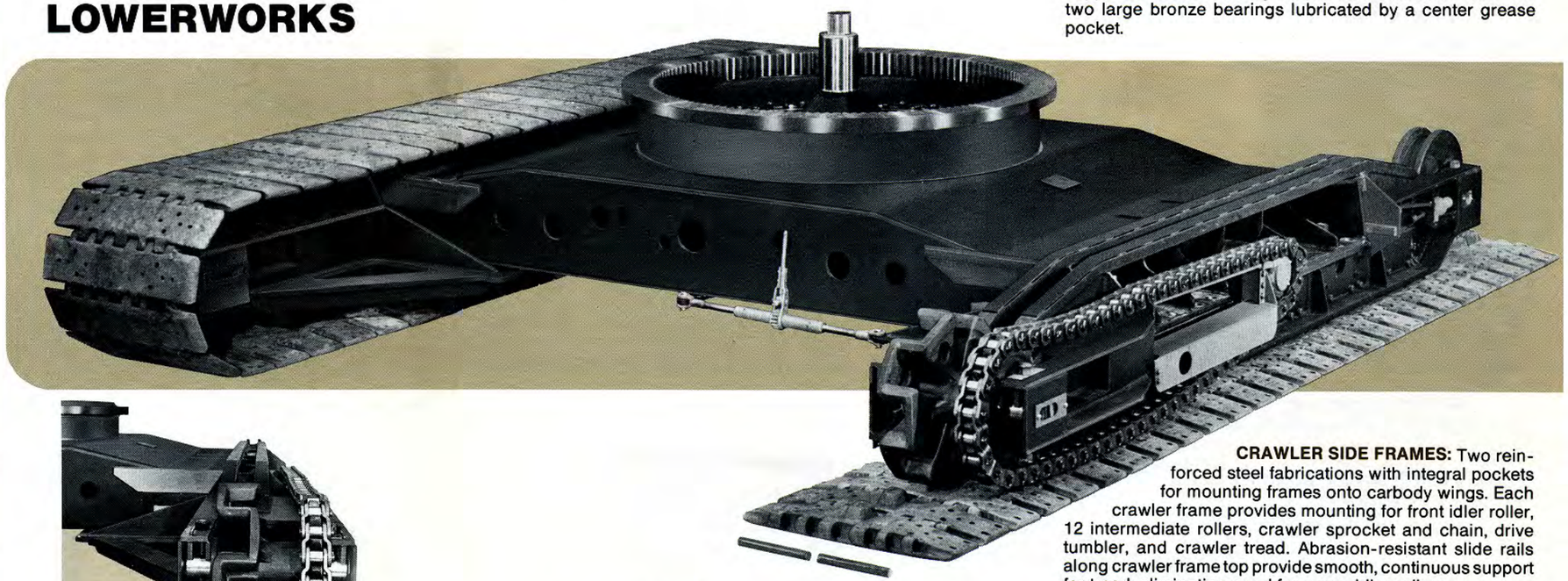
Finished carbody with welded bottom plate (below) shows machined wing surfaces that mate with integral pockets in crawler frames, providing rugged mounting and a low center of gravity. Wings are designed to maintain full bearing area whether crawlers are extended or retracted.

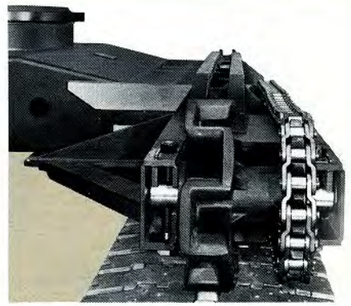




TRAVEL AND STEERING MECHANISM: Power transmitted from upperworks through vertical travel shaft to three-piece horizontal travel shaft, shown with covers removed. Bevel gears transmit power from vertical shaft to horizontal shaft and run in oil. Steering provided by air-controlled steering clutch-and-lock mechanisms located to each side of bevel gears. Both clutches engaged for straight travel; one clutch placed in neutral for gradual turns or locked position for sharp turns. Interlock prevents both clutches from being in neutral at same time. Ratchet wheel for travel locks located to left of bevel gears. Travel locks are two gravity-applied, air-released pawls that engage ratchet wheel. Engaging one pawl permits travel in one direction while preventing movement in opposite direction. Engaging both pawls prevents all travel.

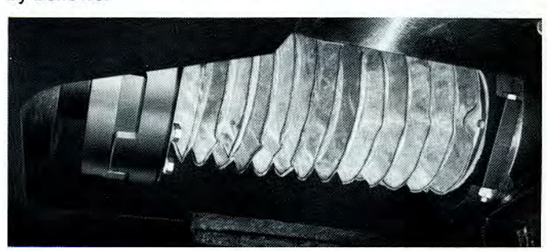
LOWERWORKS





CRAWLER SPROCKET AND TUMBLER: Transmit drive torque. Integral cast steel unit with flame-hardened sprocket teeth and tumbler rim. Mounted on stationary shaft supported at both ends by crawler frame. Sprocket and tumbler unit revolves on two large bronze bearings lubricated by center grease pocket. Self-cleaning tumbler has alternate sides open. Drive chain adjusted by positioning sprocket-and-tumbler support shaft with hydraulic jack, then inserting U-shaped shims to hold shaft in place.

JAW CLUTCH COUPLING: Jaw clutches on ends of travel shaft mate quickly with drive shafts in crawler frames and are locked securely in position with coupling covers. Crawler drive shafts are splined and telescope, permitting crawlers to be extended and retracted without uncoupling jaw clutches. Splined shafts are protected from dirt and moisture by bellows.



ROLLER PATH AND RING GEAR: Machined from heat-treated alloy steel casting. Roller path has 105⅝″ (2.68m) outside diameter, 6″ (152mm) width, and 3″ (76mm) thick hook roller flange. Integral internal ring gear has machine-cut teeth. Roller path secured to carbody with single row of high-strength bolts.

KING PIN: Machined steel fabrication. Secured to carbody with high-strength bolts. Provides support for vertical travel shaft and pivot for rotating bed. Mates with bronze bearing in rotating bed. Takes horizontal loads only, no uplift.

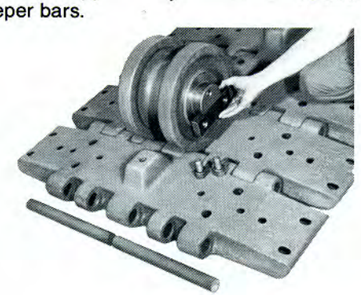
FRONT IDLER ROLLER: Double-flanged, fabricated steel roller mounted on 6¼″ (159mm) diameter stationary shaft supported at both ends by crawler frame. Roller revolves on two large bronze bearings lubricated by a center grease pocket.

CRAWLER SIDE FRAMES: Two reinforced steel fabrications with integral pockets for mounting frames onto carbody wings. Each crawler frame provides mounting for front idler roller, 12 intermediate rollers, crawler sprocket and chain, drive tumbler, and crawler tread. Abrasion-resistant slide rails along crawler frame top provide smooth, continuous support for tread, eliminating need for upper idler rollers.

CRAWLER DRIVE: Drive chain located on outside of each crawler frame. Drive sprocket self-contained within crawler frame and joined to horizontal travel shaft by jaw clutch coupling. Design allows crawler extension, retraction, and removal without separating drive chain or tread.

CRAWLER TREADS: 48″ (1.22m) wide, 52 pads per crawler frame. Adjacent pads connected by two high-carbon steel pins. Pads' closed design prevents them from carrying dirt up onto crawler frames.

INTERMEDIATE ROLLERS: Double-flanged, 14″ (356mm) diameter rollers, bronze bearing mounted on 4⅜″ (111mm) diameter stationary shafts. Bearings lubricated by center grease pocket. Rollers located in pockets along underside of crawler frame. Shaft ends supported by welded frames and held in place by keeper bars.



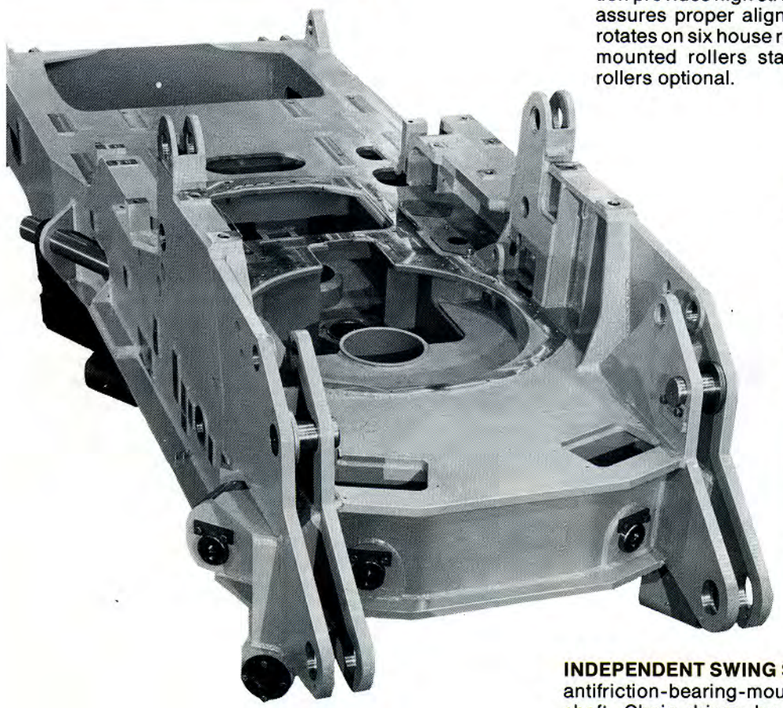
CRAWLER PADS: Constructed of cast alloy steel in closed box-section design with center driving lug. Heavy internal ribbing provides great pad strength, especially next to driving lug, where intermediate rollers bear. Bottom edges taper upward to minimize digging-in during turns.

TREAD ADJUSTMENT: Crawler tread easily adjusted by positioning front idler roller support shaft with hydraulic jack, then inserting U-shaped shims to hold shaft in place.

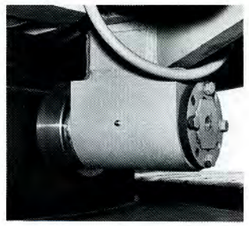
UPPERWORKS

REAR HOOK ROLLERS: Four bushing-mounted rollers supported in pairs by heavy steel hangers that pivot to equalize roller loads. Hangers spaced wide apart to provide stability. Rollers mounted on eccentric shafts for easy adjustment. Antifriction-bearing-mounted rollers optional.

ROTATING BED: Single-piece, welded-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 six house rollers: four front and two rear. Bushing-mounted rollers standard, antifriction-bearing-mounted rollers optional.

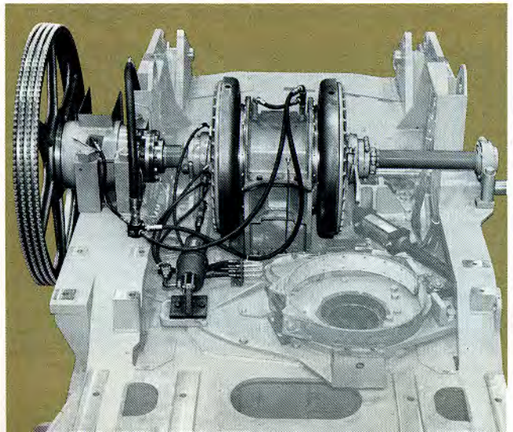


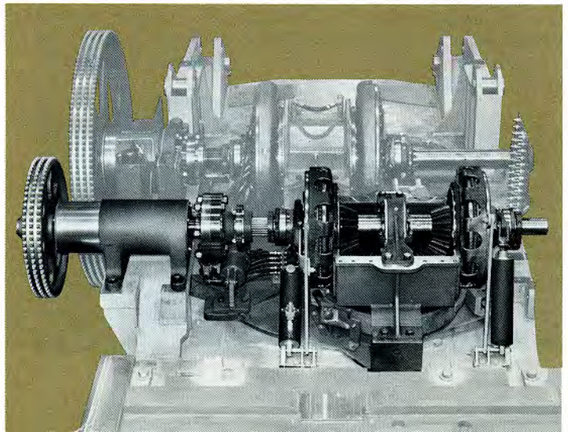
FRONT HOOK ROLLERS: Two bushing-mounted rollers supported individually by fabricated frames integral with rotating bed. Frames spaced wide to provide stability. Rollers mounted on eccentric shafts for easy adjustment. Antifriction-bearing-mounted rollers optional.



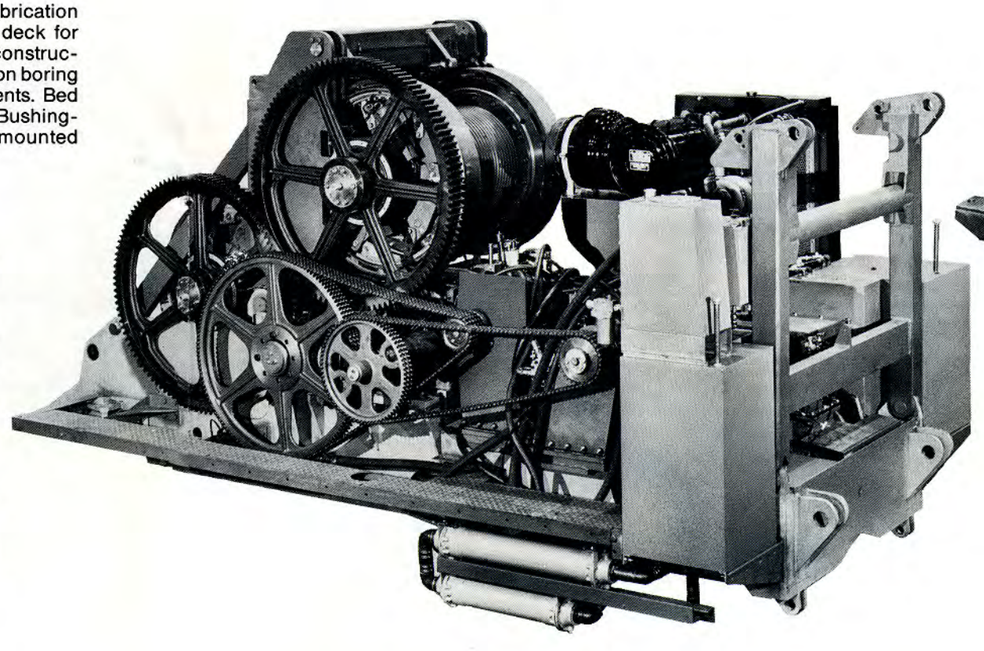
INDEPENDENT SWING SHAFT: Heat-treated, alloy-steel shaft, antifriction-bearing-mounted on rotating bed behind main drive shaft. Chain-driven by rear VICON converter. Powers two double-disc clutches that control swing direction. Clutch hubs are splined to shaft. Clutch spiders with integral bevel pinions, antifriction-bearing mounted. Clutches applied by air-actuated cam levers and released by springs. Lever faces are separated by antifriction roller bearings that minimize friction. Disc assemblies remove easily for lining replacement. Bevel pinions drive through gear train to ring gear on carbody. Spring-applied, air-released swing brake provided.

MAIN DRIVE SHAFT: Antifriction-bearing-mounted, alloy steel shaft. Chain-driven by front VICON torque converter. Pinion splined to shaft's left end drives front drum shaft. Large single-disc travel clutches at middle are air-applied, spring-released. One clutch is engaged for forward travel, the other engaged for backward travel.

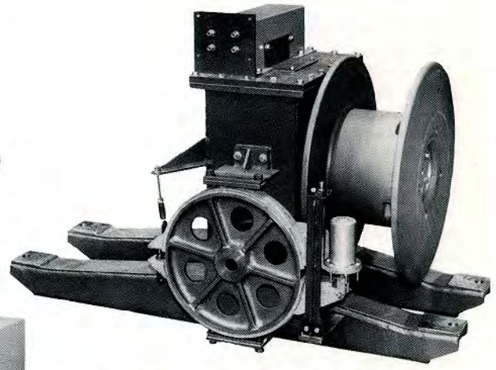




UPPERWORKS MACHINERY: Components fit compactly onto rotating bed. Right to left: boom positioning hoist, power plant with VICON® controlled torque converters and boom positioning hoist hydraulic pump, chain drives, independent swing shaft, main drive shaft, drum shafts, and A-frame center legs.

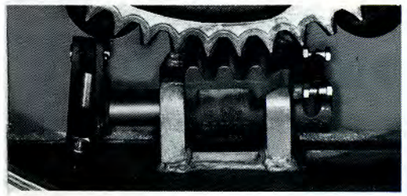


GANTRY AND BACKHITCH: Gantry is fabricated plate with parallel box-section legs. Supported on large pins by A-frame center leg. Backhitch is single-piece construction pin-connected to rear of rotating bed and gantry. All gantry sheaves bushing mounted.



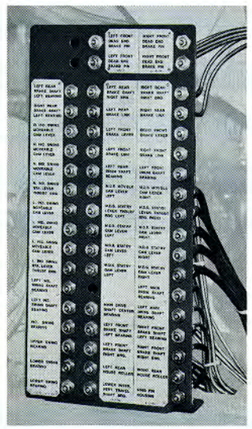
INDEPENDENT BOOM POSITIONING HOIST: Single drum mounted on heat-treated alloy-steel shaft. Driven by bronze worm and gear. All rotating shafts bushing mounted. Fully-enclosed gears run in oil. Boom hoist brake is external-contracting band-type, spring-applied, air-released. Ratchet and pawl enclosed inside gear housing. Ratchet mounted to worm gear; pawl gravity-engaged, air-released. Boom positioning hoist mounted in rear of rotating bed and powered by fixed-displacement hydraulic motor.

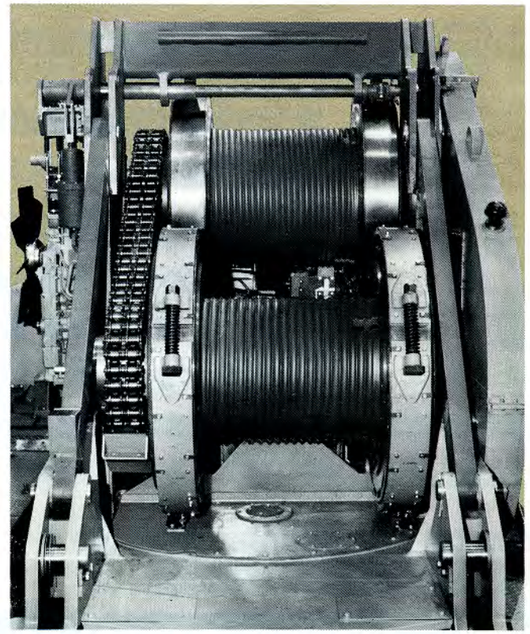
DRUM SHAFT ASSEMBLIES: Heat-treated alloy-steel shafts, antifriction-bearing mounted. Drums antifriction-bearing-mounted on shafts. Each drum is cast steel with bolt-on cast-iron combination clutch-and-brake flanges. Clutch spiders splined to shafts. Clutches, air-controlled, internal-expanding, band-type. Brakes are external-contracting, band-type, providing spring-set parking brakes and air-actuated service brakes.



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

CENTRALIZED LUBRICATION: Grouped grease fittings placed in easily accessible areas simplify lubrication and reduce maintenance time.





FRONT END EQUIPMENT

NO. 39A BOOM: 30' (9.15m) butt; 10' (3.05m), 20' (6.10m), and 40' (12.20m) inserts; 40' (12.20m) open throat top. Rectangular box-section design. All-welded construction with inverted-angle chords and tubular lacings. All sections 80" (2.03m) wide x 80" (2.03m) deep at pin-connected joints. Boom point has single, antifriction-bearing mounted, 36" (914mm) diameter sheave with cheek plate. Basic boom length 70' (21.35m); maximum length 120' (36.60m).

BOOM RIGGING: Single line reeved from boom positioning hoist through sheaves on gantry and boom top forms 8-part continuous rigging.

AUTOMATIC BOOM STOP: Boom butt contacts limit switch, stopping boom hoist operation when boom angle is less than 23° or more than 60° from horizontal. Manual override permits lowering boom to ground.

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. Induction-hardened tubing, antifriction-bearing mounted.

DRAGLINE FAIRLEAD: Suspended from boom butt and fixed with tapered pins to lugs on front of rotating bed. Full revolving frame with two antifriction-bearing-mounted sheaves. Rotates to provide proper fleeting of drag rope. Rope fully guided through frame by sheaves. Pins and sheaves bushing mounted for long life and easy maintenance.

RANGE DIAGRAM

Working ranges in table are based on following:

1. 'F' dimension based on 20' (6.1m) 'G' dimension.
2. 'D' dimension based on 14' (4.3m) level bottom to fill bucket and 'J' distance approximately 1/3 the dumping height 'F'. The two dimensions are also based on maximum drum capacity with one layer of rope. Front drum (drag) capacity — 121' (36.9m) of 1⅜" (35mm) diameter rope. Rear drum (hoist) capacity — 173' (52.7m) of 1⅛" (29mm) diameter rope. Maximum digging depths are attainable under ideal conditions and cannot be guaranteed.
3. Machines are equipped with wire rope to dig to a depth of 40' (12.2m), 50' (15.2m), 55' (16.8m), 60' (18.3m), 65' (19.8m) and 70' (21.3m) for boom lengths of 70' (21.3m), 80' (24.4m), 90' (27.4m), 100' (30.5m), 110' (33.5m) and 120' (36.6m) respectively.

GENERAL

MACHINERY HOUSE: Encloses upperworks machinery. Service doors on left side, roof, and front. Radiator shutter provided. Catwalks and railings, optional.

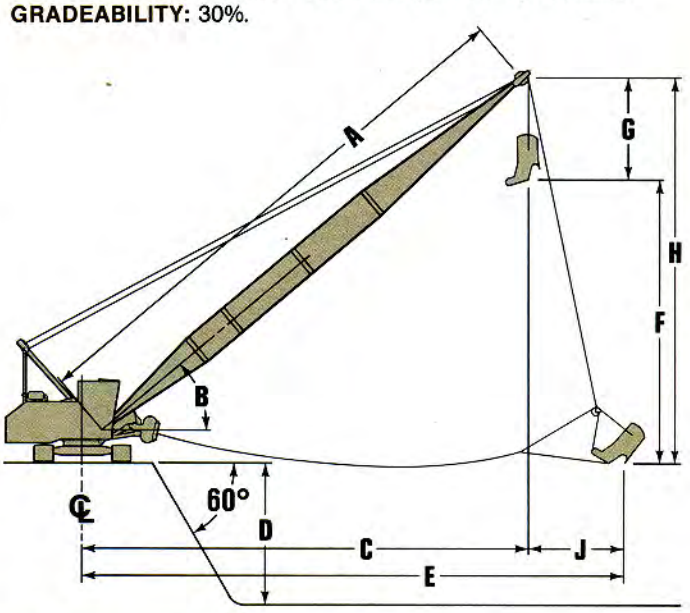
OPERATOR'S MODULE: Fully-enclosed, insulated module with large windows providing exceptional downward visibility. Mounted in elevated position at right front of rotating bed. Isolates operator from machinery noise. Signal horn standard; windshield wiper, fan, dome light, heater, and air conditioner optional.

CONTROLS: Modulating air controls operate all functions. VICON control levers for drums, travel, and swing operate both clutch and converter. First movement engages clutch; further movement increases converter output. Pedal-operated, air-applied drum brakes. Air-controlled travel locks and steering. Manually-controlled swing lock.

SWING SPEED: Variable, 5.00 RPM maximum.

TRAVEL SPEED: Variable, 1.25 MPH (2.01 KPH) maximum.

GRADEABILITY: 30%.



A Boom Length	Ft.	70			80			90			100			110			120		
	M	21.3			24.4			27.4			30.5			33.5			36.6		
B Boom Angle	Deg.	30	35	40	30	35	40	30	35	40	30	35	40	30	35	40	30	35	40
C CL Rotation To Center Dump	Ft.	69	65	62	78	74	69	86	82	77	95	90	85	104	98	92	112	106	100
	M	21.0	19.8	18.9	23.8	22.6	21.0	26.2	25.0	23.5	29.0	27.4	25.9	31.7	29.9	28.0	34.1	32.3	30.5
D Depth Cut (Approx.)	Ft.	49	42	35	64	56	49	79	71	62	94	85	75	96	99	88	88	93	85
	M	14.9	12.8	10.7	19.5	17.1	14.9	24.1	21.6	18.9	28.7	25.9	22.9	29.3	30.2	26.8	26.8	28.3	25.9
E Digging Reach (Approx.)	Ft.	77	75	73	88	86	83	97	96	93	108	105	103	119	115	112	128	125	122
	M	23.5	22.9	22.3	26.8	26.2	25.3	29.6	29.3	28.3	32.9	32.0	31.4	36.3	35.1	34.1	39.0	38.1	37.2
F Dumping Height	Ft.	24	29	34	29	35	41	34	41	47	39	46	53	44	52	60	49	58	66
	M	7.3	8.8	10.4	8.8	10.7	12.5	10.4	12.5	14.3	11.9	14.0	16.2	13.4	15.8	18.3	14.9	17.7	20.1
H Height, Grade To CL Boom Point	Ft.	44	49	54	49	55	61	54	61	67	59	66	73	64	72	80	69	78	86
	M	13.4	14.9	16.5	14.9	16.8	18.6	16.5	18.6	20.4	18.0	20.1	22.3	19.5	21.9	24.4	21.0	23.8	26.2
J Casting Distance	Ft.	8	10	11	10	12	14	11	14	16	13	15	18	15	17	20	16	19	22
	M	2.4	3.0	3.4	3.0	3.7	4.3	3.4	4.3	4.9	4.0	4.6	5.5	4.6	5.2	6.1	4.9	5.8	6.7

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

MANITOWOC ENGINEERING CO.
Division of The Manitowoc Company, Inc.
Manitowoc, Wisconsin 54220

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