

BRIDGE, GANTRY, AND MOBILE CRANES

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Abstract

In July of 1990, the author investigated the availability and cost of heavy lift equipment (predominantly mobile cranes) which might be used at the SSCL and reported the results to the Physics Research Division (Ray Stefanski) in a memorandum dated July 12, 1990. Subsequent to that investigation, information on the costs of gantry cranes was obtained and reported to the Physics Research Division (Ray Stefanski) in a memorandum dated September 17, 1990. In a continuing effort, additional information has been obtained on the probable dimensions of both single and double trolley bridge cranes and of gantry cranes. All of this information is consolidated in the attachments to this note.

Summary of Attachments

1. **MOBILE CRANE AVAILABILITY AND COST.**
Memorandum from Ron Hoffmann/Ted L. Mizutowicz to Ray Stefanski dated July 12, 1990, subject: Heavy Lift Equipment.
2. **GANTRY CRANE DIMENSIONS.**
Letter from Jim Nelson of Ederer Incorporated to Ron Hoffmann dated December 26, 1990, reference: Interaction Stations Gantry Cranes.
3. **GANTRY CRANE COSTS.**
Memorandum from Ron Hoffmann to Ray Stefanski dated September 17, 1990, subject: Cost of Gantry Cranes.
4. **BRIDGE CRANE DIMENSIONS**
Excerpts from Overhead Crane Handbook published by Whiting Corporation, fourth edition, 1979:
 - 5 TO 50 TON, PENDANT CONTROL; pages 38 through 51.
 - 10 TO 50 TON, CAB CONTROL; pages 52 through 63.
 - 60 TO 500 TON, PENDANT OR CAB CONTROL; pages 64 through 79
5. **BRIDGE CRANE DIMENSIONS, DOUBLE TROLLEY, 100 TO 300 TON.**
Excerpts from Overhead Crane Handbook published by Whiting Corporation, third edition, 1967, pages 38 through 41.

ATTACHMENT 1

MOBILE CRANE AVAILABILITY AND COST.

Memorandum

Ron Hoffmann/Ted L. Mizutowicz to Ray Stefanski

July 12, 1990

subject: Heavy Lift Equipment.

*Superconducting Super Collider Laboratory
2550 Beckleymeade, Building 4
Dallas, Texas 75237-3946*

Conventional Construction Division

TO: Ray Stefanski
FROM: Ron Hoffmann / Ted L. Mizutowicz
DATE: July 12, 1990
SUBJECT: Heavy Lift Equipment



INTRODUCTION

In accordance with your request we have investigated the availability and cost of heavy lift equipment. This memorandum summarizes our findings and is arranged by crane manufacturer or supplier with actual information obtained from them included in Appendices. Both rental cost and purchase cost are provided where they were obtainable. A summary table (Table G-1) of load capacities and costs is provided at the end of this memorandum. The rental costs are based on a 48-month rental period and include move-in and set-up charges. For rental periods of less than 48-months, the monthly rate will be higher.

A. NEIL F. LAMPSON, INC.

Lampson offers the "Transi-Lift" which is a patented crane configuration featuring the high capability characteristics of fixed stiffleg or luffing derrick equipment coupled with the mobility and flexibility of crawler cranes. The Lampson Transi-Lift (LTL) is capable of all lift crane functions including hoist, boom, swing, and travel with load.

The advantages claimed by Lampson for the LTL cranes are:

1. A mobile crawler crane with heavy lift capacity which is assembled from components readily transported by truck or rail.
2. LTL can be assembled and disassembled at a site away from the main construction area. Once assembled, it can move into position, perform scheduled lift and transport functions, and then move back to a designated storage area (or to another position where lift and transport functions can be performed for the construction of another detector).
3. LTL minimizes the necessity of expensive civil works such as foundation and rail systems.

Memo to: Ray Stefanski

July 12, 1990

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Lifting capabilities at various working radii are provided in Appendix A for different LTL models with different boom lengths. The load information is given in Kips, not tons; (1 Kip = 1/2 US ton).

Budget cost data was obtained as follows:

LTL 2000	Purchase \$ 13,500,000 including freight and set-up
	Rent \$ 290,000 / mo. including move-in and set-up
LTL 1500	Purchase \$ 11,500,000 including freight and set-up
	Rent * \$ 240,000 / mo. including move-in and set-up
LTL 1200	Purchase \$ 8,900,000 including freight and set-up
	Rent \$ 185,000 / mo. including move-in and set-up
LTL 900	Purchase \$ 4,800,000 including freight and set-up
	Rent \$ 95,000 / mo. including move-in and set-up
LTL 660	Purchase \$ 3,900,000 including freight and set-up
	Rent \$ 80,000 / mo. including move-in and set-up

The address and telephone number of the Lampson home office and nearest branch office are:

HOME OFFICE
607 East Columbia Drive
P.O.Box 6510
Kennewick, WA 99336
Phone:(509)586-0411

NEAREST BRANCH
Mr. Robert R. Jester
5315 Oates Road
Houston, Tx. 77013
Phone: (713)674-2531

B. MANITOWOC ENGINEERING CO.

Manitowoc's new crawler-mounted model 7200 crane provides maneuverability with 1000 ton lift crane capacity and 500 ton tower crane capacity. Lift - Tower versatility enables the 7200 to be field- converted from lift crane to tower crane, utilizing existing boom components. It should be noted that model 7200 is still under design, and that load capacities are preliminary and subject to verification by test. The numbers in Table G-1 were obtained from the manufacturer's representative.

Both Manitowoc's models 7000 and 6000 can be converted from the lift crane configuration to an X-tender configuration by adding a transporter, boom support and X-tender beam. However, budget cost information could not be obtained from Manitowoc for the 7000 or 6000 X-tender cranes. The author suspects that this may be due to a patent infringement dispute with Lampson.

Model 4600 S-4 Ringer is a high capacity, long-reach, ringer crane. The load capacities shown in Table G-1 agree with the data shown in Appendix B. Verbal information provided by the manufacturer's representative just prior to publication of this memorandum

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indicates an increase in capacity of about 15% at 50' and almost 100% at 125' and 200', but this has not yet been confirmed by published data.

The advantages claimed by Manitowoc for their cranes are:

1. All models are equipped with a VICON (Variable Independent Control) power transmission system for precise lowering of the load.
2. The crawlers demonstrate an easy maneuverability with a load.
3. Demonstrates heavy lift capacities for long boom applications.
4. The low ground bearing pressure and full 360 deg. swing of the ringer crane family eliminates the need for extensive ground preparation.
5. Modular design provides ease of shipment and fast set-up. All models comply with standard shipping width requirements.

Load capability information on Manitowoc Models 7200, 7000, 6000 & 4600-S4 Ringer is provided in Appendix B. Capacities are given in US pounds or thousands of US pounds (Kips), not in tons.

Budget cost data was obtained as follows:

7200 Lift	Purchase	\$ 9,000,000 including freight and set-up
	Rent	\$ 205,000 / mo.including move-in and set-up
7200 Tower	Purchase	\$ 10,000,000 including freight and set-up
	Rent	\$ 300,000 / mo.including move-in and set-up
7000 Lift	Purchase	\$ 4,500,000 including freight and set-up
	Rent	\$ 150,000 / mo. including move-in and set-up
6000 Lift	Purchase	\$ 3,600,000 including freight and set-up
	Rent	\$ 100,000 / mo. including move-in and set-up
4600-S4	Purchase	\$ 3,500,000 including freight and set-up
	Rent	\$ 70,000 / mo. including move-in and set-up

The address and telephone number of the Manitowoc home office and nearest branch office are:

HOME OFFICE

Mr. Stan Jensen
500 SO. 16 th Str.
P.O.Box 70
Manitowoc, Wisconsin 54221
Phone:(414)684-6621

NEAREST BRANCH

Martin Equipment Co.
Mr. Bob Martin, Jr.
P.O.Box 20338
Dallas,Tx.75220
Phone:(214)556-0910

C. CHICAGO BRIDGE & IRON CO.

ICHABOD is a rotating stiffleg derrick, believed by CB&I to be the largest of its type in the world. Rotation is accomplished by means of three carriages running on a pair of circular rails which are supported on a concrete ring beam. The crane is not movable. A description of the crane is included in Appendix C. The load capacities included in Table G-1 were obtained from a manufacturer's representative.

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The purchase price for ICHABOD is \$5,000,000 which includes freight and set-up on a foundation to be provided by the purchaser. The crane is not available for rent.

The address and telephone number of the Chicago Bridge & Iron Company home office and nearest branch office are:

HOME OFFICE
800 T. Jorie Blvd.
Oak Brook, IL 60521
Phone:(708)572-7000

NEAREST BRANCH
Mr. Jack Marwin
P.O.Box 690588
Houston,Tx. 77269
Phone:(713)896-3750

D. JAKE'S CRANE, RIGGING AND TRANSPORT INTERNATIONAL

A major portion of Jake's business is providing heavy haul transport services. Their hydraulic-over-nitrogen suspension system gives the JXS (Jake's eXtra Speed) unit the ability to react instantaneously to pavement deviations of up to 18 inches. For off-road hauling, the rear section of the system can be manually steered. The JXS system is designed to move payloads of up to 250 tons at highway speeds. A description of the JXS Super Heavy Hydraulic-Pneumatic Transporter is included in Appendix D1.

Jake's also provides cranes for heavy construction operations. Their American Model 11320 unit can be configured as a conventional crawler crane, as a tower crane, as a "Sky Horse", as a "Guy Horse", or as a "Guy Derrick". These configurations and load capacity tables for the conventional crawler, "Sky Horse", and "Guy Derrick" configurations are shown in Appendix D2. The load information is given in US pounds.

The advantages claimed by Jake's for their model AM 11320 cranes are;

1. Versatility and ease of conversion (1-2 days in the field) of the base lifting unit to the configuration best suited for the construction task .
2. Flexibility and mobility with a load when in the crawler configuration.
3. By utilizing one piece of lifting equipment for an entire project, the total cost is reduced and schedules are better controlled.

The base purchase price for the conventional model AM-11320, is \$1,800,000. A Sky Horse attachment can be added for another \$100,000 and the guy-line-system, boom and mast needed for the Guy Derrick configuration can be added for an additional \$100,000. These prices are budgetary costs and include freight and set-up charges.

Based on information obtained from Jake's, the budgetary rental cost, including move-in and set-up, is estimated to be \$30,000 per month for any one of the three crane configurations.

The address and telephone number of Jake's home office is:

HOME OFFICE
Mr. Kent Goodman
6109 S. Industrial Rd.
Las Vegas, NV 89118
Phone:(800)553-5253

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E. ANTHONY CRANE RENTAL OF TEXAS, INC.

Anthony Crane Rental of Texas, Inc. is a metroplex-based rental service for hydraulic, truck-mounted crane equipment with capabilities ranging from 2 to 450 tons. Anthony can also provide any make and model of crane on the market. The cranes are available operated or on a bare rental bases, with or without on-site maintenance service.

In collaboration with Mannesmann Demag Baumaschinen, a German-based crane design and manufacturing company, Anthony offers to provide the Demag CC-12000 crawler crane which is available in a number of configurations. Two configurations are shown in Appendix E along with their load capacity tables. In these tables, the loads are given in metric tons and the working radii are given in meters.

The advantages claimed by Anthony for the Demag CC-12000 crane are;

1. Quick assembly.
2. Optimal component transport weights and dimensions.
3. Sturdy lattice tubular construction of high-strength, fine grain steel. The stay ropes are replaced by rods of high-strength steel.

Based on information obtained from Anthony, the budgetary rental cost, including move-in, set-up, on-site maintenance, and operation, is \$600,000 per month for the SSL/LSL model and would be less for the SH/LH model.

The address and telephone number of the Anthony Crane Rental office is:

Mr. Samuel R. Anthony
5701 Denton Highway
Fort Worth, Tx. 76137
Phone:(817)498-2221

F. ENERPAC DIVISION OF APPLIED POWER, INC.

Enerpac Synchronous Strand Lift System is a system for lifting or lowering high tonnage by combinations of basic units which are integrated with the customers support system, such as a gantry structure or lift tower structure, to form a complete high tonnage material handling machine. The units operate on 0.6 inch diameter, grade 270, concrete prestressing strands, each strand having a load carrying capacity of 11 tons. Units are made to operate on 6, 8 or 12 strands having total capacities of 66, 88, and 132 tons respectively and are designated as models ST-66, ST-88, and ST-132. For purposes of load equalization, multiple units must be combined in numbers equal to a power of two (2, 4, 8, 16, etc).

The budgetary cost of a single ST-132 unit, including the hydraulic power supply and control system necessary to operate it, and start-up installer's expenses, is \$43,500. The system is not available for rent.

Technical data obtained on the Enerpac system is included in Appendix F. Because of the dissimilarity of this system with the other crane systems covered by this memorandum, the Enerpac Strand Lift System has been omitted from Table G-1.

The address and telephone number of the Enerpac home office and nearest branch office are:

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HOME OFFICE
P.O.Box 325
Milwaukee, Wisconsin 53201
Phone:(414)781-6600

NEAREST BRANCH
Mr. James Orr
8041 Mariners Drive #102
Stockton, CA. 95209
Phone:(209)951-4502

G. SUMMARY

Table G-1 provides a summary of the lifting capacities and estimated budgetary rental and purchase costs of the cranes.

cc J. Sanford
T. Toohig
R. Tenner
T. Lundin
C. Trimble
T. Mizutowicz
R. Hoffmann

**TABLE G-1
 CAPACITY AND COST SUMMARY**

COMPANY MODEL	CAPACITY IN TONS @			RENT \$/mo.	BUY \$
	50'	125'	200'		
Lampson					
LTL-2000, 120' stinger	1,997	1,587	1,075	290,000	13,500,000
LTL-1500, 80' stinger	1,305	997	581	240,000	11,500,000
LTL-1500, 120' stinger	1,275	1,082	814	240,000	11,500,000
LTL-1200, 80' stinger	1,056	783	450	185,000	8,900,000
LTL-1200, 120' stinger	1,053	918	622	185,000	8,900,000
LTL-900, 46' stinger	775	266	164	95,000	4,800,000
LTL-900, 65' stinger	846	406	258	95,000	4,800,000
LTL-660, 46' stinger	574	305	169	80,000	3,900,000
LTL-660, 65' stinger	560	354	222	80,000	3,900,000
Manitowoc					
S-7200, Lift Crane	1,000	400	150	205,000	9,000,000
S-7200, Tower Crane	500	250	100	300,000	10,000,000
S-7000, Lift Crane	292	115	61	150,000	4,500,000
S-7000, X-Tender	1,000	400	150	Note 1	Note 1
S-6000, Lift Crane	220	65	31	100,000	3,600,000
S-6000, X-Tender	750	641	222	Note 1	Note 1
4600-S4, Ringer	750	304	154	70,000	3,500,000
C B & I					
ICHABOD	1,000	450	150	Note 2	5,000,000
Jake's					
AM-11320, Crawler	108	30	11	30,000	1,800,000
AM-11320, Sky Horse	180	60	27	30,000	1,900,000
AM-11320, Guy Derrick	433	197	107	30,000	2,000,000
Anthony					
Demag CC-12000 SH/LH	948	237	91	<600,000	Note 3
Demag CC-12000 SSL/LSL	1,058	825	539	600,000	Note 3

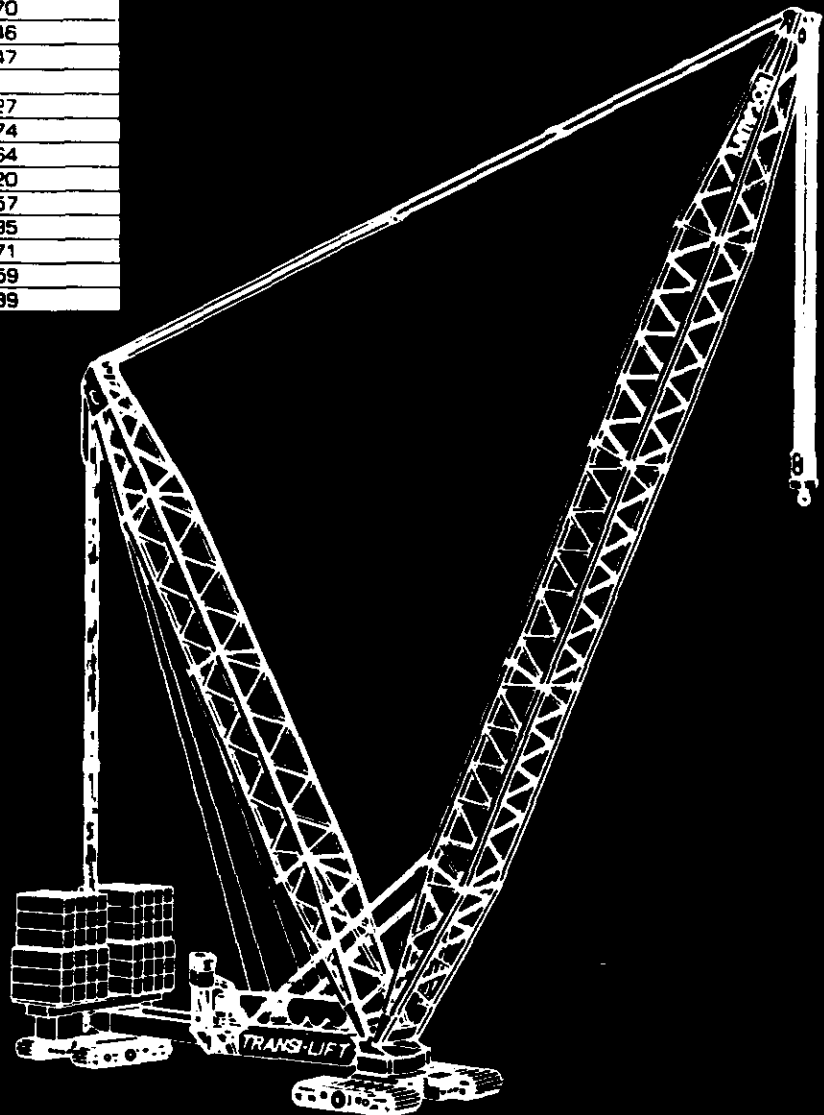
NOTES:

1. Information could not be obtained from Manitowoc.
2. This crane is not available for rent.
3. Anthony deals in crane rentals only.

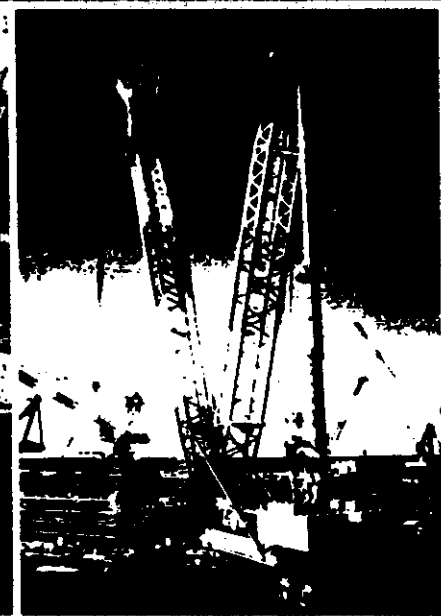
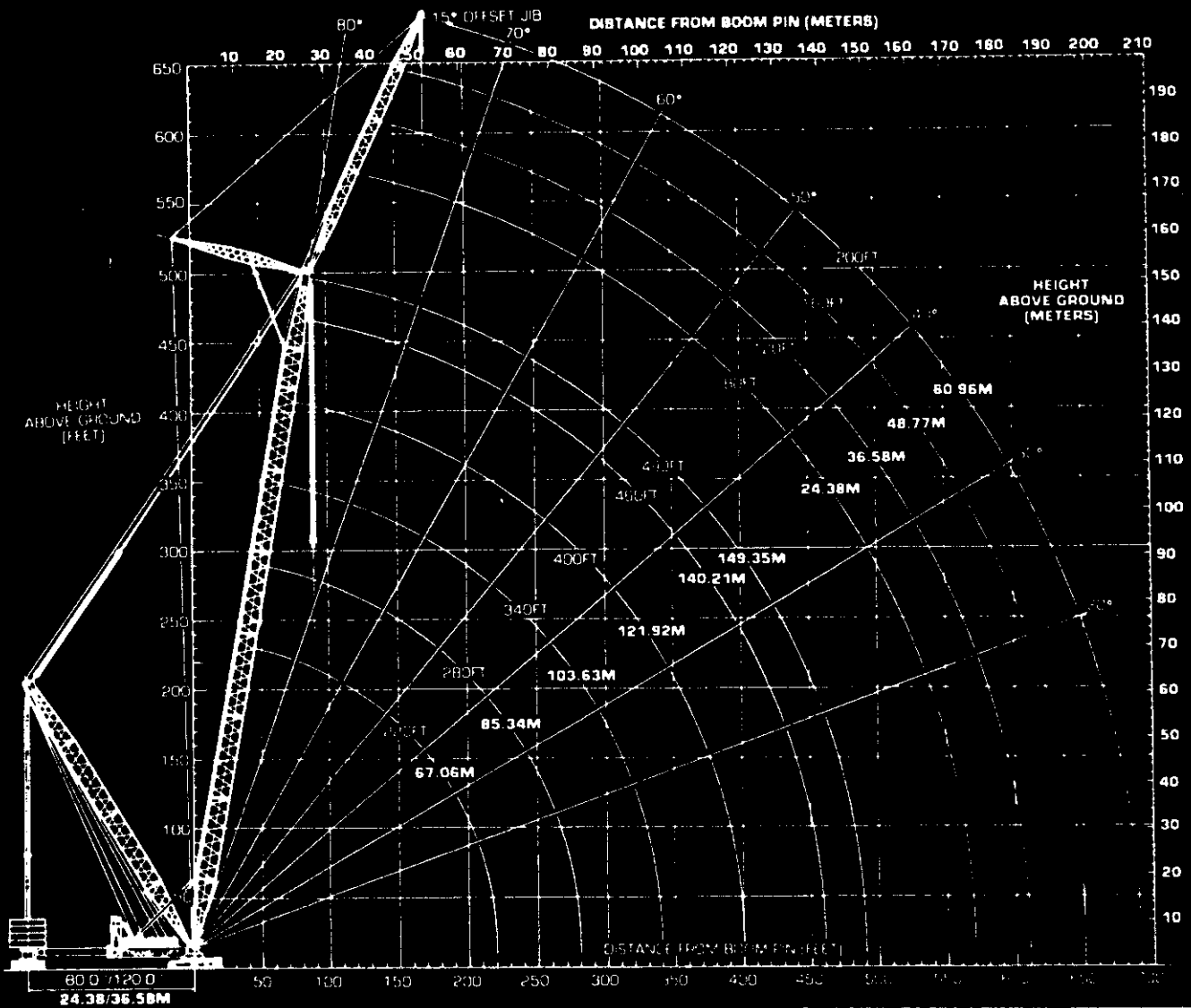
Boom Length Feet	Mast Length Feet	Load Radius Feet	Capacities - Kips
			Main Boom
			120 Ft. Stinger
2	2	50	3994
		100	3729
		150	2618
		200	1886
		250	1271
		280	794
3	2	62	3072
		100	2865
		150	2579
		200	2149
		300	1237
		340	657
4	2	72	2604
		100	2470
		150	2149
		200	1724
		250	1328
		300	970
4	2	350	646
		400	247
		88	1827
		100	1774
		150	1564
		200	1320
4	2	250	1057
		300	785
		350	571
		400	359
		450	139

The Lampson "Transi Lift" is a patented Crane configuration featuring high capacity characteristic of fixed stiffleg or luffing derrick equipment coupled with the mobility and flexibility of a conventional crawler crane. Transi-Lift is capable of all lift crane functions including hoist, boom, swing and travel with loads. Transi-Lift was innovated and developed by Lampson in response to ever increasing heavy lift load requirements associated with a rigging system imposing minimum impact and disruption to other construction job site work areas, activities and schedule. The unique Transi-Lift offers many advantages.

Transi-Lift's on the job site means substantial reduction of work interruption, saving in construction schedule and overall savings in time and money to the customer user. Lampson, one of the foremost Companies in the heavy rigging industry for over 35 years has developed this highly engineered tested and proven system to serve the construction industry throughout the world. This technically advanced equipment which offers unmatched construction efficiency and safety is now available.



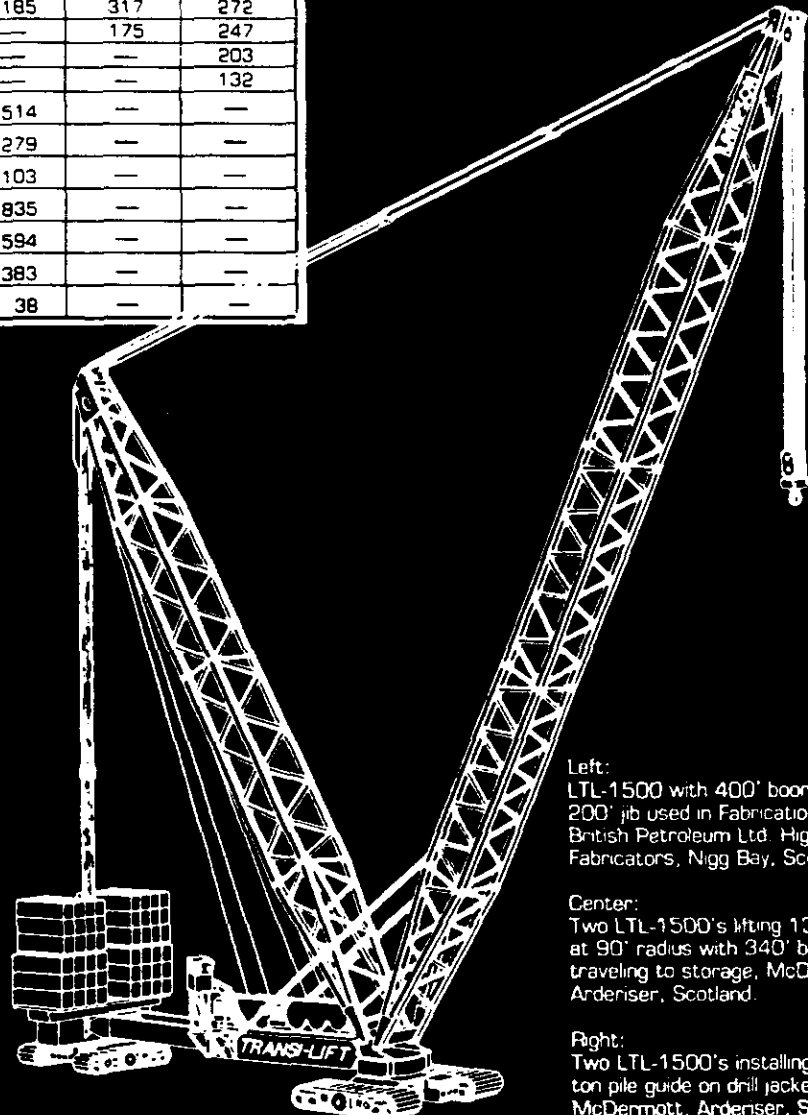
Cover and ins de photos
 Transi-Lift Series IV Model
 LTL 2000 handling loads at
 long radius, 340' main boom
 120' jib at Kashizaki
 Kanwa 5 (Nigata) site



Boom Length Feet	Mast Length Feet	Load Radius Feet	Capacities - Kips			
			Main Boom		Jib 15 Degree Offset	
			80 Ft. Stinger	120 Ft. Stinger	80 Feet	200 Feet
280	200	51	2610	2950	—	—
		100	2352	2298	—	—
		150	1634	2031	—	—
		200	1162	1627	—	—
		250	768	1062	—	—
340	200	280	529	596	—	—
		62	2287	2307	—	—
		100	2150	2152	675	—
		150	1606	1938	602	—
		200	1137	1614	549	—
400	200	300	632	904	427	—
		340	393	473	393	—
		72	1871	1955	—	—
		100	1754	1856	684	—
		150	1133	1616	623	407
430	200	200	773	1295	571	388
		300	418	729	466	341
		400	192	185	317	272
		450	—	—	175	247
		500	—	—	—	203
430	200	550	—	—	—	132
		78	—	1514	—	—
		150	—	1279	—	—
		200	—	1103	—	—
		250	—	835	—	—
430	200	300	—	594	—	—
		350	—	383	—	—
		430	—	38	—	—

The Lampson "Transi-Lift" is a patented Crane configuration featuring high capacity characteristic of fixed stiffleg or luffing derrick equipment coupled with the mobility and flexibility of a conventional crawler crane. Transi-Lift is capable of all lift crane functions including hoist, boom, swing and travel with loads. Transi-Lift was innovated and developed by Lampson in response to ever increasing heavy lift load requirements associated with a rigging system imposing minimum impact and disruption to other construction job-site work areas, activities and schedule. The unique Transi-Lift offers many advantages.

Transi-Lift's on the job-site means substantial reduction of work interruption, saving in construction schedule and over all savings in time and money to the customer/user. Lampson, one of the foremost Companies in the heavy rigging industry for over 35 years has developed this highly engineered tested and proven system to serve the construction industry throughout the world. This technically advanced equipment which offers unmatched construction efficiency and safety is now available.

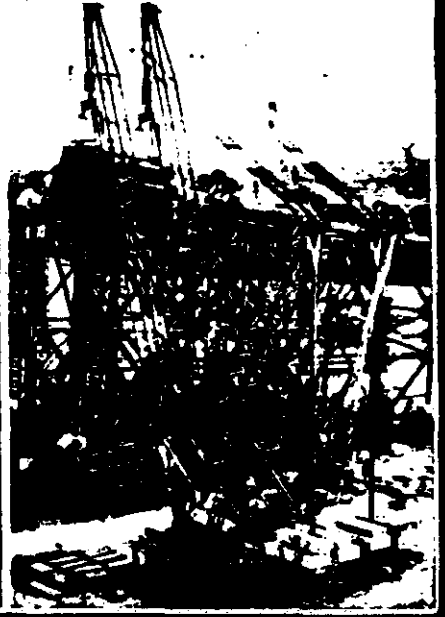
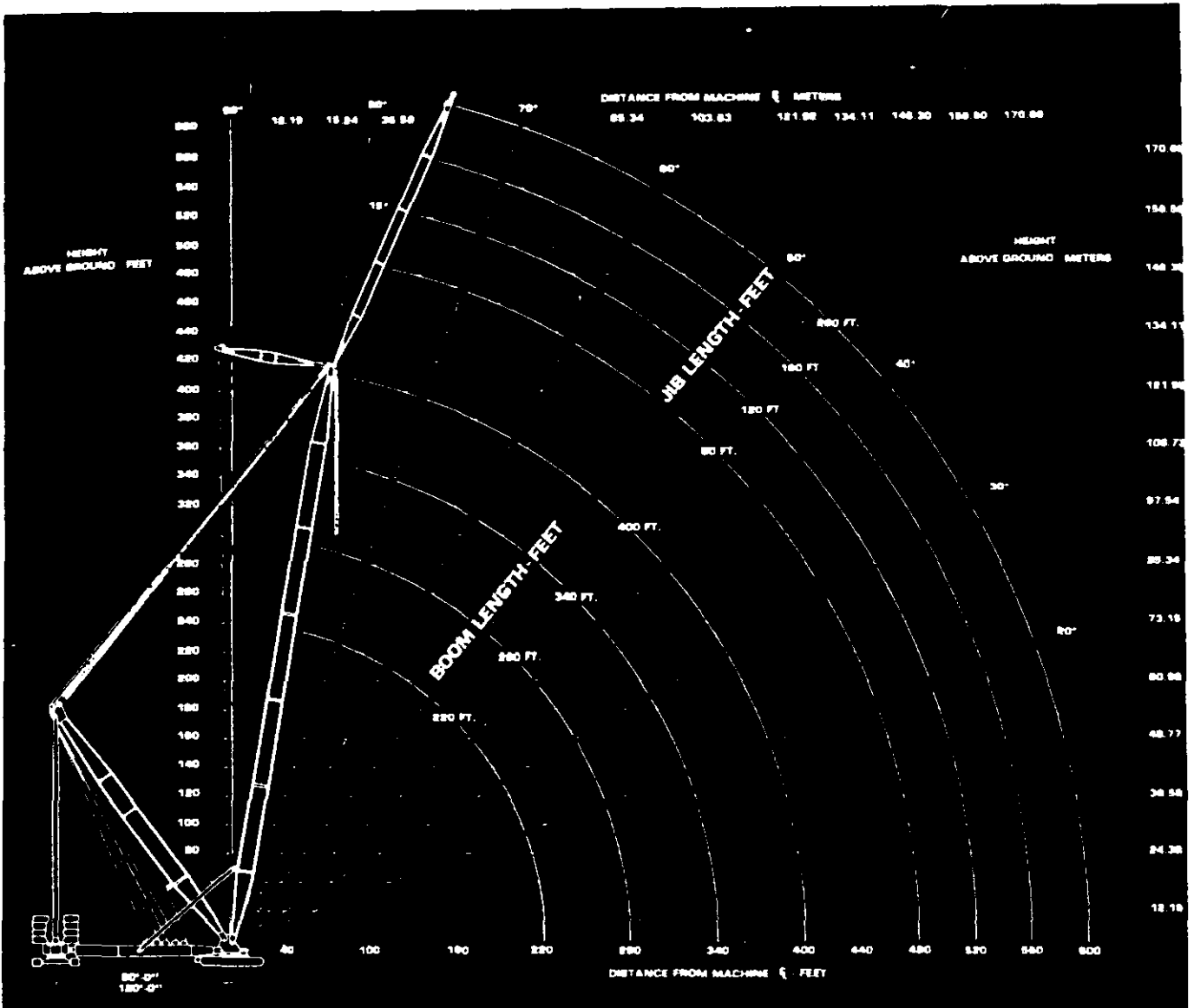


Left:
LTL-1500 with 400' boom and 200' jib used in Fabrication of British Petroleum Ltd. Highland Fabricators, Nigg Bay, Scotland.

Center:
Two LTL-1500's lifting 1300 tons at 90' radius with 340' boom traveling to storage, McDermott, Ardeniser, Scotland.

Right:
Two LTL-1500's installing 1300 ton pile guide on drill jacket, McDermott, Ardeniser, Scotland.

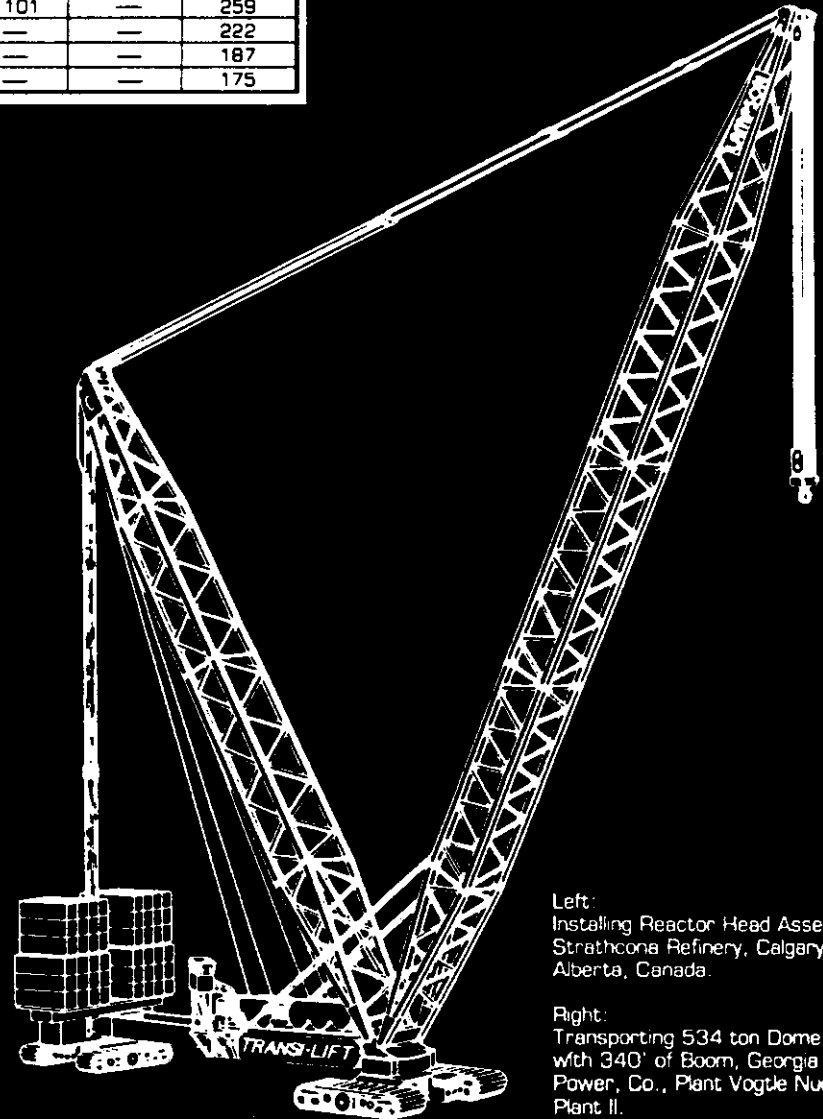
Cover:
Two LTL-1500's installing module on Tension Leg Platform, McDermott, Ardeniser, Scotland.



Boom Length Feet	Mast Length Feet	Load Radius Feet	Capacities - Kips			
			Main Boom		Jib 15 Degree Offset	
			80 Ft. Stinger	120 Ft. Stinger	120 Feet	200 Feet
280	190	51	2112	2105	—	—
		100	1945	1944	438	—
		140	1338	1771	404	—
		180	1000	1415	378	—
		280	501	513	337	—
		400	—	—	162	—
340	190	62	1779	1789	—	—
		120	1507	1577	—	—
		180	933	1372	—	—
		240	644	985	—	—
		300	469	691	—	—
		340	374	376	—	—
400	190	72	1489	1503	—	—
		100	1407	1418	—	—
		150	1133	1256	—	395
		200	823	1012	—	366
		300	468	557	—	319
		400	185	101	—	259
		450	—	—	—	222
		500	—	—	187	
		520	—	—	175	

The Lampson "Transi-Lift®" is a patented Crane configuration featuring high capacity characteristic of fixed stiffleg or luffing derrick equipment coupled with the mobility and flexibility of a conventional crawler crane. Transi-Lift is capable of all lift crane functions including hoist, boom, swing and travel with loads. Transi-Lift was innovated and developed by Lampson in response to ever increasing heavy lift load requirements associated with a rigging system imposing minimum impact and disruption to other construction job site work areas, activities and schedule. The unique Transi Lift offers many advantages.

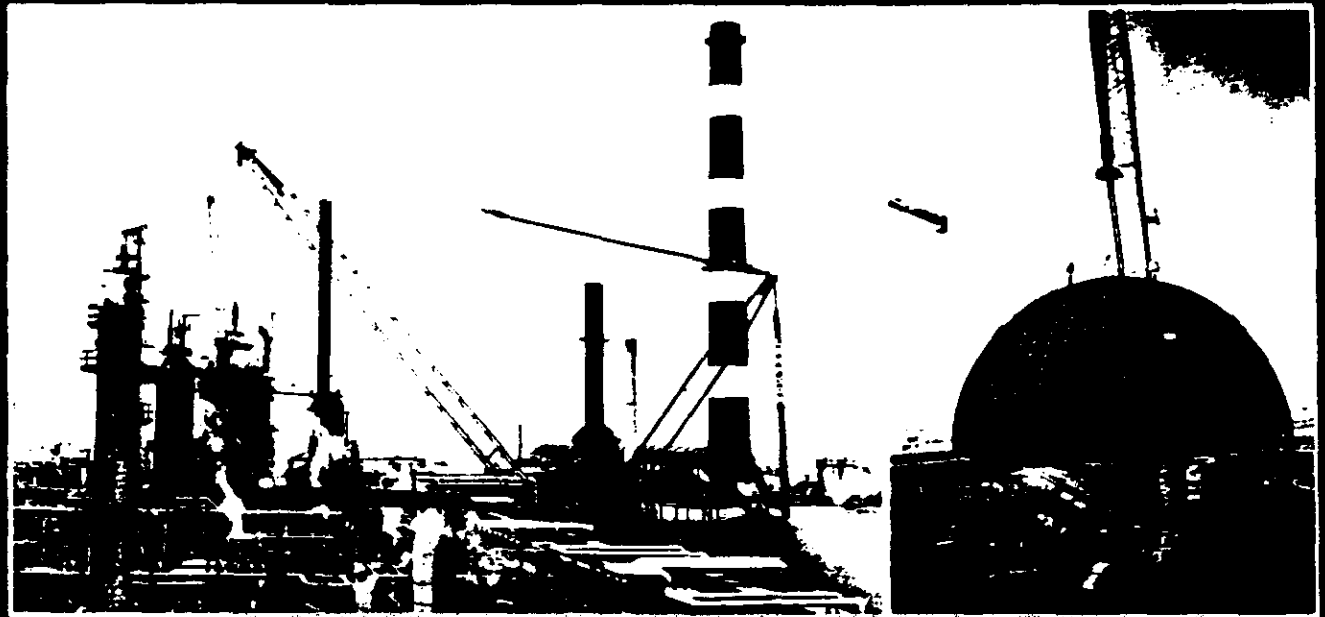
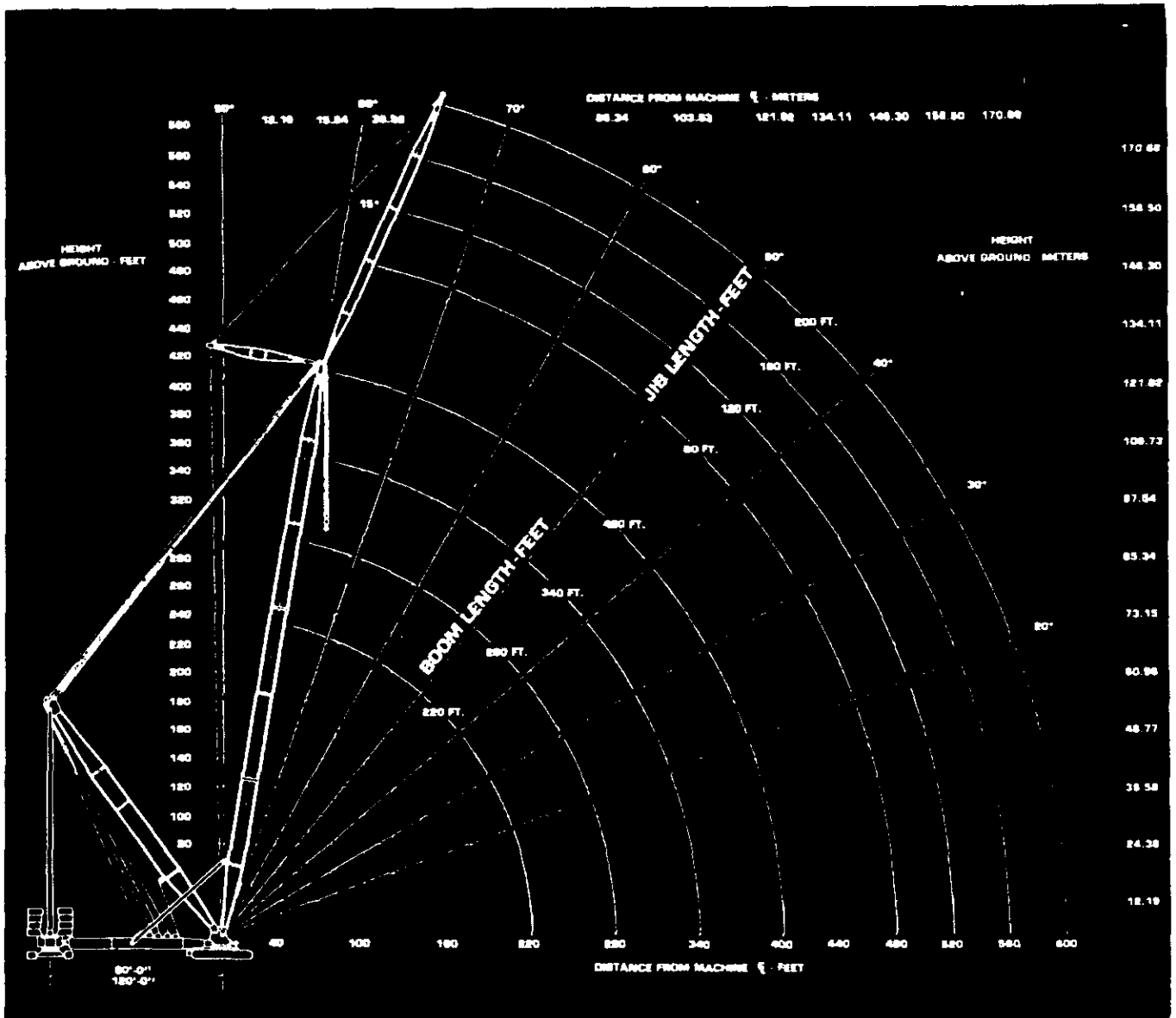
Transi Lift's on the job site means substantial reduction of work interruption, saving in construction schedule and over all savings in time and money to the customer/user. Lampson, one of the foremost Companies in the heavy rigging industry for over 35 years has developed this highly engineered tested and proven system to serve the construction industry throughout the world. This technically advanced equipment which offers unmatched construction efficiency and safety is now available.



Cover:
LTL-1200 with 280' Boom, 190' Mast, removing a Module Base, 680 ton lifted load picked at a 200' radius, Swan Island, Portland, OR.

Left:
Installing Reactor Head Assembly Strathcona Refinery, Calgary Alberta, Canada.

Right:
Transporting 534 ton Dome Liner with 340' of Boom, Georgia Power, Co., Plant Vogtle Nuclear Plant II.



MODEL LTL-900

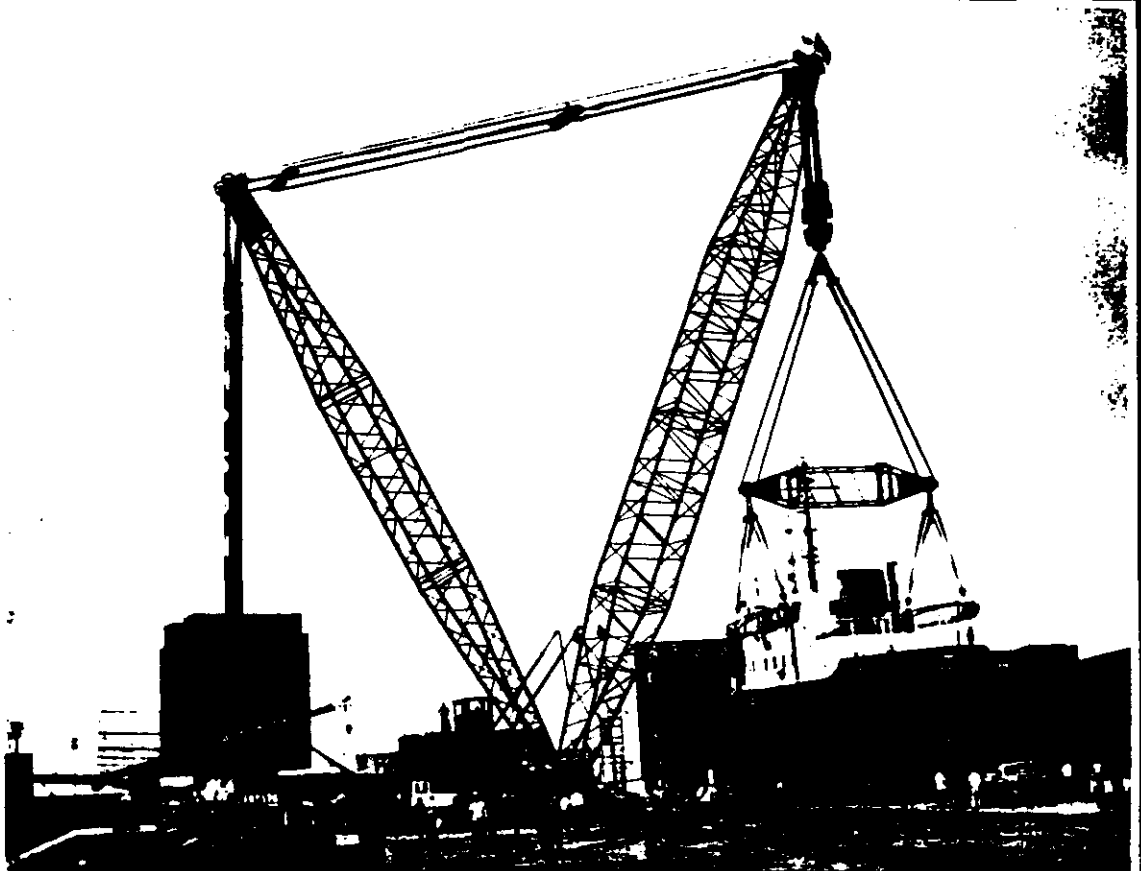
BOOM LENGTH FEET	LOAD RADIUS FEET	CAPACITIES IN (000'S)			
		MAIN BOOM		JIB(S)	
		46 FT. STINGER	65 FT. STINGER	120 IN / 7' 6" 12' OFFSET	120 IN / 7' 6" 6' OFFSET 80 IN / 6' 8" 10' OFFSET
160	30	1797	1803	-	-
	55	1487	1665	-	-
	80	998	1130	313	-
	105	702	735	262	42
	130	430	465	219	36
	160	225	200	189	31
280	50	989	1000	-	-
	90	581	898	335	-
	140	510	775	263	40
	190	348	543	212	33
	240	252	408	176	28
	280	197	239	139	25
400	80	496	486	-	-
	140	430	440	198	45
	220	261	329	178	34
	280	176	250	138	29
	340	121	175	96	25
	400	78	82	70	22

The Lampson "Transi-Lift[®]", Model LTL-900, is a patented mobile crane configuration featuring high capacity characteristics of fixed stiff leg or luffing derrick equipment coupled with the mobility and flexibility of a conventional crawler crane. Transi-Lift is capable of all lift crane functions including hoist, boom, swing and travel with loads. The present Transi-Lift product line consists of a family of designated models with rated capacities from 350 to 2000 short tons under U.S. mobile crane codes and standards.

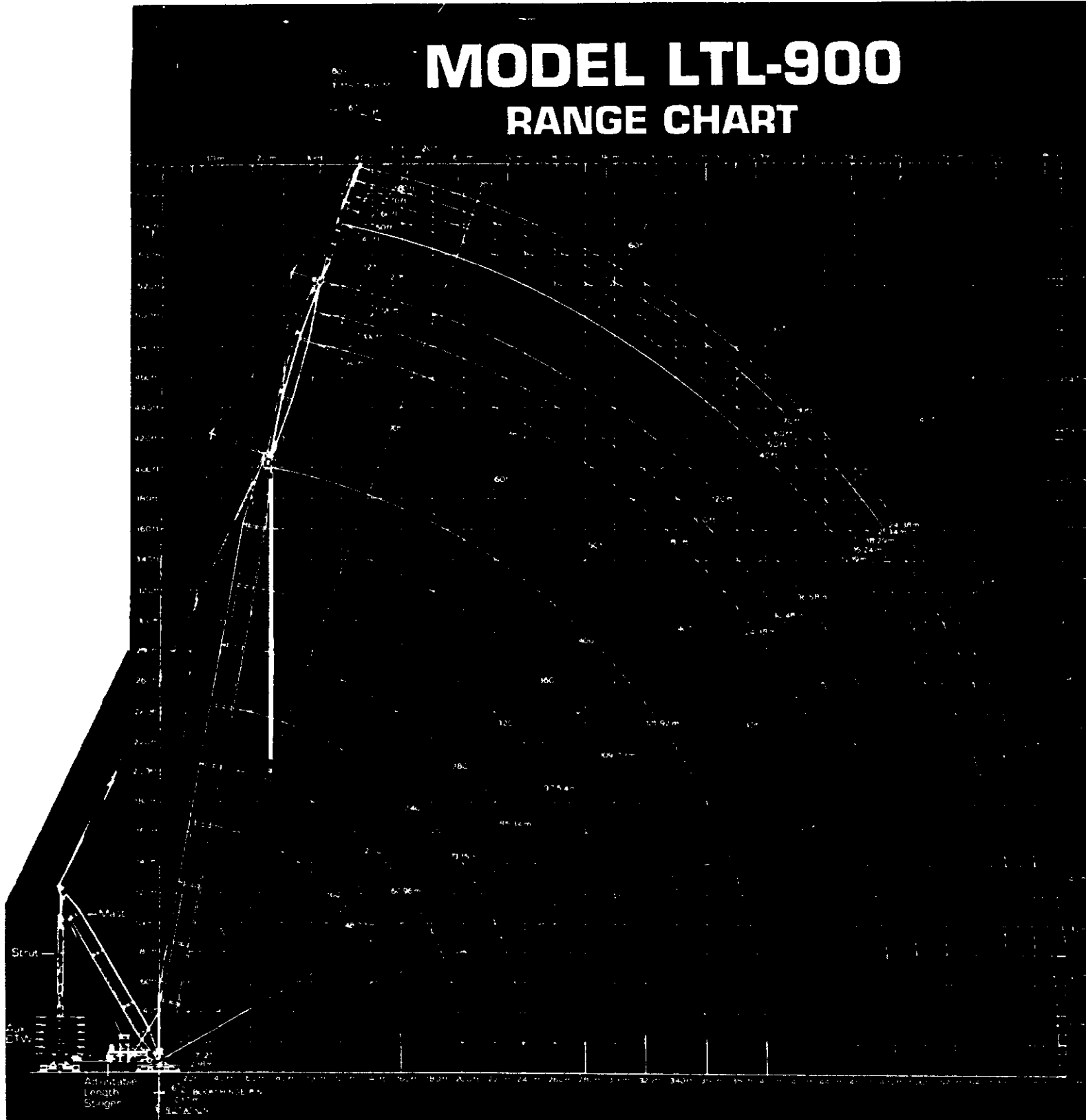
The Model LTL-900, with a nominal capacity of 900 short tons, is a technically advanced mobile crane with all pin-connected beam and mast structure requiring less time to assemble and disassemble. Entirely designed and manufactured by Lampson, the LTL-900 crane components can be transported entirely by truck over the interstate system for quick and efficient movement. Outfitted with a suitable multi-drum hoist, the LTL-900 provides heavy lift capabilities from either the main boom or jib with exceptional reach and elevation, and yet retains a compact configuration to minimize area required.

NOTE: Mast Length 130 Feet

Below: LTL 900 launching a 662 ton U.S. Coast Guard Icebreaker Tug "Sturgeon Bay," National City, CA



MODEL LTL-900 RANGE CHART

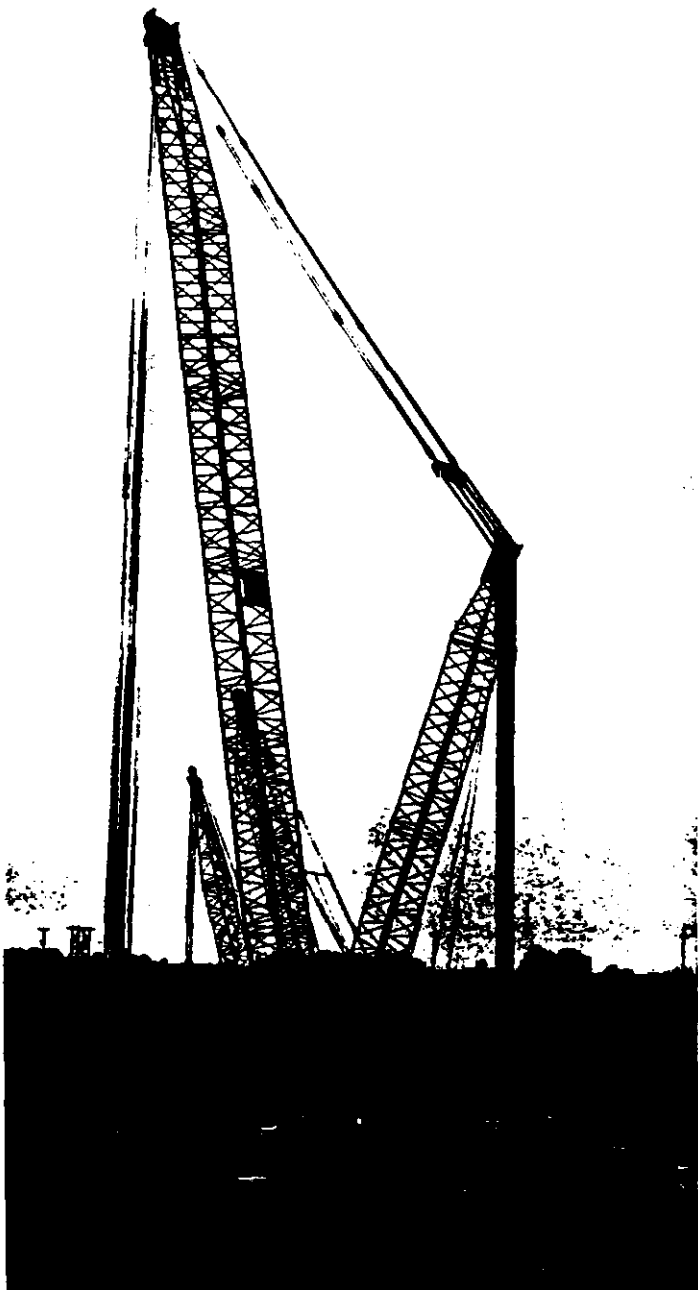


Cover: LTL-900 Erecting 750 ton reactor vessels,
Regina, Saskatchewan, Canada

Back: LTL 900 with 1000 ton test load, Lampson
facilities, Pasco, WA

The Lampson "Trans-Lift", Model LTL-660, is a patented mobile crane configuration featuring high capacity characteristics of fixed stiff leg or luffing derrick equipment coupled with the mobility and flexibility of a conventional crawler crane. Trans-Lift is capable of all lift crane functions including hoist, boom, swing and travel with loads. The present Trans-Lift product line consists of a family of designated models with rated capacities from 350 to 2000 short tons under U.S. mobile crane codes and standards.

The Model LTL-660, with a rated capacity exceeding 600 short tons, uses lattice boom and mast sections taken from conventional crawler cranes and mounted on Lampson designed and manufactured undercarriages and associated components. Equipped with either a three or four drum hoist, the LTL-660 provides exceptional capabilities and versatility in performing a wide variety of construction project lift assignments with safety and efficiency.



BOOM LENGTH FEET	LOAD RADIUS FEET	CAPACITIES IN (000'S)			
		MAIN BOOM		JIB(S)	
		46 FT. STINGER	66 FT. STINGER	120'x27'x8 12'-OFFSET	120'x27'x8 6' OFFSET 80'x25 10'-OFFSET
140	25	1203	1192	-	-
	45	1158	1134	-	-
	65	1117	1079	-	-
	90	889	1010	-	-
	115	662	858	-	-
220	140	432	481	-	-
	40	825	850	-	-
	80	724	735	338	-
	110	675	674	275	-
	145	521	613	226	-
300	180	405	553	191	-
	220	271	334	163	-
	60	470	480	-	-
	130	389	417	224	-
	165	361	389	229	38.1
400	220	301	338	196	31.7
	275	231	286	168	27.1
	300	203	258	122	25.5
	70	267	295	-	-
480	135	201	220	-	-
	200	168	178	-	-
	265	146	148	-	-
	330	128	122	-	-
	385	109	96	-	-

NOTE: Mast height 130 feet

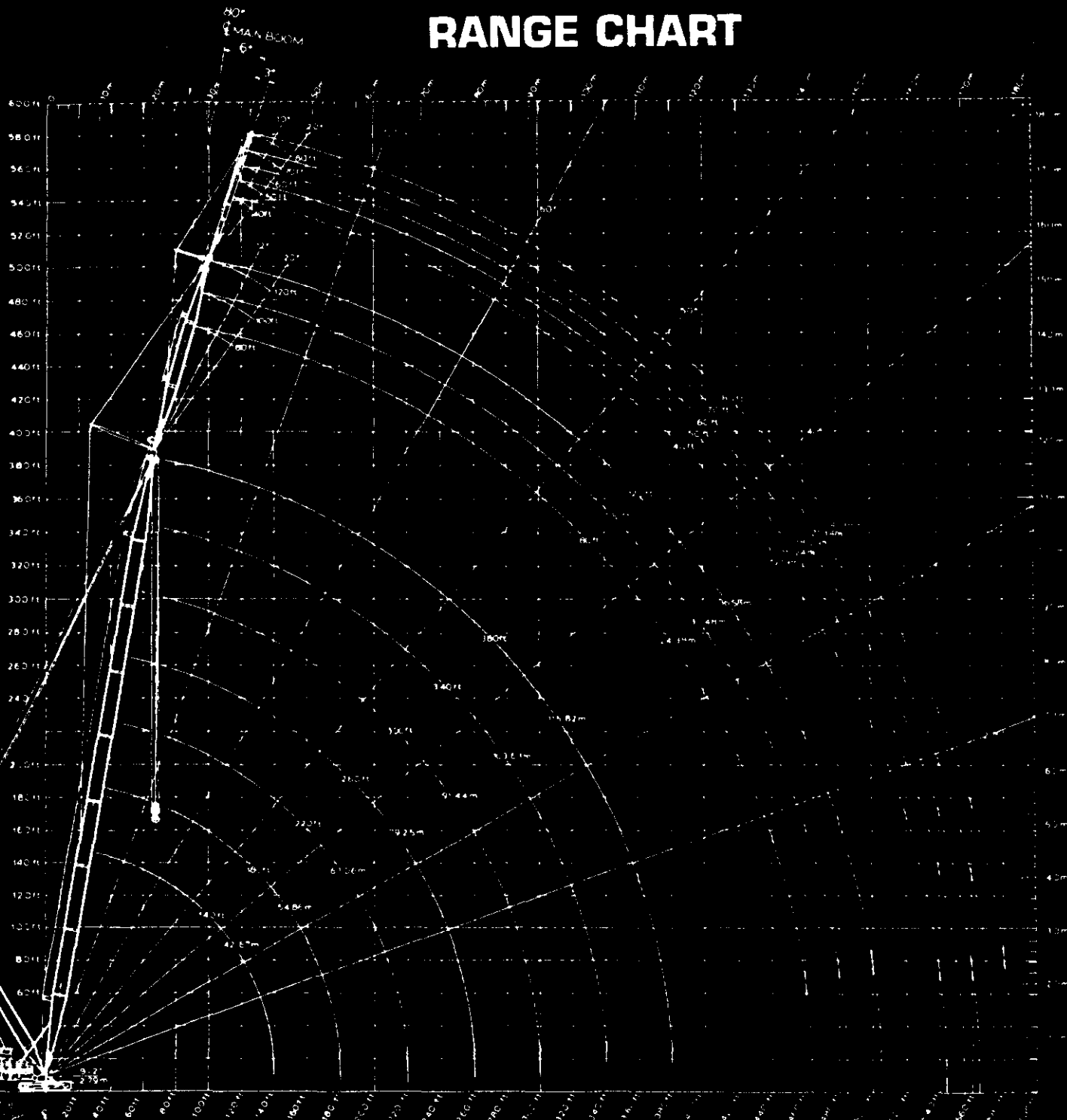
Cover: LTL-660 at Refinery Project - Western Wyoming

Back: Model LTL-660 at a California refinery handling a 150 ton reactor head at 181 foot radius with 320' of boom

Left: LTL-660 with 275 ton test load at Lampson's facilities - Pasco, WA

MODEL LTL-660

RANGE CHART



NEW

FROM MANITOWOC

MODEL

7200

Manitowoc's new, crawler-mounted Model 7200 has lifting capabilities that far exceed our largest present models (see graphs next page). The first 7200 was purchased with tower assembly, prior to completion, thanks to Manitowoc's time-proven reputation for reliability, innovative design leadership, and quality construction.

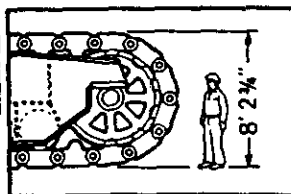
- **FIELD-PROVEN COMPONENTS AND DESIGNS...**the 7200 uses many standard Manitowoc components, proven dependable through years of service on other models.
- **MOBILITY...**independently-powered, counter-rotatable crawlers provide outstanding maneuverability for a crane of this size.
- **VICON®...**Manitowoc's patented power transmission system.
- **MODULAR DESIGN...**provides ease of shipment and fast set-up. All modules comply with standard shipping width requirements.
- **LIFT-TOWER VERSATILITY...**enables the 7200 to be field-converted from liftcrane to towercrane utilizing existing boom components...providing added owner economies. Manitowoc's Model 7200 tower design patented under U.S. Pat. No. 4,194,638 and other U.S. and foreign applications pending.

For complete information on the Model 7200, contact Dept. 8236: MANITOWOC ENGINEERING CO., division of The Manitowoc Company, Inc., Manitowoc, WI 54220, USA.



®CADAM is a registered trademark of Lockheed Corporation.

Left: Manitowoc's design and engineering of the 7200 was greatly accelerated by the firm's recently-installed CADAM® system, now being operated three shifts daily.



1,000-TON

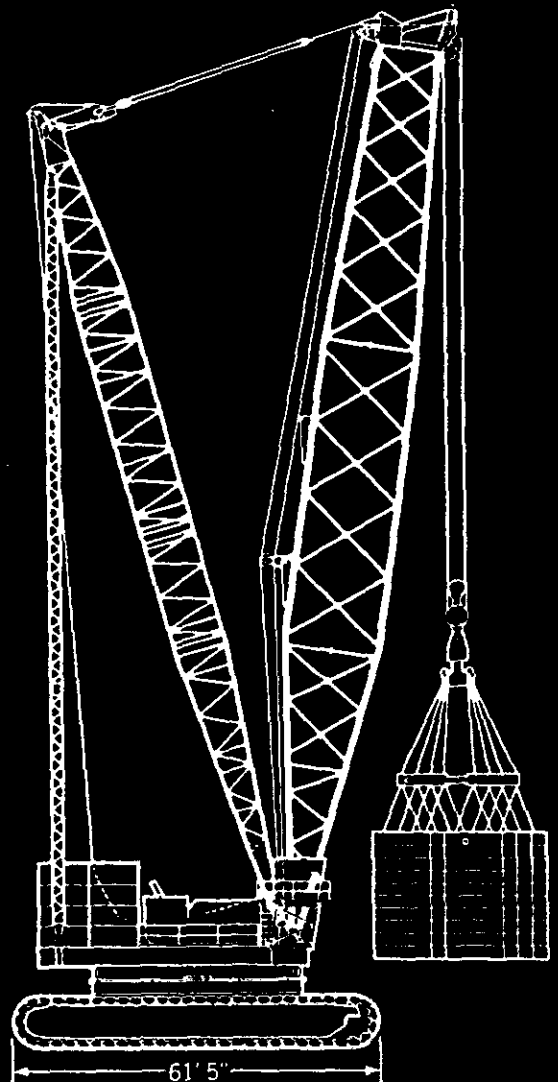
CAPACITY LIFTCRANE

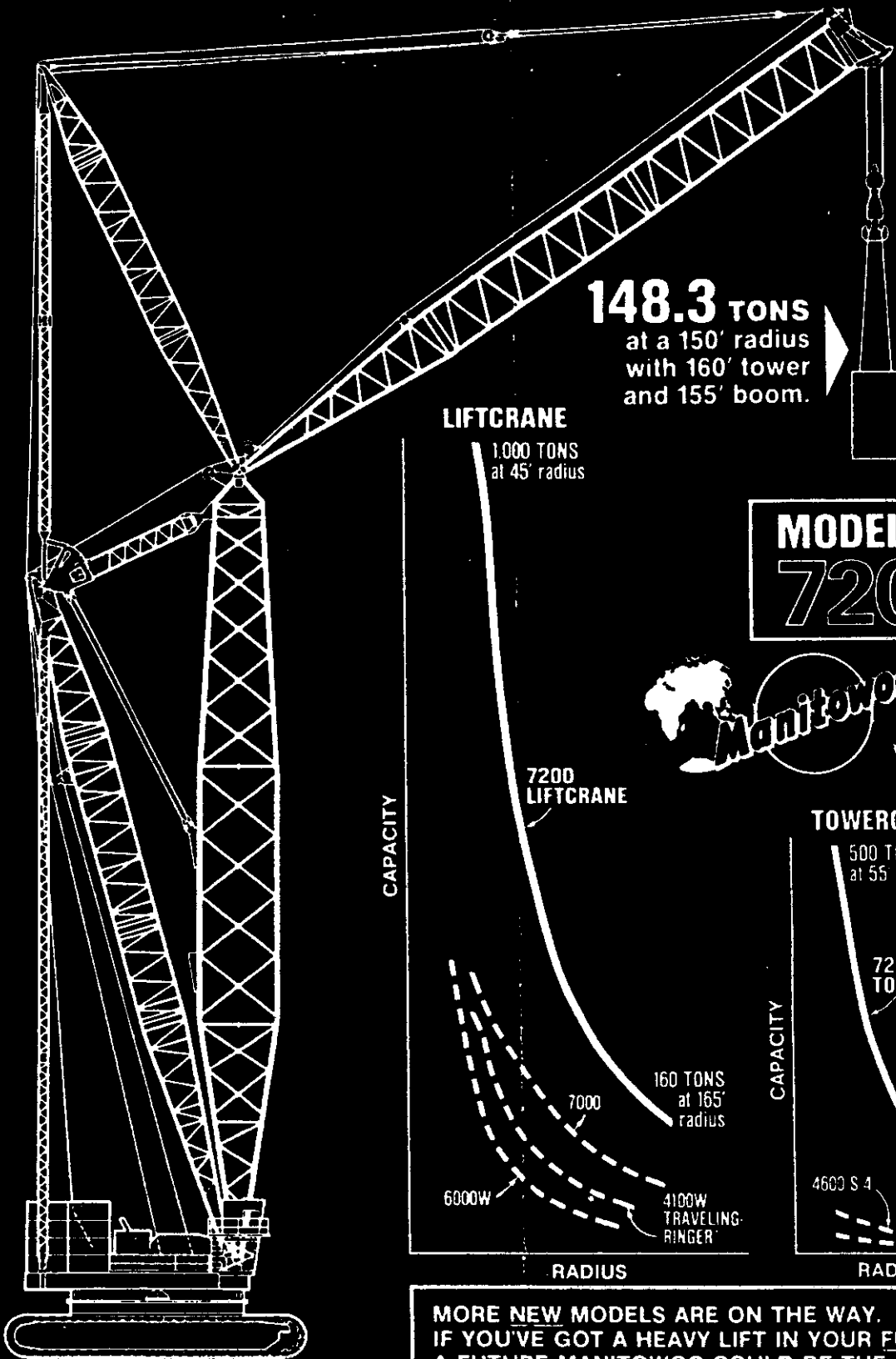
155' boom at 45' radius

500-TON

CAPACITY TOWERCRANE

160' tower, 155' boom at 55' radius





148.3 TONS
 at a 150' radius
 with 160' tower
 and 155' boom.

LIFTCRANE

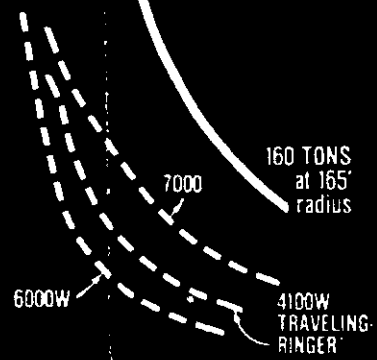
1,000 TONS
 at 45' radius

**MODEL
 7200**



CAPACITY

7200 LIFTCRANE



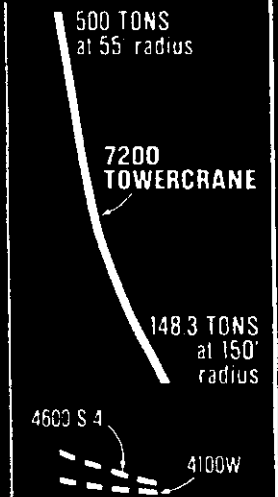
RADIUS

TOWERCRANE

500 TONS
 at 55' radius

CAPACITY

7200 TOWERCRANE



RADIUS

**MORE NEW MODELS ARE ON THE WAY.
 IF YOU'VE GOT A HEAVY LIFT IN YOUR FUTURE,
 A FUTURE MANITOWOC COULD BE THE ANSWER!
 CALL US FOR A MEETING • 414-684-6621**

MANITOWOC ENGINEERING CO.

MACHINERY MANUFACTURING DIVISION OF THE MANITOWOC COMPANY, INC.
500 So. 16TH STREET - P. O. BOX 70 - PHONE 684-6621 AREA CODE 414
MANITOWOC, WISCONSIN 54220

Model 7200 — Liftcrane and Towercrane

Preliminary Specifications 6-1-82

Reference:

Drawings SK-5908 and SK-5909, dated 2/18/82
Model 7200, Outline Dimensions dated, 2/19/82
Preliminary Capacity Charts:
Liftcrane, dated 2/18/82
Towercrane, dated 4/9/82

Model 7200 with 1,000-ton nominal liftcrane rating and 500-ton nominal towercrane rating. Lowerworks includes modular carbody with 36" diameter roller path, two crawler assemblies, and dual diesel engine crawler drive. Upperworks includes sectional rotating bed, diesel-powered load hoist, hydraulic swing system and boom hoist, operator's module, counterweight, 140' mast, and liftcrane or towercrane attachment.

LOWERWORKS

CARBODY: Two transverse beams with integral front and rear 36" diameter ring segments pin-connect to crawler frames; two longitudinal beams with integral side ring segments pin-connect to transverse beams; three diagonal beams pin-connect to transverse beams to support king pin.

CRAWLERS: 61'5" long with fabricated 6" diameter dual sprocket drive tumbler, front idler roller, and sixteen intermediate rollers. Treads 9" wide with 59 pads per crawler frame. Pads weigh approximately 3,800 pounds each, have 24" pitch, and adjacent pads form sockets for double-sprocket drive.

POWER PLANT ASSEMBLY: Two Caterpillar 3406 DITA diesel engines (375 HP @ 2,100 RPM) provide independent drive to each crawler. Each engine drives through a hydraulic torque converter, two-speed power shift transmission, and double planetary reduction to dual sprocket drive tumbler.

UPPERWORKS

SECTIONAL ROTATING BED: Heavy-duty weldment including wide front section for boom or tower and mast support and rear section for mounting load hoist and boom hoist. Front section includes large equalized antifriction bearing mounted house and hook rollers, operator's module support, and swing motor mountings. Rear section includes large antifriction bearing mounted house and hook rollers, counterweight supports, backhitch supports, catwalks, and king pin bushing.

LOAD HOIST: VICON® (Variable Independent CONTROL) equipped Manitowoc Model 560 hoist with wide/narrow split rear drums and full width front drum. Each rear drum equipped with air clutch and air brake; front drum equipped with two air clutches and air brakes. Hoist power plant includes Caterpillar 3412 DIT diesel engine (630 HP @ 2,000 RPM), 11,500 series VICON controlled converter, and transmission case with hydraulic pumps for boom hoist, swing, and full range VICON power load lowering. Also included are fuel tank, radiator, electric starting, air compressor, engine shroud, and instrumentation and control assembly.

INDEPENDENT BOOM HOIST: Grooved dual drums on alloy steel shaft. Driven through gear and pinion reduction by alloy steel worm shaft and bronze worm wheel. All rotating shafts are antifriction bearing mounted; all gears are fully enclosed and run in oil. Boom hoist powered by variable displacement hydraulic motor, providing full-

range speed control. Boom hoist main brake external-contracting band-type, air-released, air-applied, and spring-set. Auxiliary brake external-contracting band-type, air-applied and air-operated from operator's module. Ratchet on boom hoist drum flange, with pawl mounted on gear housing. Boom hoist pinned to rotating bed.

SWING SYSTEM: Eight (8) Swing-drive® units, pivot mounted, with pinions engaging ring gear. Pitch (backlash) controlled by pinion flange and gear segment skirt. Control system includes neutral "free-float", and selector for high speed — low torque using four swingers for light loads; or high torque — low speed using eight swingers for heavier loads. Swing brake at each motor. Air-applied, spring-set positive swing lock.

OPERATOR'S MODULE: Fully enclosed and insulated module mounted on front section of rotating bed. Includes control consoles, instrument panels, tinted safety glass windows, heater, window wiper, horn, defogging fan, and catwalks and handrails to machinery platform.

MAST: 140' No. 63 boom, including service ladder and removable platform, tower erecting sheaves, connections for tower tie frame, and fixed lattice-type backhitch. Includes manually operated jack to engage locking pins for mast and strut connections (tower attachment).

COUNTERWEIGHT: Estimated 1,034,000 pounds for liftcrane and tower operation. Optional interlocking steel boxes filled with steel and concrete. Boxes may be customer furnished and/or filled.

FRONT END EQUIPMENT

LIFTCRANE: 1,000-ton nominal rating at 45' radius with 155' boom.

LIFTCRANE BOOM: No. 70/71 boom consisting of 50' butt, 25' and 50' inserts, and 5' hammerhead top. Includes 1,000-ton rated boom point, 20-ton rated upper boom point, boom stops, boom angle indicator, pendants, equalizer, and boom hoist wire rope. Basic length, 155'; maximum length, 505'.

TOWER ATTACHMENT: Consisting of No. 70 tower and No. 71 boom. Provides 500-ton nominal rating at 55' radius with 160' of tower and 155' boom.

NO. 70 TOWER: Formed by larger sections of liftcrane boom. Self-erecting. 17' x 17'1-1/4" box-section tower (25' and 50' inserts) including cap, boom carrier, and tie frame with self-erecting sheaves, and wire rope. Basic tower length, 160'; maximum length, 235'.

STRUT: 100' No. 27A boom, including sheaves and fixed lattice type upper backhitch.

NO. 71 TOWER BOOM: Formed by smaller sections of liftcrane boom. Includes 500-ton rated boom point, 20-ton rated upper boom point, boom angle indicator, pendants, equalizer, and boom hoist wire rope. 10'10" x 10'11-1/4" box section. Basic length, 155'; maximum length, 255'.

LOAD LINE: Approximately 9,000' long, 1-3/8" diameter, EIPS, IWRC.

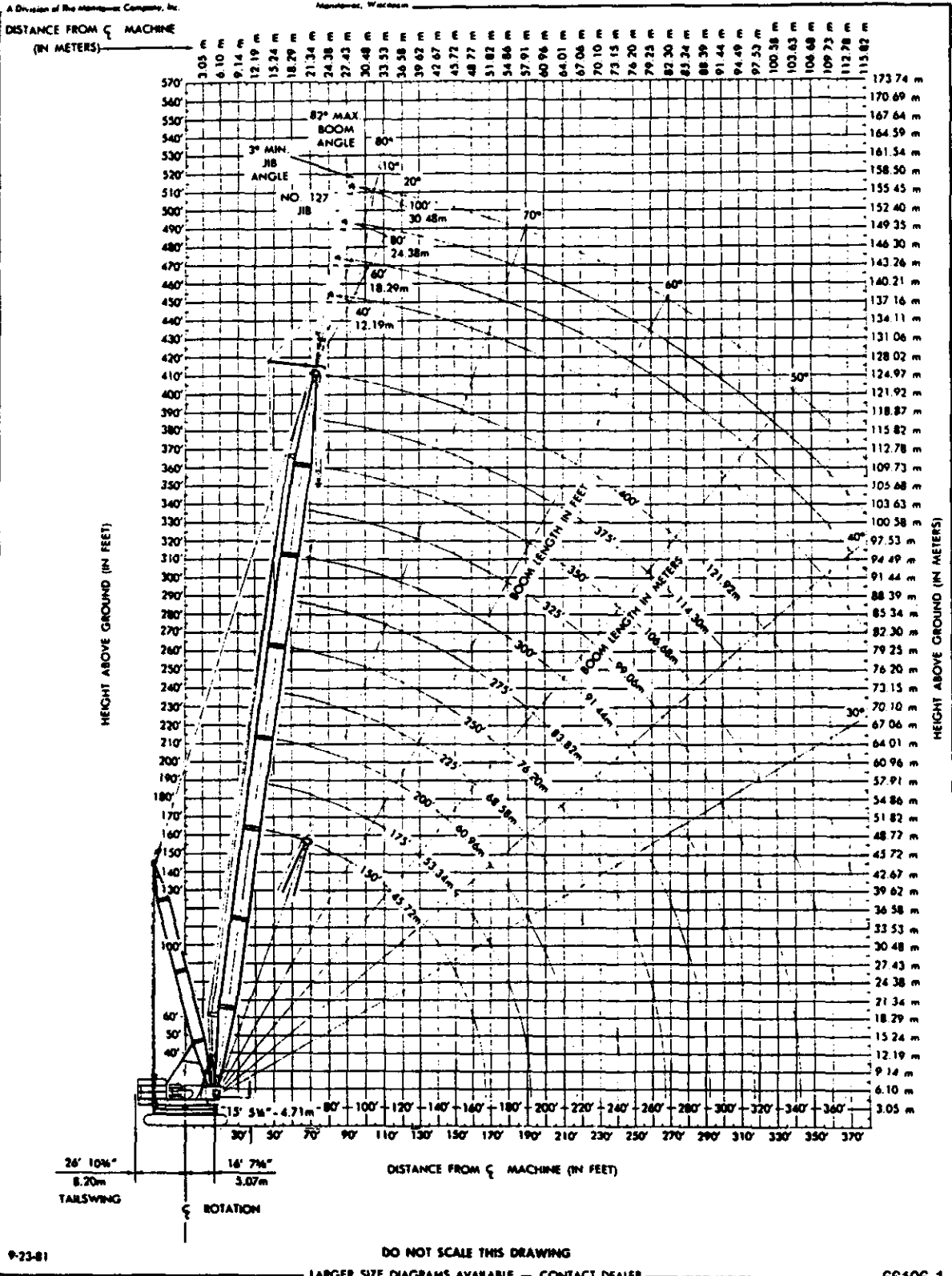
WHIP LINE: Approximately 1,000' long, 1-3/8" diameter, EIPS, IWRC.

SWIVEL HOOK: 20-ton capacity for single-part whip line.

NOTE: These specifications are preliminary and subject to change.

APPENDIX B. MANITOWOC - S-7000 LIFT CRANE SHT B-4

MANITOWOC ENGINEERING CO.



RANGE DIAGRAM -- 7000 - NO. 64 BOOM - NO. 127 JIB

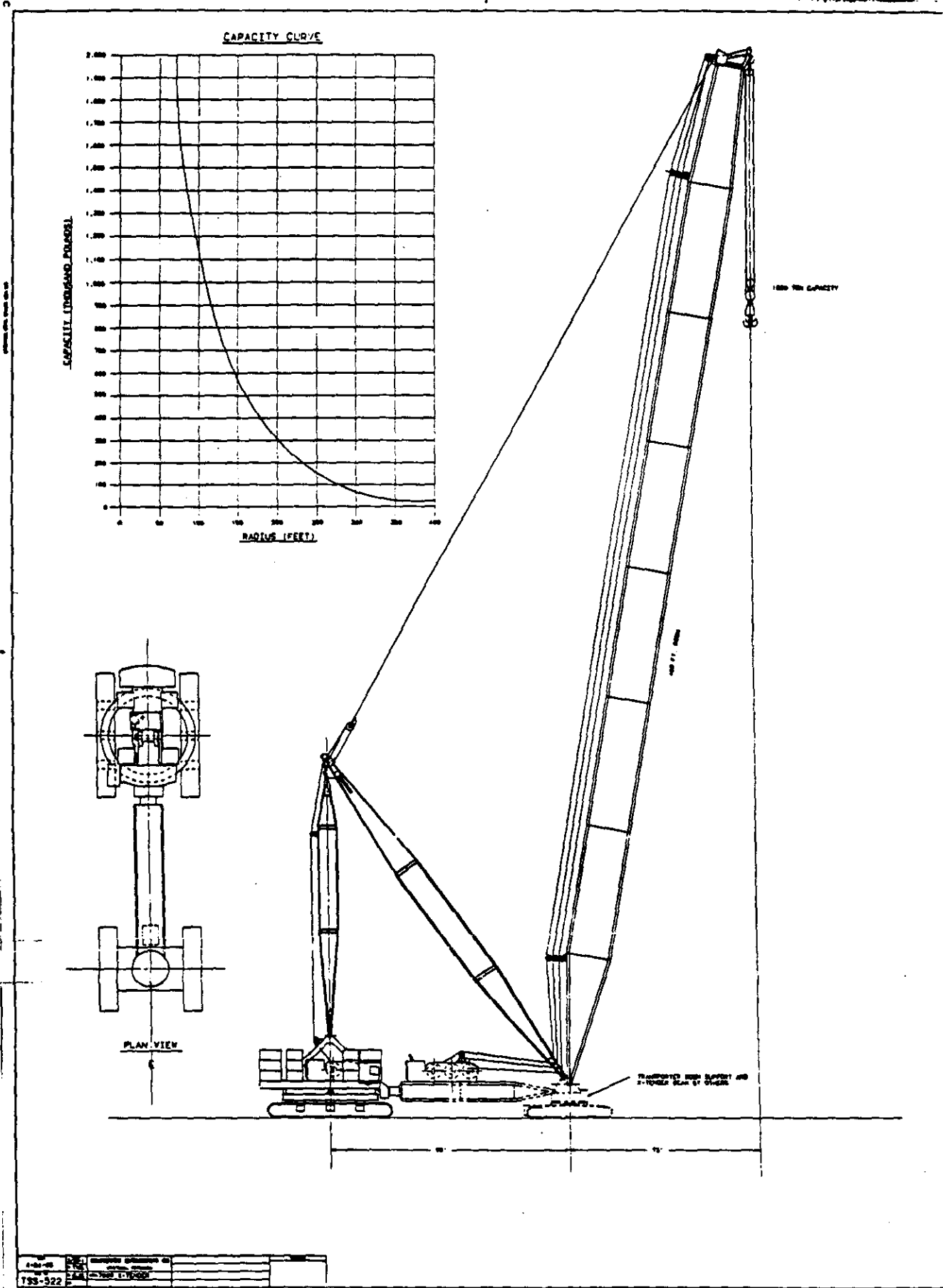
Memo to: Ray Stefanski

July 12, 1990

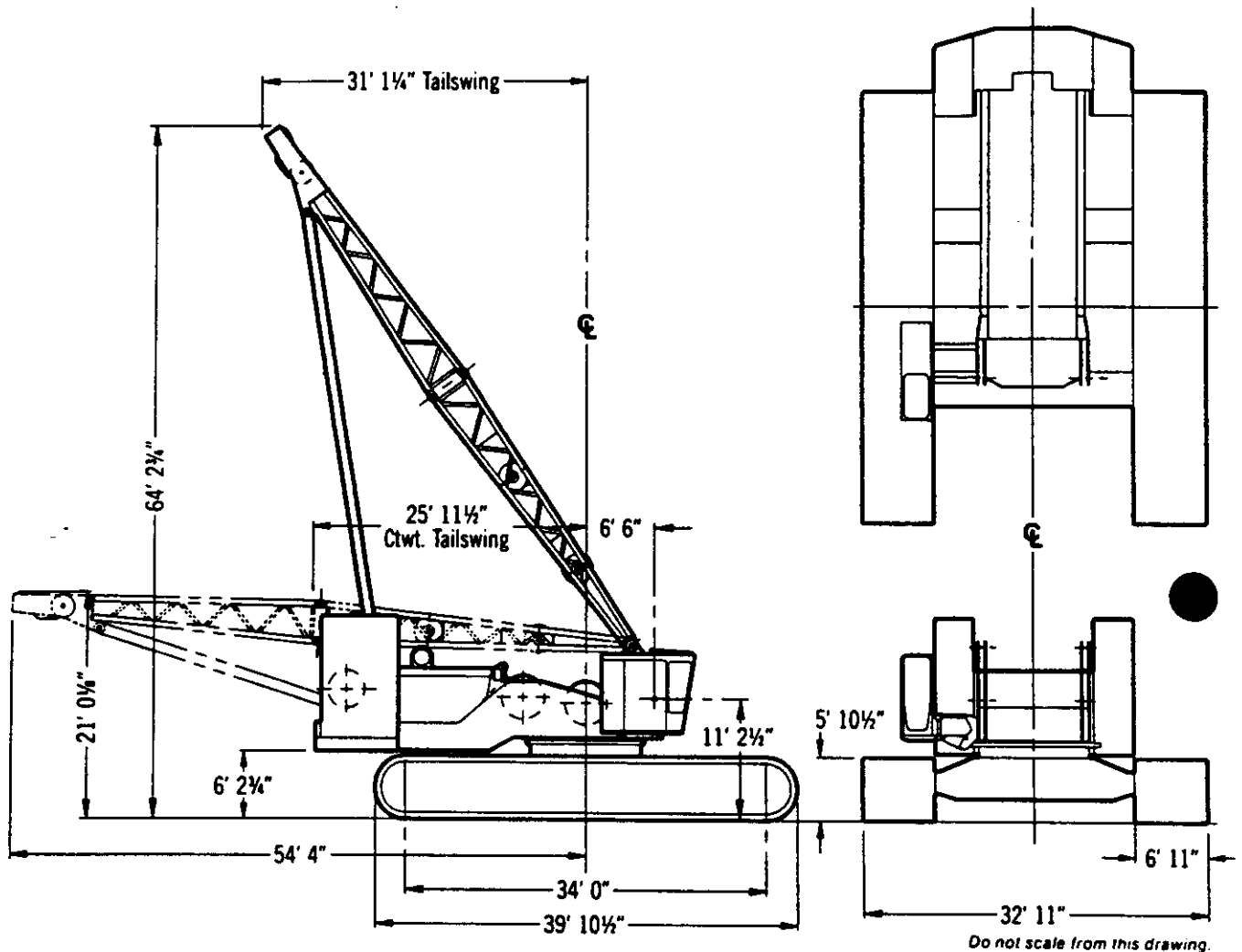
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APPENDIX B. MANITOWOC - S-7000 X-TENDER

SHT B-7



OUTLINE DIMENSIONS 6000 SERIES-2



WEIGHTS

	Pounds*
LIFTCRANE: With 75' boom, gantry and backhitch, boom hoist rigging and pendants, wire rope, basic upperworks package, counterweights, 39'10 1/2" long crawlers with 83" treads.....	931,520
UPPERWORKS: Complete with basic machinery including main drums, (but not including boom hoist, gantry, backhitch, front end attachments or counterweights).....	156,000
BOOM: (75' basic boom).....	20,600
GANTRY, BACKHITCH and BOOM HOIST	42,000

	Pounds*
REMOVABLE COUNTERWEIGHT: (Total).....	240,000
CARBODY MODULE: With king pin and roller path.....	65,300
TRANSVERSE BEAMS: (Each 34,300).....	68,600
POWER PACKAGE	12,900
CRAWLER ASSEMBLIES: (2) with 83" wide crawler treads and hydraulic motors (each assembly 163,060).....	326,120

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

Memo to: Ray Stefanski

July 12, 1990

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APPENDIX B. MANITOWOC - S-6000 LIFT CRANE

SHT B-9

MANITOWOC ENGINEERING CO.

MANITOWOC MODEL 6000 SERIES 2
NO. 66 BOOM
275,000 LB. COUNTERWEIGHT

CHART DATE 9/5/85

OPER. RADIUS FT.	CAPACITIES IN THOUSANDS OF LBS.								
	BOOM LENGTH - FT.								
	75	100	125	150	175	200	225	250	
20	1,200.0*								
21	1,152.2*								
22	1,108.4*								
23	1,067.7*								
24	1,029.9*	1,061.3*							
25	994.5*	988.3*							
26	961.5*	955.3*	949.0*						
27	930.5*	924.3*	918.1*						
28	901.4*	895.3*	889.1*						
29	874.0*	867.9*	861.8*						
30	848.1*	842.2*	836.0*	831.1*					
32	800.7*	794.8*	788.7*	783.9*					
34	758.1*	752.3*	746.5*	741.5*	735.6*				
36	714.8*	710.2*	705.3*	701.7*	697.0*				
38	659.6	657.6	655.4	653.7	651.5	648.5*			
40	608.2	606.1	603.8	602.0	599.6	597.6	595.3		
45	508.1	505.8	503.3	501.4	498.9	496.7	494.2	491.8	
50	435.4	433.0	430.4	428.4	425.7	423.4	420.8	418.3	
55	380.3	377.8	375.1	372.9	370.2	367.8	365.0	362.5	
60	337.0	334.4	331.6	329.4	326.6	324.1	321.3	318.7	
65	302.1	299.5	296.6	294.4	291.5	289.0	286.1	283.5	
70	273.4	270.7	267.8	265.5	262.6	260.0	257.1	254.4	
75	249.3	246.6	243.7	241.3	238.3	235.8	232.8	230.1	
80		226.1	223.2	220.8	217.8	215.2	212.1	209.4	
85		208.5	205.5	203.1	200.1	197.5	194.4	191.6	
90		193.2	190.2	187.8	184.7	182.0	179.0	176.2	
95		179.8	176.7	174.3	171.2	168.5	165.4	162.6	
100		167.9	164.8	162.4	159.3	156.6	153.4	150.6	
105			154.2	151.8	148.6	145.9	142.8	140.0	
110			146.7	142.3	139.1	136.4	133.2	130.4	
115			136.2	133.7	130.5	127.8	124.6	121.8	
120			128.4	125.9	122.7	120.0	116.8	113.9	
125			121.3	118.8	115.6	112.9	109.7	106.8	
130				112.4	109.1	106.4	103.2	100.3	
135				106.4	103.2	100.4	97.2	94.3	
140				100.9	97.7	95.0	91.7	88.8	
145				95.9	92.7	89.9	86.6	83.7	
150				91.2	88.0	85.2	81.9	79.0	
155					83.6	80.8	77.6	74.7	
160					79.5	76.8	73.5	70.6	
165					75.7	73.0	69.7	66.8	
170					72.2	69.4	66.1	63.2	
175					68.8	66.1	62.8	59.8	
180						62.9	59.6	56.7	
185						60.0	56.7	53.7	
190						57.2	53.9	50.9	
195						54.5	51.2	48.3	
200						52.0	48.7	45.8	
205							46.4	43.4	
210							44.1	41.2	
215							42.0	39.0	
220							39.9	37.0	
225								35.1	
230								33.2	
235								31.4	
240								29.7	
245								28.1	

Capacities for various boom lengths and operating radii are for freely suspended loads and do not exceed 75% of a static tipping load. Capacities based on structural competence are denoted by an asterisk (*).

Weight of all load blocks, hooks, weight ball, slings, hoist lines, beneath boom point sheaves, etc., is considered part of the main boom load. Boom is not to be lowered beyond radii where combined weights are greater than rated capacity. Where no capacity is shown, operation is not intended or approved.

Machine to operate in a level position on a firm surface and be rigged in accordance with and under conditions referred to in Rigging Drawing No. 162089. Crane operator judgment must be used to allow for dynamic load effects of swinging, hoisting or lowering, travel, as well as adverse operating conditions and physical machine depreciation.

Operating radius is the horizontal distance from the axis of rotation to the center of vertical hoist line or load block.

Machine equipped with 39'-10" crawlers, 83" treads, 54' gantry, 14 part boom hoist reeving, four 1-3/4" boom pendants, and 275,000# counterweight.

Memo to: Ray Stefanski

July 12, 1990

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APPENDIX B. MANITOWOC - S-6000 LIFT CRANE

SHT B-10

MANITOWOC ENGINEERING CO.

MANITOWOC MODEL 6000 SERIES 2
NO. 66-64 BOOM
275,000 LB. COUNTERWEIGHT

Chart Date 10/11/83

OPER. RADIUS FT.	CAPACITIES IN THOUSANDS OF LBS.											
	BOOM LENGTH - FT.											
	100	125	150	175	200	225	250	275	300	325	350	375
23	690.0*											
24	690.0*											
25	690.0*											
26	690.0*	657.2*										
27	690.0*	657.0*										
28	690.0*	656.8*										
29	690.0*	656.8*										
30	690.0*	655.2*	643.0*									
32	685.9*	649.8*	629.6*									
34	681.0*	644.6*	615.0*	589.9*								
36	676.4*	639.8*	601.3*	575.8*								
38	664.8	635.3*	588.1*	562.3*	537.7*							
40	613.4	611.5	575.7*	549.5*	525.2*	496.0*						
45	513.3	511.3	509.5	507.1	496.5*	470.6*	432.2*					
50	440.6	438.5	436.6	434.0	432.2	430.3	410.3*	381.5*	345.1*			
55	385.5	383.2	381.3	378.6	376.7	374.7	373.1	363.3*	334.5*	302.5*		
60	342.2	339.8	337.8	335.1	333.1	331.0	329.4	327.3	323.4*	293.4*	260.3*	232.9*
65	307.3	304.9	302.8	300.0	298.0	295.9	294.2	292.0	290.2	284.5*	253.0*	225.9*
70	278.6	276.1	274.0	271.1	269.1	266.9	265.2	263.0	261.2	258.9	245.6*	219.0*
75	254.5	252.0	249.9	246.9	244.8	242.7	240.9	238.7	236.8	234.5	232.7	212.2*
80	234.1	231.5	229.4	226.4	224.3	222.1	220.3	218.0	216.2	213.8	211.9	205.6*
85	216.5	213.9	211.7	208.7	206.6	204.4	202.6	200.3	198.4	196.0	194.1	191.7
90	201.2	198.6	196.4	193.4	191.2	189.0	187.2	184.8	182.9	180.6	178.6	176.2
95	187.8	185.2	183.0	179.9	177.7	175.4	173.6	171.3	169.4	167.0	165.0	162.6
100	175.9	173.3	171.1	168.0	165.8	163.5	161.7	159.3	157.4	155.0	153.0	150.5
105		162.7	160.5	157.4	155.1	152.9	151.0	148.6	146.7	144.3	142.3	139.8
110		153.2	151.0	147.8	145.6	143.3	141.5	139.1	137.1	134.7	132.7	130.2
115		144.7	142.4	139.3	137.0	134.7	132.9	130.4	128.5	126.0	124.0	121.5
120		136.9	134.7	131.5	129.2	126.9	125.0	122.6	120.7	118.2	116.2	113.7
125		129.9	127.6	124.4	122.2	119.8	117.9	115.5	113.6	111.1	109.1	106.5
130			121.1	117.9	115.7	113.3	111.5	109.0	107.0	104.6	102.5	100.0
135			115.2	112.0	109.7	107.4	105.5	103.0	101.1	98.6	96.5	94.0
140			109.7	106.5	104.3	101.9	100.0	97.5	95.6	93.1	91.0	88.5
145			104.7	101.5	99.2	96.8	94.9	92.5	90.5	88.0	85.9	83.4
150			100.0	96.8	94.5	92.1	90.2	87.8	85.8	83.3	81.2	78.7
155				92.4	90.1	87.6	85.9	83.4	81.4	78.9	76.8	74.3
160				88.4	86.1	83.7	81.8	79.3	77.3	74.8	72.7	70.2
165				84.6	82.3	79.9	78.0	75.5	73.5	71.0	68.9	66.3
170				81.0	78.7	76.3	74.4	71.9	69.9	67.4	65.3	62.8
175				77.7	75.4	73.0	71.1	68.6	66.6	64.0	62.0	59.4
180					72.3	69.9	68.0	65.5	63.4	60.9	58.8	56.2
185					69.3	66.9	65.0	62.5	60.5	57.9	55.9	53.3
190					66.5	64.1	62.2	59.7	57.7	55.1	53.1	50.5
195					63.9	61.5	59.6	57.1	55.0	52.5	50.4	47.8
200					61.4	59.0	57.1	54.6	52.5	50.0	47.9	45.3
205						56.6	54.7	52.2	50.2	47.6	45.5	42.9
210						54.4	52.5	50.0	47.9	45.4	43.3	40.7
215						52.3	50.3	47.8	45.8	43.2	41.1	38.5
220							50.2	48.3	45.8	43.8	41.2	39.1
225								46.4	43.8	41.8	39.2	37.2
230								44.5	42.0	40.0	37.4	35.3
235								42.8	40.2	38.2	35.6	33.5
240								41.1	38.6	36.5	33.9	31.8
245								39.5	36.9	34.9	32.3	30.2
250									35.4	33.4	30.8	28.7
255									33.9	31.9	29.3	27.2
260									32.5	30.4	27.9	25.8
265									31.1	29.1	26.5	24.4
270									29.8	27.8	25.2	23.1
275										26.5	23.9	21.8

Capacities for various boom lengths and operating radii are for freely suspended loads and do not exceed 75% of a static tipping load. Capacities based on structural competence are denoted by an asterisk (*).

Weight of all load blocks, hooks, weight ball, slings, hoist lines, beneath boom point sheaves, etc., is considered part of the main boom load. Boom is not to be lowered beyond radii where combined weights are greater than rated capacity. Where no capacity is shown, operation is not intended or approved.

Machine to operate in a level position on a firm surface and be rigged in accordance with and under conditions referred to in Rigging Drawing No. 162090. Crane operator judgment must be used to allow for dynamic load effects of swinging, hoisting or lowering, travel, as well as adverse operating conditions and physical machine depreciation.

Operating radius is the horizontal distance from the axis of rotation to the center of vertical hoist line or load block.

Machine equipped with 39'-10" crawlers, 83" treads, 54' gantry, 14 part boom hoist reeving, four 1-3/4" boom pendents, and 275,000# counterweight.

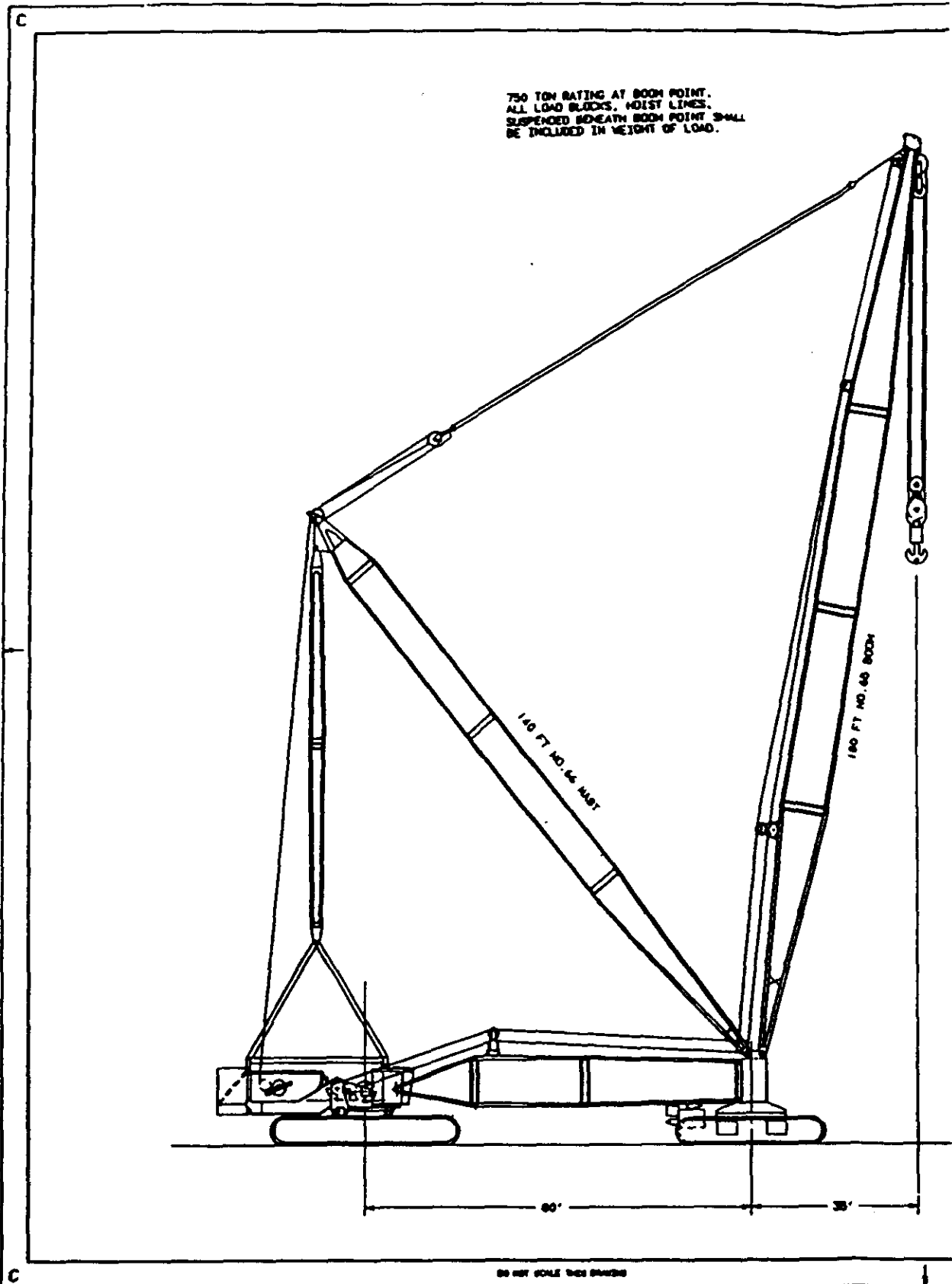
Memo to: Ray Stefanski

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APPENDIX B. MANITOWOC - S-6000 X-TENDER

SHT B-11



Memo to: Ray Stefanski

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APPENDIX B. MANITOWOC - S-6000 X-TENDER

SHT B-12

MANITOWOC ENGINEERING CO.

MANITOWOC 6000 X-TENDER

BOOK #65

140,000 LBS. CRANE CTWT.

Chart Date 2-6-85

RADIUS IN FT.	CAPACITIES IN THOUSANDS OF LBS.												
	BOOM LENGTH - FT.												
	140	180	200	220	240	260	280	300	320	340	360	380	400
105	1,500.0*												
110	1,500.0*												
115	1,500.0*												
120	1,421.5*												
125	1,281.6	1,436.9*	1,280.9*										
130	1,148.7	1,310.7*	1,262.5*										
135	1,040.0	1,204.3*	1,162.6*	1,164.7*	1,040.2*								
140	949.3	1,113.3*	1,076.7*	1,042.8*	1,005.4*	890.7*	784.4*						
145	872.7	1,032.4	1,002.2*	972.0*	943.6*	862.9*	762.0*	675.4*	593.5*	531.8*			
150	806.9	941.8	936.8*	909.7*	884.2*	848.9*	750.5*	658.9*	578.5*	519.1*	456.8*		
155	750.0	865.1	862.3	834.5*	814.5*	809.4*	739.0*	647.4*	570.7*	512.4*	449.1*	396.9*	336.1*
160	700.0	799.4	796.6	774.8	754.1*	754.0*	727.3*	637.8*	562.8*	505.6*	443.5*	396.9*	336.1*
165	656.2	742.4	739.6	737.0	734.2	733.1*	705.4*	628.0*	554.7*	498.6*	437.7*	394.0*	336.1*
170	617.1	692.5	689.7	687.2	684.7	682.1	669.5*	618.2*	544.5*	491.5*	431.6*	388.8*	336.6*
175	582.1	656.2	653.5	651.0	648.5	646.0	633.5	608.3*	538.1*	484.2*	425.7*	383.4*	332.2*
180	549.2*	617.1	614.4	611.9	609.4	606.9	594.4	592.8*	529.8*	476.8*	419.5*	377.9*	327.7*
185	517.1*	582.1	579.4	576.9	574.4	571.9	559.4	557.8*	521.3*	469.4*	413.2*	372.3*	323.0*
190	485.0*	549.2*	546.5	544.0	541.5	539.0	526.5	524.9*	526.7	461.8*	406.8*	366.6*	318.0*
195	453.6*	517.1*	514.4	511.9	509.4	506.9	504.4	501.9	498.2	495.8	454.2*	400.3*	360.8*
200	422.1*	485.0*	482.3	479.8	477.3	474.8	472.3	469.8	466.6*	464.6*	423.9*	373.7*	334.9*
205	390.6*	453.6*	450.9	448.4	445.9	443.4	440.9	438.4	435.2*	433.2*	393.7*	354.9*	307.3*
210	359.1*	422.1*	419.4	416.9	414.4	411.9	409.4	406.9	403.7*	401.7*	362.9*	324.9*	279.2*
215	327.6*	390.6*	387.9	385.4	382.9	380.4	377.9	375.4	372.2*	370.2*	332.5*	295.2*	250.6*
220	296.1*	359.1*	356.4	353.9	351.4	348.9	346.4	343.9	340.7*	338.7*	301.5*	264.9*	220.6*
225	264.6*	327.6*	324.9	322.4	319.9	317.4	314.9	312.4	309.2*	307.2*	270.5*	234.9*	191.6*
230	233.1*	296.1*	293.4	290.9	288.4	285.9	283.4	280.9	277.7*	275.7*	239.5*	204.9*	162.3*
235	201.6*	264.6*	261.9	259.4	256.9	254.4	251.9	249.4	246.2*	244.2*	208.5*	174.9*	133.3*
240	170.1*	233.1*	230.4	227.9	225.4	222.9	220.4	217.9	214.7*	212.7*	177.5*	144.9*	104.7*
245	138.6*	201.6*	198.9	196.4	193.9	191.4	188.9	186.4	183.2*	181.2*	146.5*	114.9*	75.7*
250	107.1*	170.1*	167.4	164.9	162.4	159.9	157.4	154.9	151.7*	149.7*	115.5*	84.9*	47.1*
255	75.6*	138.6*	135.9	133.4	130.9	128.4	125.9	123.4	120.2*	118.2*	84.5*	54.9*	18.5*
260		107.1*	104.4	101.9	99.4	96.9	94.4	91.9	88.7*	86.7*	53.5*	23.9*	
265		75.6*	72.9	70.4	67.9	65.4	62.9	60.4	57.2*	55.2*	22.5*		
270		44.1*	41.4	38.9	36.4	33.9	31.4	28.9	25.7*	23.7*			
275			10.9*	8.4	5.9	3.4	0.9						
280				3.4	0.9								
285													
290													
295													
300													
305													
310													
315													
320													
325													
330													
335													
340													
345													
350													
355													
360													
365													
370													
375													
380													
385													

Capacities for various boom lengths and operating radii are for freely suspended loads and do not exceed 75% of a static tipping load. All capacities marked by (*) are based on structural competence.

Weight of all load blocks, hooks, weight ball, slings, hoist lines, etc., beneath boom point sheaves, is considered part of the main boom load. Boom is not to be lowered beyond radii where combined weights are greater than rated capacity. Where no capacity is shown, operation is not intended or approved.

Load line specifications 1-5/8 in. 6 x 41 Seale filler wire, extra improved plow steel, regular lay, IWRC. Minimum breaking strength 264,000#. Maximum load = 60,000#/line. Approx. weight = 4.88#/ft.

Machine to operate in a level position on firm surface. Crane operator judgment must be used to allow for dynamic load effects of swinging, hoisting or lowering, wind conditions, as well as adverse operating conditions and physical machine depreciation.

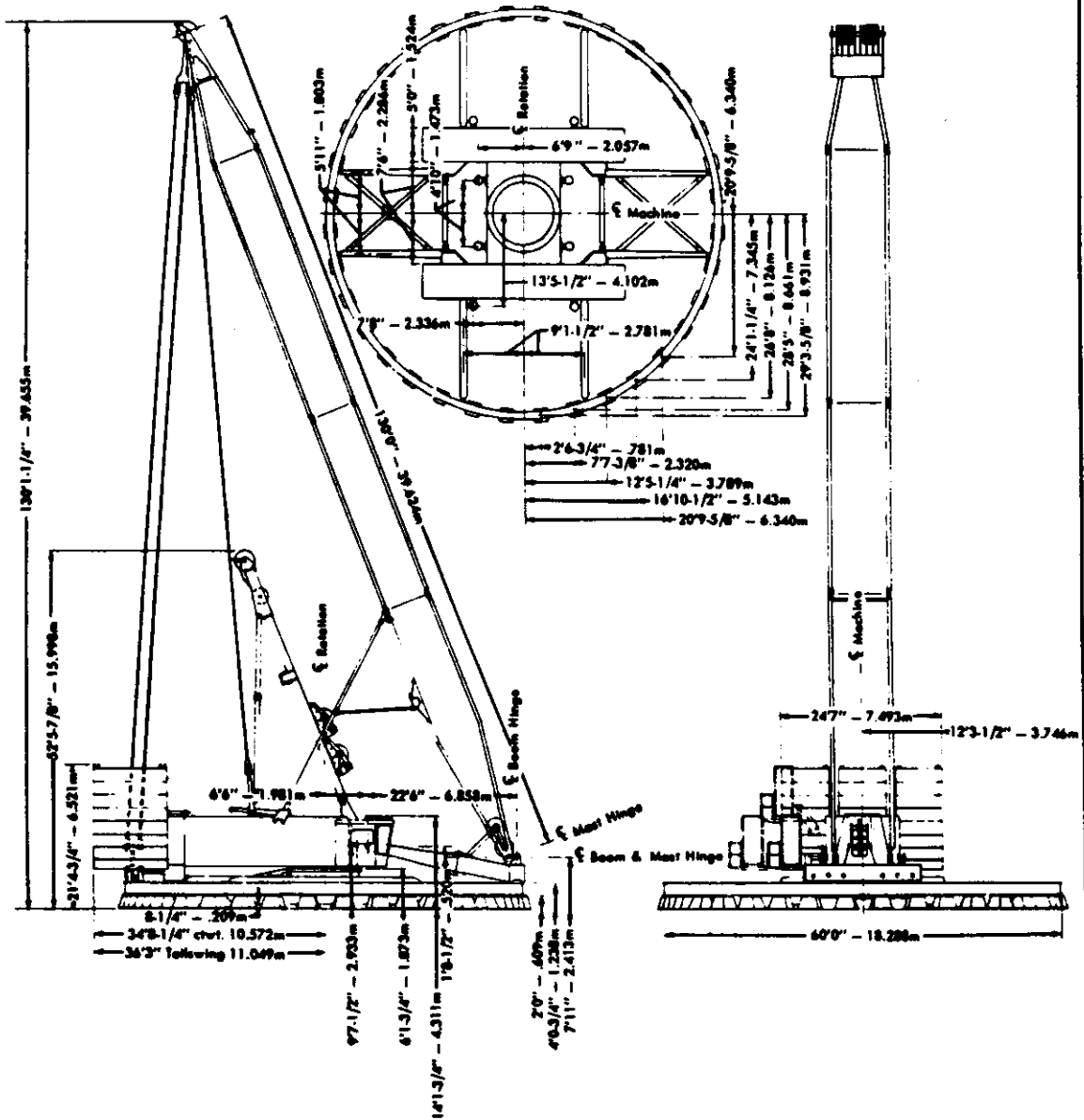
Operating radius is the horizontal distance from the vertical axis of rotation to the center of vertical hoist line or load block.

Machine equipped with 39'-3" crawlers, 60" treads, 140' mast, 18 part boom hoist reeving, eight 1-3/8" boom pendants, 140,000 lbs. of crane counterweight. Lifter capacities given for machine with a horizontal distance of 80'-0" between axis of rotation and vertical centerline of boom hinge point.

MANITOWOC ENGINEERING CO.

A Division of The Manitowoc Company, Inc.

Manitowoc, Wisconsin



44274

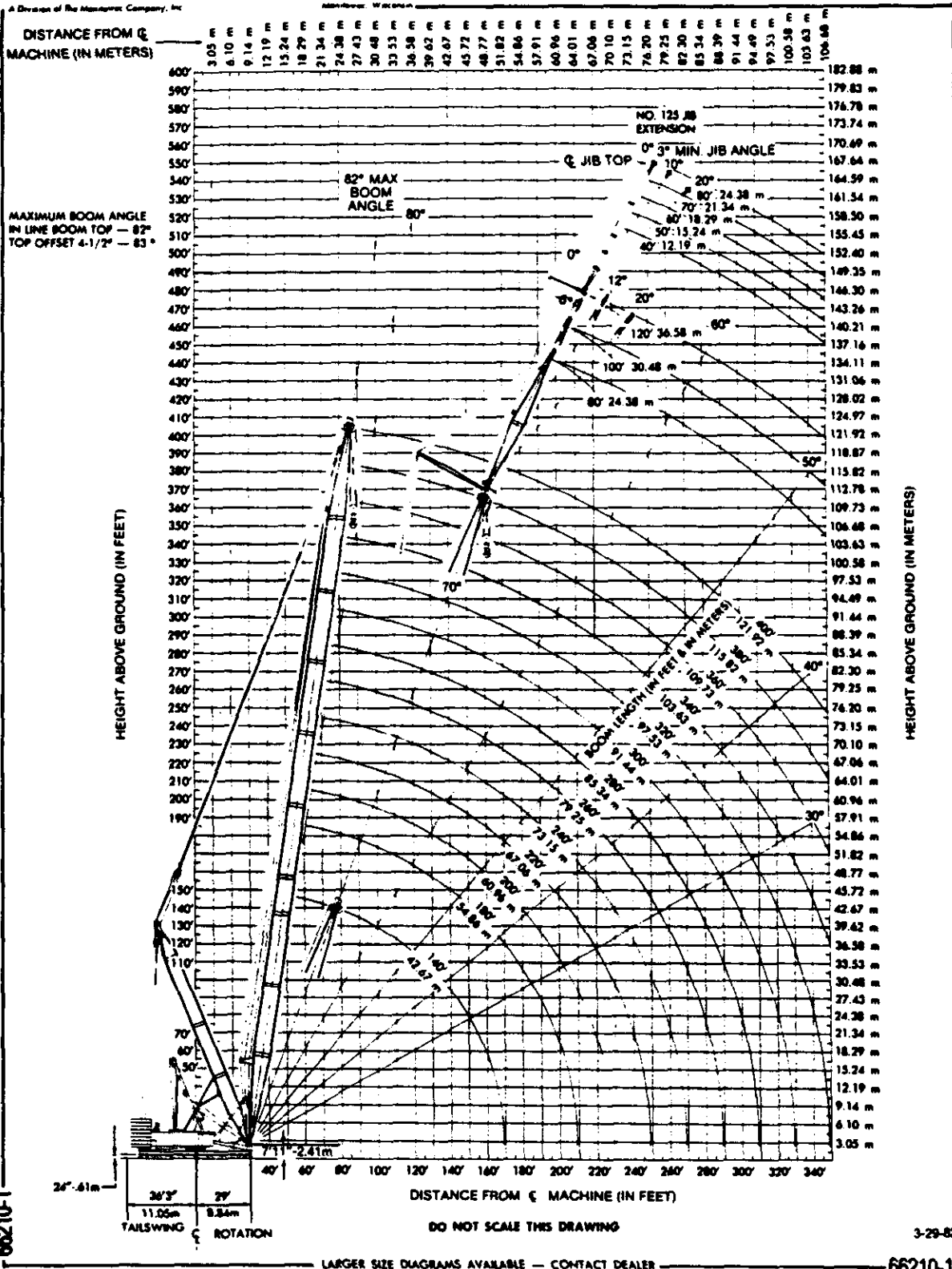
M4600 S4 RINGER 53

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OUTLINE DIMENSIONS

MANITOWOC ENGINEERING CO.



RANGE DIAGRAM - M4600 S-4 RINGER S-3 NO. 65 BOOM - NO. 27A-27B JIB - NO. 125 JIB EXTENSION

MANITOWOC ENGINEERING CO.

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



LIFTCRANE CAPACITIES

MEETS
ANSI B30.5
REQUIREMENTS

4600 SERIES 4
RINGER SERIES 3

BOOM NO. 65
60' RINGER ATTACHMENT ON
BLOCKING OR PEDESTALS
123,000 LB. CRANE COUNTERWEIGHT
978,700 LB. AUXILIARY COUNTERWEIGHT
360 DEGREE RATING

CAPACITIES FOR VARIOUS BOOM LENGTHS AND OPERATING RADII ARE FOR FREELY SUSPENDED LOADS AND DO NOT EXCEED 75% OF A STATIC TIPPING LOAD. CAPACITIES BASED ON STRUCTURAL COMPETENCE ARE DENOTED BY AN ASTERISK (*).

UPPER BOOM POINT CAPACITIES FOR LIFTCRANE SERVICE WITH SINGLE PART WHIP LINE ARE 44,000 LBS. FOR 1-1/4" WIRE ROPE, 45,000 LBS. FOR 1-3/8" WIRE ROPE AND 50,000 LBS. FOR 1-1/2" OR 1-5/8" WIRE ROPE. CAPACITIES FOR TWO PART LINE ARE 88,000 LBS. FOR 1-1/4" WIRE ROPE, 90,000 LBS. FOR 1-3/8" WIRE ROPE AND 100,000 LBS. FOR 1-1/2" OR 1-5/8" WIRE ROPE. IN ALL CASES, UPPER BOOM POINT CAPACITIES CANNOT EXCEED THOSE LISTED FOR THE MAIN BOOM CAPACITY.

WEIGHT OF JIB, ALL LOAD BLOCKS, HOOKS, WEIGHT BALL, SLINGS, HOIST LINES, ETC., BENEATH BOOM AND JIB POINT SHEAVES, IS CONSIDERED PART OF THE MAIN BOOM LOAD. BOOM IS NOT TO BE LOWERED BEYOND RADII WHERE COMBINED WEIGHTS ARE GREATER THAN RATED CAPACITY. WHERE NO CAPACITY IS SHOWN, OPERATION IS NOT INTENDED OR APPROVED.

MACHINE TO OPERATE ON A FIRM UNIFORMLY SUPPORTING SURFACE WITH ROLLER PATH LEVEL WITHIN A TOLERANCE OF 1-1/4" IN 60' AND PROPERLY SUPPORTED. REFER TO RIGGING NO. 66184 AND WIRE ROPE SPECIFICATION CHART NO. 7307-A OR NO. 7357-A. CRANE OPERATOR JUDGMENT MUST BE USED TO ALLOW FOR DYNAMIC LOAD EFFECTS OF SWINGING, HOISTING OR LOWERING, WIND CONDITIONS, AS WELL AS ADVERSE OPERATING CONDITIONS AND PHYSICAL MACHINE DEPRECIATION.

OPERATING RADIUS IS THE HORIZONTAL DISTANCE FROM THE AXIS OF ROTATION TO THE CENTER OF VERTICAL HOIST LINE OR LOAD BLOCK. BOOM ANGLE IS THE ANGLE BETWEEN HORIZONTAL AND CENTERLINE OF BOOM BUTT AND INSERTS AND IS AN INDICATION OF OPERATING RADIUS. IN ALL CASES, OPERATING RADIUS SHALL GOVERN CAPACITY. BOOM POINT ELEVATION IS VERTICAL DISTANCE FROM GROUND LEVEL TO CENTERLINE OF BOOM POINT SHAFT.

MACHINE EQUIPPED WITH 60' RINGER ATTACHMENT, 30'5" CRAWLERS, 60" TREADS, 33' RETRACTABLE GANTRY, 130' MAST, 18 PART BOOM HOIST REEVING, EIGHT 1-3/8" BOOM PENDANTS, 123,000 LB. CRANE COUNTERWEIGHT (120,000 LBS. WITH COUNTERWEIGHT ASSEMBLY NO. 49667) AND 978,700 LB. AUXILIARY COUNTERWEIGHT.

MAXIMUM BOOM AND JIB LENGTHS LIFTED UNASSISTED		DEDUCT FROM CAPACITIES WHEN JIB IS ATTACHED	
BOOM LGTH.	JIB NO. 27A8	JIB LGTH.	JIB NO. 27A8
400'	---	80'	48,000 LBS.
380'	120'	100'	57,800 LBS.
		120'	67,000 LBS.

LOAD BLOCK, HOOK AND WEIGHT BALL ON GROUND AT START.

WARNING: CHECK AMOUNT OF AUXILIARY COUNTERWEIGHT ON MACHINE BEFORE USE OF THIS CHART.

CONSULT JIB CHART FOR JIB CAPACITIES.

BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS	BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS	BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS
140	55	80.1	145.5	1,500,000*	180	60	80.7	185.2	1,500,000*	200	60	81.7	205.5	1,301,700*
	60	78.0	144.5	1,500,000*		65	79.1	184.3	1,500,000*		65	80.2	204.7	1,301,700*
	65	75.9	143.2	1,500,000*		70	77.5	183.2	1,492,700		70	78.7	203.7	1,281,600*
	70	73.8	141.8	1,500,000*		75	75.8	182.0	1,325,700		75	77.3	202.6	1,248,100*
	75	71.6	140.2	1,333,200		80	74.2	180.6	1,191,200		80	75.8	201.3	1,188,400
	80	69.5	138.3	1,198,700		85	72.5	179.0	1,080,500		85	74.3	199.9	1,077,800
	85	67.2	136.2	1,084,800*		90	70.8	177.3	988,000		90	72.8	198.4	985,200
	90	65.0	133.9	982,200*		95	69.1	175.4	909,300		95	71.3	196.7	906,500
	95	62.7	131.4	895,100*		100	67.4	173.3	841,700		100	69.8	194.9	838,900
	100	60.3	128.6	820,300*		105	65.7	171.1	783,000		105	68.2	192.9	780,200
	105	57.9	125.5	753,100*		110	63.9	168.7	731,400		110	66.7	190.8	728,600
	110	55.5	122.1	693,200*		115	62.1	166.1	685,900		115	65.1	188.5	683,100
	115	52.9	118.4	640,000*		120	60.3	163.2	645,300		120	63.5	186.0	642,500
	120	50.3	114.3	592,500*		125	58.4	160.2	608,900		125	61.9	183.4	606,100
	125	47.5	109.8	549,700*		130	56.5	156.9	576,200		130	60.2	180.6	573,300
	130	44.7	104.9	510,900*		135	54.6	153.4	546,500		135	58.6	177.5	543,600
135	41.6	99.4	475,300*	140	52.6	149.6	513,600*	140	56.9	174.3	516,600			
140	38.4	93.3	442,400*	145	50.5	145.6	483,200*	145	55.1	170.9	491,900			
145	34.9	86.3	411,600*	150	48.4	141.2	455,300*	150	53.3	167.2	469,200			
150	31.0	78.4	382,600*	155	46.2	136.5	429,600*	155	51.5	163.2	448,300			
155	26.7	69.0	354,500*	160	43.9	131.4	405,700*	160	49.7	159.1	425,400*			
160	21.5	57.3	326,500*	165	41.6	125.8	382,300*	165	47.7	154.6	402,600*			
				170	39.1	119.8	359,400*	170	45.7	149.8	381,400*			
				175	36.4	113.2	337,900*	175	43.7	144.6	361,600*			
				180	33.6	105.9	317,400*	180	41.6	139.1	343,000*			
				185	30.6	97.7	297,900*	185	39.3	133.1	325,500*			
				190	27.2	88.4	278,900*	190	37.0	126.6	308,100*			
				195	23.4	77.5	260,100*	195	34.5	119.5	290,600*			
				200	18.8	64.2	241,000*	200	31.8	111.7	273,700*			
								205	28.9	102.9	257,500*			
								210	25.8	93.0	241,600*			
								215	22.1	81.5	225,800*			
								220	17.8	67.3	209,500*			

Memo to: Ray Stefanski

July 12, 1990

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APPENDIX B.

MANITOWOC - 4600-S4

SHT B-16

MANITOWOC ENGINEERING CO.

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



LIFTCRANE CAPACITIES

MEETS
ANSI B30.5
REQUIREMENTS

4600 SERIES 4
RINGER SERIES 3

BOOM NO. 65
60' RINGER ATTACHMENT ON
BLOCKING OR PEDESTALS
123,000 LB. CRANE COUNTERWEIGHT
978,700 LB. AUXILIARY COUNTERWEIGHT
360 DEGREE RATING

BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS	BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS	BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS
65	81.1	225.0	1,138,000*		65	81.9	245.2	1,009,900*		235	38.0	166.6	228,500*	
70	79.8	224.1	1,110,500*		70	80.6	244.4	992,400*		240	36.2	159.8	218,300*	
75	78.5	223.1	1,083,900*		75	79.4	243.5	975,000*		245	34.3	152.7	208,400*	
80	77.1	221.9	1,058,300*		80	78.2	242.4	957,700*		250	32.2	144.9	198,900*	
85	75.8	220.7	1,033,500*		85	77.0	241.3	940,700*		255	30.1	136.5	189,700*	
90	74.4	219.3	982,600		90	75.8	240.0	924,000*		260	27.8	127.3	179,900*	
95	73.1	217.8	904,000		95	74.5	238.7	901,500		265	25.3	117.0	169,700*	
100	71.7	216.2	836,300		100	73.3	237.2	833,800		270	22.5	105.5	159,600*	
105	70.3	214.4	777,600		105	72.0	235.6	775,100		275	19.3	92.1	149,300*	
110	68.9	212.5	726,100		110	70.8	233.8	723,500		280	15.6	75.8	138,400*	
115	67.5	210.4	680,500		115	69.5	232.0	678,000						
120	66.1	208.2	639,900		120	68.2	230.0	637,400		70	82.0	284.9	759,800*	
125	64.6	205.9	603,500		125	66.9	227.9	601,000		75	81.0	284.1	748,200*	
130	63.2	203.4	570,800		130	65.6	225.6	568,200		80	79.9	283.2	736,500*	
135	61.7	200.7	541,100		135	64.3	223.2	538,500		85	78.9	282.3	724,700*	
140	60.2	197.9	514,000		140	62.9	220.9	511,500		90	77.8	281.2	713,000*	
145	58.7	194.9	489,300		145	61.6	218.0	486,800		95	76.8	280.0	701,300*	
150	57.2	191.7	466,700		150	60.2	215.2	464,100		100	75.7	278.8	689,700*	
155	55.6	188.3	445,800		155	58.8	212.2	443,200		105	74.7	277.4	678,200*	
160	54.0	184.7	426,500		160	57.4	209.0	424,000		110	73.6	276.0	666,800*	
165	52.3	180.9	408,600		165	56.0	205.7	406,100		115	72.5	274.4	655,500*	
170	50.7	176.8	392,000		170	54.5	202.1	389,500		120	71.4	272.7	632,000*	
175	48.9	172.5	376,500		175	53.0	198.4	374,000		125	70.4	271.0	595,600	
180	47.2	167.9	358,500*		180	51.5	194.5	359,500		130	69.3	269.1	562,900	
185	45.4	163.1	340,700*		185	49.9	190.3	346,000		135	68.2	267.1	533,200	
190	43.5	157.9	324,000*		190	48.3	185.9	333,300		140	67.1	265.0	506,100	
195	41.5	152.3	308,300*		195	46.7	181.3	320,000*		145	65.9	262.8	481,400	
200	39.5	146.3	293,400*		200	45.0	176.3	305,000*		150	64.8	260.4	458,700	
205	37.4	139.9	279,200*		205	43.3	171.1	290,700*		155	63.7	258.0	437,900	
210	35.2	133.0	265,700*		210	41.5	165.5	277,200*		160	62.5	255.4	418,600	
215	32.8	125.4	251,800*		215	39.7	159.6	264,400*		165	61.4	252.7	400,700	
220	30.3	117.1	237,700*		220	37.7	153.3	252,200*		170	60.2	249.8	384,100	
225	27.5	107.9	223,900*		225	35.7	146.4	240,500*		175	59.0	246.8	368,600	
230	24.5	97.4	210,400*		230	33.6	139.1	229,300*		180	57.8	243.7	354,200	
235	21.1	85.2	196,900*		235	31.4	131.1	218,300*		185	56.6	240.4	340,600	
240	17.0	70.2	182,800*		240	28.9	122.3	206,300*		190	55.3	237.0	327,900	
					245	26.3	112.5	194,600*		195	54.1	233.4	316,000	
					250	23.4	101.5	182,900*		200	52.8	229.6	304,800	
					255	20.1	88.7	171,200*		205	51.5	225.7	294,200	
					260	16.2	73.1	158,900*		210	50.1	221.6	284,200	
										215	48.8	217.2	274,700	
										220	47.4	212.7	265,700	
										225	46.0	207.9	257,200	
										230	44.5	202.9	247,200*	
										235	43.0	197.6	236,500*	
										240	41.5	192.0	226,200*	
										245	39.9	186.1	216,400*	
										250	38.3	179.9	206,900*	
										255	36.6	173.2	197,900*	
										260	34.8	166.2	189,200*	
										265	33.0	158.6	180,800*	
										270	31.0	150.5	172,600*	
										275	28.9	141.7	164,700*	
										280	26.7	132.0	156,700*	
										285	24.3	121.4	147,700*	
										290	21.6	109.3	138,800*	
										295	18.6	95.4	129,600*	

CHART NO. 7300-A, 10-19-89/GA
PAGE 2 OF 4

MANITOWOC ENGINEERING CO.

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



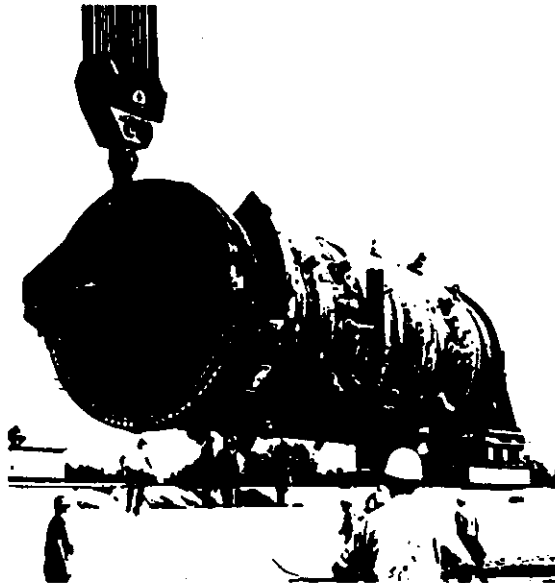
LIFTCRANE CAPACITIES

MEETS
 ANST B30.5
 REQUIREMENTS

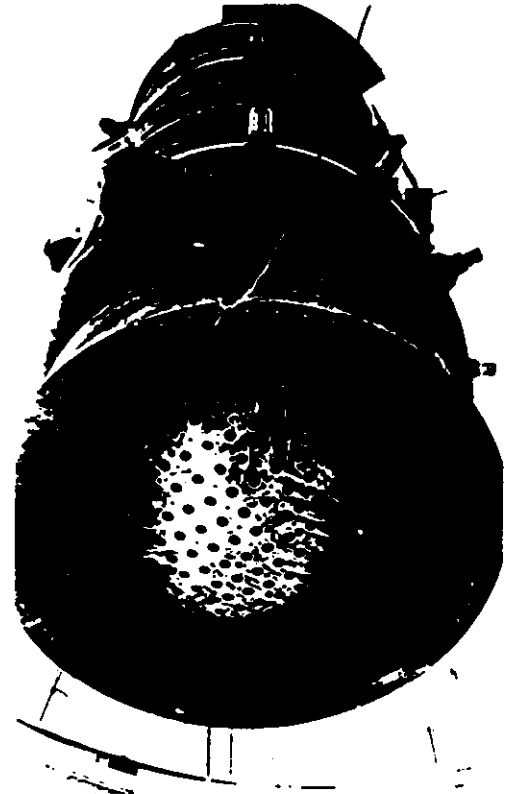
4600 SERIES 4
RINGER SERIES 3

BOOM NO. 85
60' RINGER ATTACHMENT ON
BLOCKING OR PEDESTALS
123,000 LB. CRANE COUNTERWEIGHT
978,700 LB. AUXILIARY COUNTERWEIGHT
360 DEGREE RATING

BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS	BOOM LGTH. FEET	OPER. RAD. FEET	BOOM ANG. DEG.	BOOM POINT ELEV. FEET	CAPACITY POUNDS
95	80.3	382.1	385.100		95	80.8	402.4	333.800	
100	79.5	381.2	379.500		100	80.1	401.6	329.100	
105	78.8	380.2	373.700		105	79.3	400.6	324.300	
110	78.0	379.2	367.800		110	78.6	399.6	319.300	
115	77.2	378.1	361.800		115	77.9	398.6	314.000	
120	76.4	376.9	355.800		120	77.1	397.4	308.400	
125	75.7	375.6	349.700		125	76.4	396.2	302.700	
130	74.9	374.3	343.600		130	75.7	395.0	296.900	
135	74.1	372.8	337.400		135	74.9	393.6	291.200	
140	73.3	371.3	331.300		140	74.2	392.2	285.400	
145	72.5	369.8	325.100		145	73.4	390.7	279.600	
150	71.7	368.1	318.800		150	72.7	389.2	273.800	
155	70.9	366.4	312.500		155	71.9	387.6	268.000	
160	70.1	364.6	306.200		160	71.2	385.9	262.200	
165	69.3	362.8	299.900		165	70.4	384.1	256.400	
170	68.5	360.8	293.600		170	69.6	382.2	250.600	
175	67.7	358.8	287.200		175	68.9	380.3	244.800	
180	66.9	356.6	281.000		180	68.1	378.3	239.000	
185	66.1	354.4	274.700		185	67.3	376.2	233.300	
190	65.2	352.1	268.600		190	66.6	374.1	227.700	
195	64.4	349.7	262.400		195	65.8	371.8	222.000	
200	63.6	347.3	256.300		200	65.0	369.5	216.300	
205	62.7	344.7	250.100		205	64.2	367.1	210.800	
210	61.9	342.0	244.100		210	63.4	364.6	205.200	
215	61.0	339.3	238.100		215	62.6	362.0	199.800	
220	60.1	336.4	232.300		220	61.8	359.4	194.400	
225	59.3	333.5	226.400		225	60.9	356.6	189.100	
230	58.4	330.4	220.700		230	60.1	353.8	183.800	
235	57.5	327.2	215.000		235	59.3	350.8	178.500	
240	56.6	324.0	209.300		240	58.5	347.7	173.300	
245	55.7	320.6	203.600		245	57.6	344.6	168.200	
250	54.7	317.0	198.000		250	56.7	341.3	163.100	
255	53.8	313.4	192.500		255	55.9	338.0	158.100	
260	52.9	309.6	187.100		260	55.0	334.5	153.100	
265	51.9	305.8	181.700		265	54.1	330.9	148.200	
270	50.9	301.9	176.400		270	53.2	327.2	143.400	
275	50.0	297.6	171.100		275	52.3	323.3	138.600	
280	49.0	293.2	166.000		280	51.4	319.4	133.900	
285	48.0	288.8	160.800		285	50.5	315.3	129.200	
290	46.9	284.1	155.700		290	49.6	311.0	124.600	
295	45.9	279.3	150.700		295	48.6	306.7	120.100	
300	44.8	274.3	145.700		300	47.6	302.1	113.700	
305	43.7	269.1	140.700		305	46.7	297.4	103.600	
310	42.6	263.7	133.100		310	45.7	292.6	93.700	
315	41.5	258.1	121.800		315	44.6	287.6	83.800	
320	40.3	252.3	110.600		320	43.6	282.4	74.100	
325	39.1	246.2	99.600		325	42.6	277.0	64.400	
330	37.9	239.9	88.600		330	41.5	271.4	54.800	
335	36.7	233.2	77.800						
340	35.4	226.3	67.100						
345	34.0	219.0	56.500						



Rolled from CB&I's Memphis plant, the nuclear reactor pressure vessel is being lifted for upright placement into a cylindrical steel facility to undergo hydrostatic and other tests.



Control rod penetration holes—185 of them—were highlighted as the reactor vessel was lowered into the steel test "tank." Basic weight of the reactor vessel is 624 tons.

All About "Ichabod"

Muscular derrick at Memphis has 1,000-ton lift capacity

How do you lift up to a thousand tons of steel?

At Chicago Bridge & Iron Company's plant in Memphis, Tennessee, it can be done with a rotating stiffleg derrick—designed and built by CB&I—that is believed to be the largest of its type in the world.

Vessels produced at Memphis—which may weigh 1,000 tons or more—must be moved from the plant to the waterfront, set upright and tested, then loaded on barges for shipment to job sites.

CB&I couldn't buy equipment suited to its unique needs. It didn't exist. So the company designed and built it.

Construction began after months of study and planning, but within a year after breaking ground the facility was ready for testing and loading of the Memphis plant's first reactor.

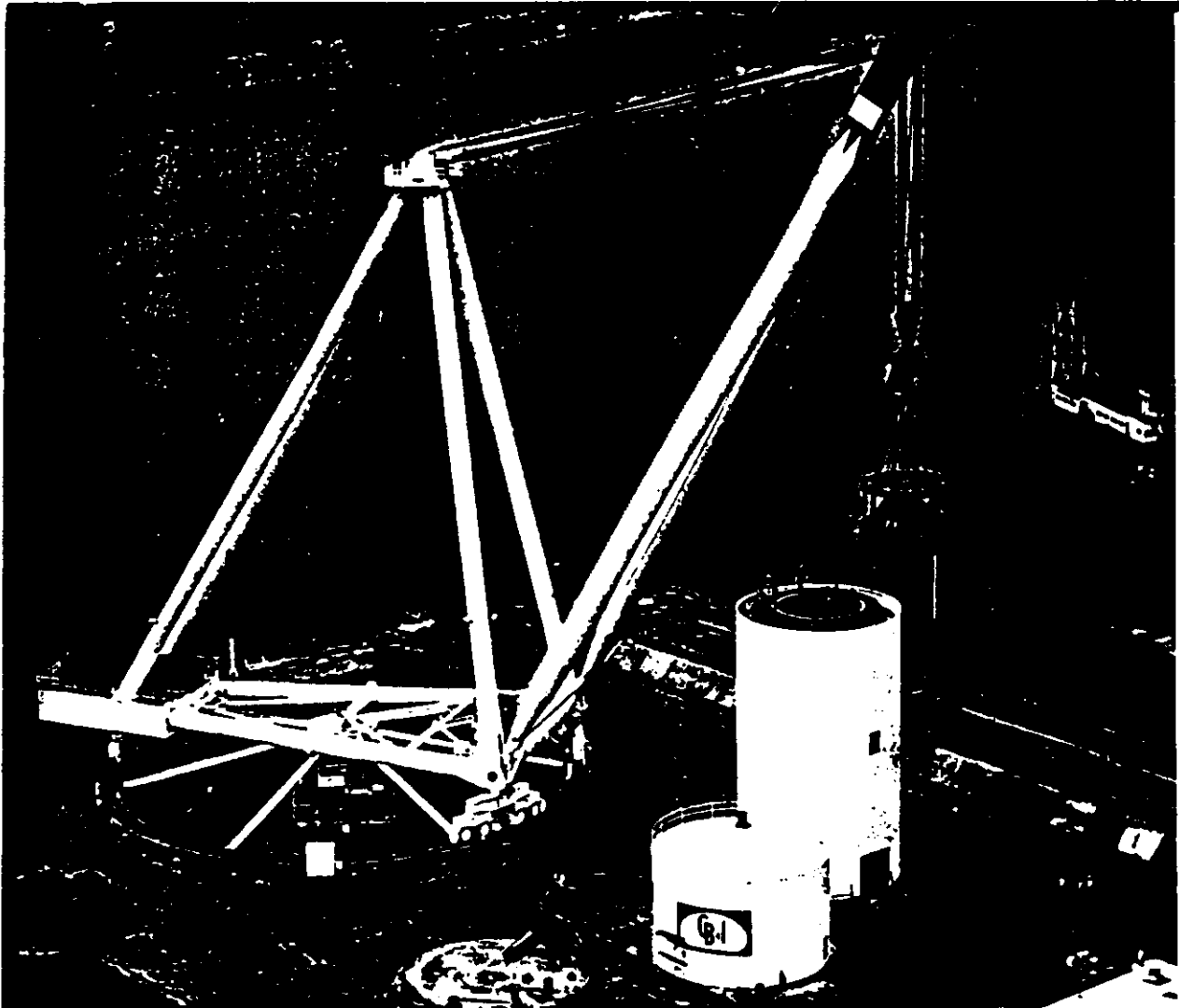
From a distance, the derrick looks like a huge prehistoric bird. The structure's mast head is 167 feet high and the boom tip—the structure's projecting "beak"—reaches 230 feet above ground.

Lifting capacity varies from 1,000 tons at short radius to 150 tons at maximum radius. Moreover, it is designed to handle loads up to 1,250 tons under controlled conditions. The jib has a capacity of 100 tons.

The hoist has five drums driven by an electric motor and is equipped with more than three miles of cable.

Rotation is accomplished by means of three carriages, each having 16 wheels and each powered by an electric motor. The carriages run on a pair of rails, which are supported on a concrete ring beam. This beam rests on concrete piles.

It takes only one man to operate the derrick. Loads can be lowered so slowly that it is difficult to observe movement and, if necessary, the huge derrick can be



Heavy steel head—weighing nearly 100 tons—is placed on nuclear reactor pressure vessel preparatory to testing. Specially designed by CB&I engineers (and whimsically named "Ichabod"), the derrick making the lift has a 1,000-ton capacity, is the largest of its type in the world. Top section of the cylindrical test facility is in the foreground.

rotated just a fraction of an inch. However, provision has been made for relatively high speed operation when handling light loads.

In addition to being able to handle pressure vessels, the derrick is suitable for use in assembling large structures such as drilling platforms or offshore storage tanks, and is capable of unloading virtually any material that may be delivered to the plant by water.

The waterfront complex, however, is more than just a derrick. Large, heavy vessels must be moved from the shop to the water, tested to exacting requirements, and loaded aboard barges on a river which may rise and fall 45 feet annually.

A retaining wall, consisting of six 60-foot diameter cylindrical steel cells projecting 60 feet above the river bottom, takes care of the river fluctuation. Stability for moving the vessels is provided by a four-track rail system. Cars yoked together are used for big pieces.

Testing and post-test inspection of vessels, which may require a month or more, requires protection from the weather. This is provided by a vertical tank-like test building made in sections. During testing, the upper section may be removed a dozen times.

The test building rests on a concrete pad. There are two other such foundations—one was used for the load test—plus a pad on which vessels are tilted upright or lowered to the horizontal position. Each pad is equipped with air, water, gas, oxygen, acetylene and electricity. To meet nuclear test requirements, there is a boiler to heat water and two demineralizers which render the water so pure that it will not conduct electricity. The whole test complex is lighted to permit around-the-clock operation.

Once again, CB&I employees have proved they are capable of meeting any challenge, anywhere—10,000 miles away or in their own backyard.

Big Loads Roll Lightly

New JXS heavy-haul system effectively controls axle loading, while providing higher speeds, more stability and a greater margin of safety

by WALT MOORE, Senior Editor

Nevada's gold-mining industry is flourishing these days, and mines such as FirstMiss Gold Inc., near Winnemucca, are installing new technology to process ore more efficiently. Part of FirstMiss Gold's new technology has included installation of three huge autoclaves, pressurized vessels that use steam, oxygen and sulfuric acid to initially process the ore. But before these massive vessels—each weighing 404,000 pounds—could be installed this past summer, they had to be moved 16 miles from the rail spur to the mine.

FirstMiss Gold realized that moving these immense loads over a combination of gravel and paved roads in the northwestern corner of the state would require the services of an experienced heavy-hauler. In anticipation of the moves, bids were solicited for the job nearly three years ago. One of the firms asked to quote was Jake's Crane & Rigging Inc., a large crane-rental and heavy-haul company headquartered in Las Vegas, Nev.

"When we were asked early this year if our bid was still good," says John Greer, the firm's business manager, "we had to dust it off and take another look. We'd bid the job based on using dollies—the best technology available at the time for moving loads like this, but obviously our costs for using that system had increased in three years."

In a dolly-system, a series of individual wheeled platforms are placed under the load at strategic locations, and often are connected

With one of the 202-ton autoclaves aboard, the new JXS transport system is powered by two Peterbilt tractors—one pulling, the other pushing.

with drawbars. While it's an oversimplification, the dolly-system used by the heavy-hauler is similar to the method employed by a furniture mover who places small wheeled platforms, dollies, under large, bulky pieces.

But the dolly-system has inherent disadvantages, Greer says. Placing a large, heavy load on the system is a long, complicated, labor-intensive process, which normally requires the hauler to fabricate expensive custom frames to mate the load to the dollies. And if the load has to be backed up more than a few feet, he says, each dolly normally has to be jacked up and rotated 180 degrees.

"Fortunately," says Greer, "we were just putting the finishing touches on our new JXS heavy-haul system when we got the call. Because the system uses trailer modules instead of dollies, loading time is only a fraction of what it would be with dollies. And since the trailers provide an integral hauling platform, very little custom fabricating is required."

The first time out

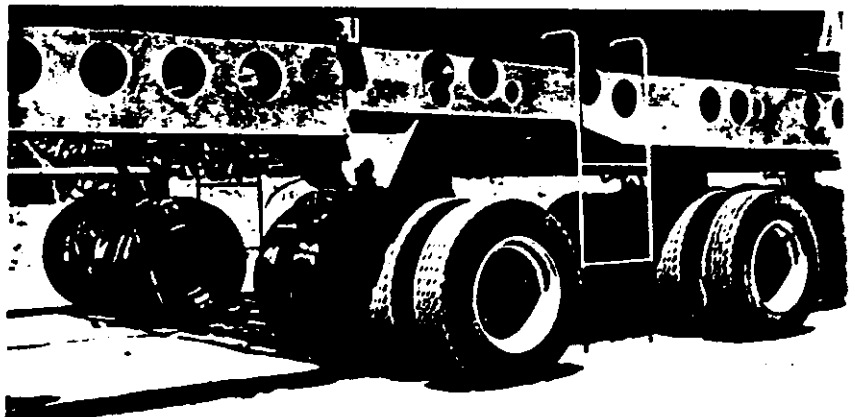
Based simply on the efficiency

and economy of its new JXS heavy-haul system, Jake's Crane & Rigging remained the low bidder for moving the mine's autoclaves.

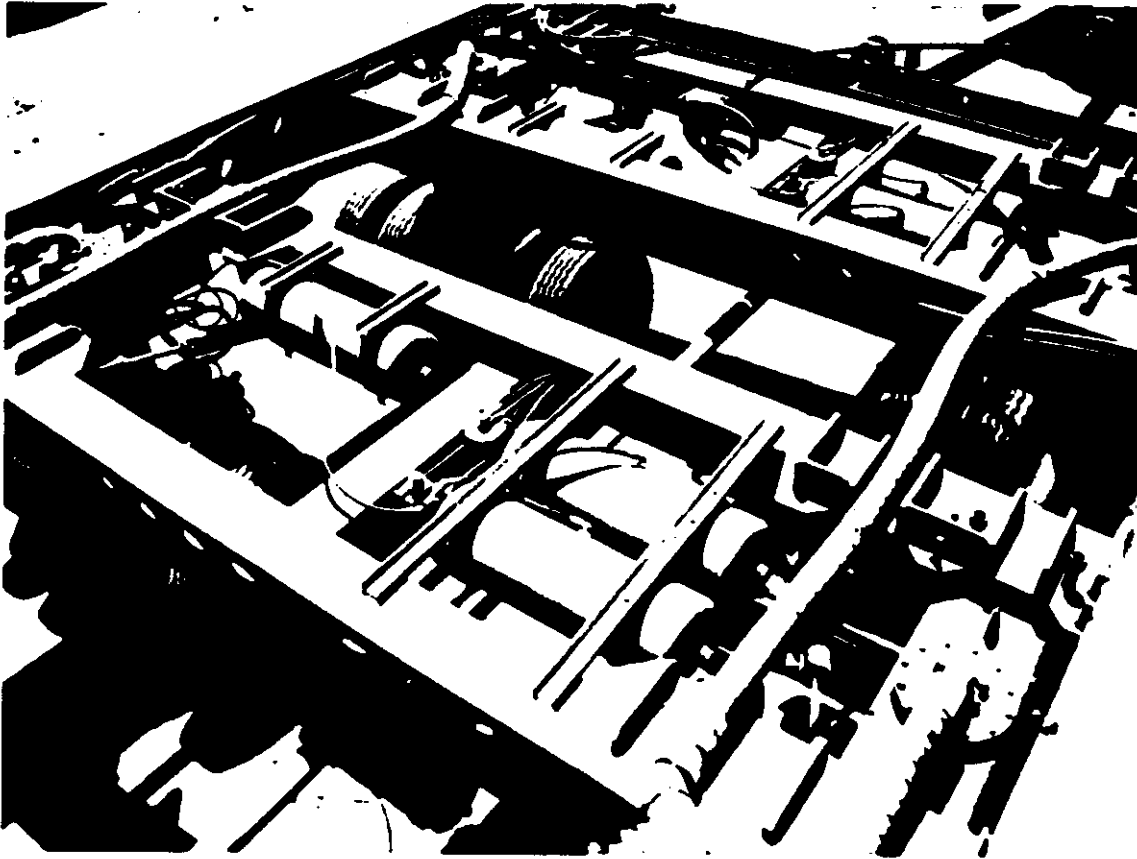
When the firm loaded the first vessel onto the new JXS trailers, the combined weight of the payload and transport system totalled 575,000 pounds. Except for the front axle, which carried only 20,000 pounds, all axles in the system carried nearly equal loads. And the maximum load on any of the system's tandem axles was 68,000 pounds—a weight that would be street-legal under almost any state's heavy-haul permitting system for an axle width of 14 feet.

"Not only did we protect the pavement from excessive axle-loading," says Bob Dieleman, president of Jake's Crane & Rigging, "we reached speeds of 23 mph on some parts of the haul. And since this was the first haul with the new system, we were being very conservative about speed."

Each "axle" in the JXS system consists of a pair of independent wheel assemblies located transversely across from each other. Note the pin connection between the two trailer modules.



Each axle is a pair of independent wheel assemblies



The hydraulic-over-nitrogen suspension system gives the JXS system the ability to react instantaneously to pavement deviations. For off-road hauling, the rear section of the system can be manually steered.

"With a dolly-system," says Dieleman, "you'd have been limited to maybe 2 or 3 mph on the route we used, and then you'd worry about a dolly kicking out from under the load if it hit a pothole. We think our new JXS trailer system has the potential to revolutionize heavy-hauling."

Jake's new JXS system

The new JXS heavy-haul system was developed jointly by Jake's Crane & Rigging and engineering consultant Jim McGhie, who, after 18 years as chief transport engineer with Amhoist, now owns Construction Equipment Design Co. in Eagan, Minn.

The JXS concept, essentially, is a system of modular trailers that can be configured into 11-, 13-, 17- or

21-axle versions, which include a three-axle pulling tractor. Using a patented suspension system, the JXS system, according to Dieleman, is designed to move payloads of up to 250 tons at highway speeds. And even at maximum load, the weight on any of the system's tandem axles would not exceed 70,000 pounds on an axle width of 14 feet.

Each axle in the JXS system is actually a pair of independent wheel assemblies located on opposite sides of the trailer module. Each assembly uses two sets of dual wheels, which are connected with a rigid axle. Each wheel assembly's axle, however, is pinned to a vertical hydraulic cylinder, a connection that allows the wheels to oscillate side to side to follow the pavement's contour.

The outer housing of each wheel-assembly cylinder is pinned to the trailer's frame. Actually, two pin-connection points are available for each assembly, allowing the axle to be either 12 feet or 14 feet wide.

The cylinder absorbs all vertical, rotational and moment loading, and serves as a bearing when the cylinder rod rotates to steer the wheel assembly.

Coordinated steering of all the wheel assemblies is handled by a mechanical/hydraulic system that senses movement at the pulling tractor's fifth wheel. Each wheel assembly also is equipped with its own air-actuated, drum-brake system that meets federal highway regulations.

The secret's in the suspension

At the heart of the new JXS transport system is its hydraulic-over-nitrogen suspension system. Although suspension plumbing differs slightly depending on the exact configuration of a JXS trailer module, the hydraulic suspension cylinders for two adjacent wheel assemblies, on the same side of the trailer, typically are interconnected with a nitrogen-pressurized accumulator system.

"The beauty of this true floating

suspension system," says Kent Goodman, Jake's vice president of operations, "is its ability to react instantaneously to pavement deviations. The accumulator system, coupled with the long, 18-inch stroke of the wheel-assembly cylinders, makes it virtually impossible to get axle overload or point-loading."

Because the system reacts so quickly to pavement contour, Goodman says, positive tire contact is maintained, and dynamic loading of the pavement is virtually eliminated. Dynamic loading, a proven enemy of any paved surface, occurs when a slow-acting or inflexible suspension system allows a vehicle's wheels to bounce, momentarily creating loads that exceed the load of a static axle.

The suspension system also provides other unique advantages. By using the hydraulic power-pack, an integral part of the JXS system, the suspension cylinders can be used to adjust the height and attitude of the load. A control panel on each trailer module allows adjustment of the suspension cylinders and also incorporates gauges that provide a direct reading of each axle's load. This feature eliminates the time-consuming process of running each axle over a scale to verify weight.

Laboratory tested

According to Greer, the firm was extremely pleased with the JXS system's performance on its first job. But perhaps even more encouraging, he says, are the results from a test conducted by the University of California, Berkeley. In the test, the JXS suspension system was compared to systems using air-bag, leaf-spring and walking-beam suspensions.

Each of the systems was evaluated on a shaking table at the University's Earthquake Engineering Research Center. The objective of the test, according to Dr. Jorge Sousa, a principal researcher on the project, was to investigate the relative level of pavement damage caused by heavily loaded truck trailers equipped with different types of suspension systems.

A report issued to summarize the results of the test states that "an alternative method for comparing trailers is to compute the amount of payload a trailer can carry over the life of a pavement.



This value can be computed by multiplying the number of passes the pavement can withstand by the total load carried with each pass."

"By applying this currently adopted methodology," says Sousa, "it is clear that a JXS-14 trailer is capable of carrying more load over the life of the pavement section considered than any other trailer studied."

Building on success

Because the new JXS transport system is based on a modular concept, says Dieleman, it has the potential for a wide range of configurations. An idea the firm presently is developing entails a system of modular goosenecks, which can be fifth-wheel mounted to the JXS trailer modules.

With the new gooseneck system, the JXS concept can be expanded by fitting a low-bed platform between two trailer modules. Or, the goosenecks can be fitted with custom adaptors that connect directly to the load and make the load an

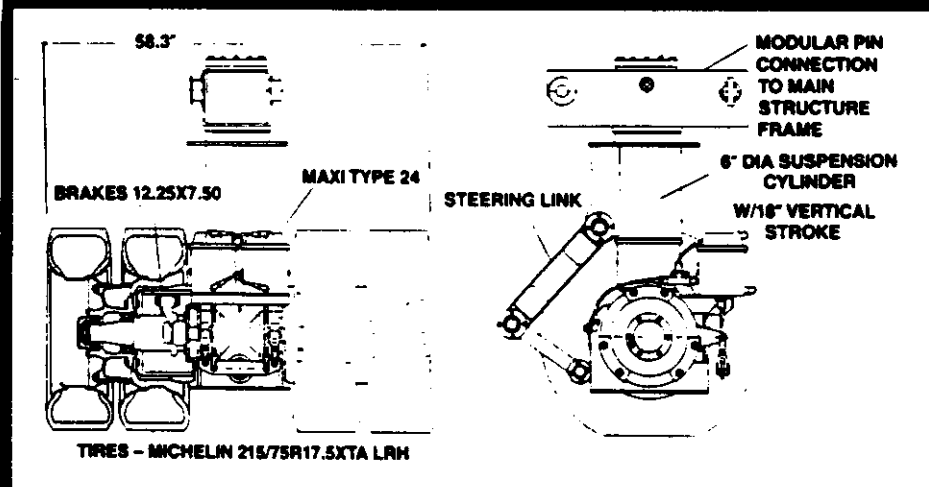
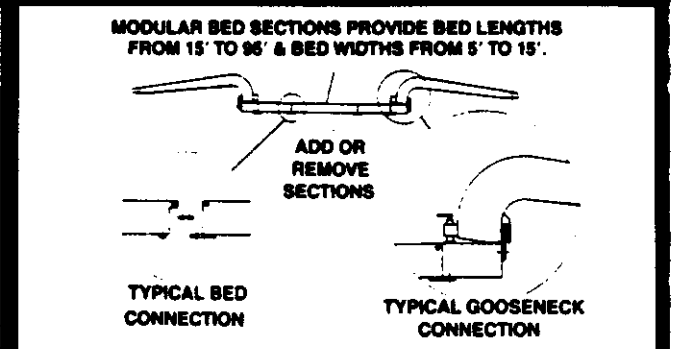
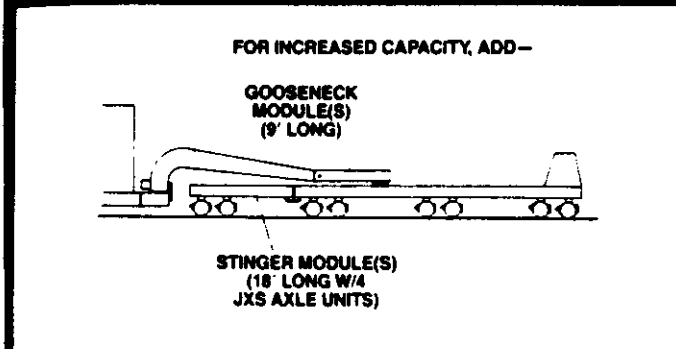
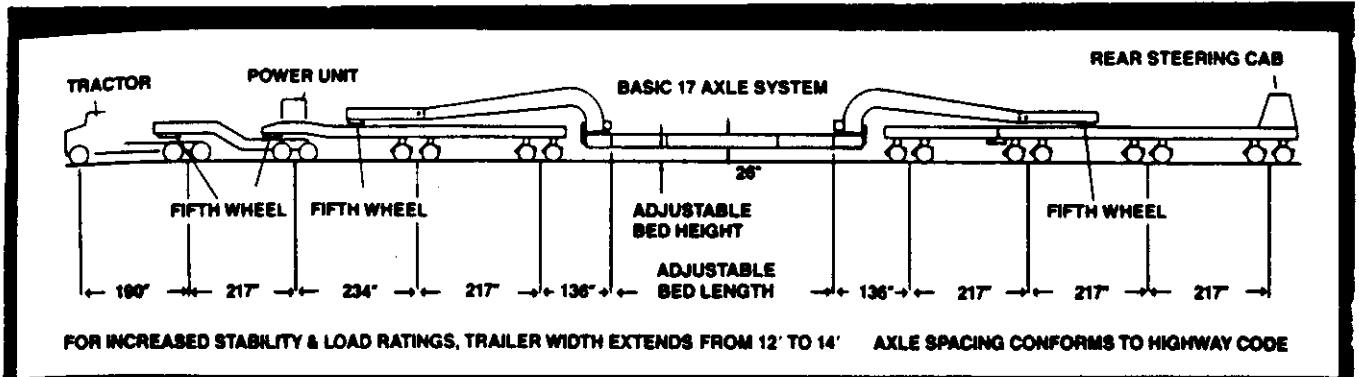
When the new JXS suspension system was evaluated on a shaker table by the University of California, Berkeley, it was found superior to the other systems tested in its ability to carry more load over the life of a pavement section.

integral part of the transport system—commonly called a "Schnabel hookup." This arrangement allows the load to sit low, facilitating the movement of high loads.

What does Jake's Crane & Rigging expect from the new JXS system?

"It should help us expand the heavy-haul side of our business," says Greer, "and that's important these days, because the crane-rental business is so competitive. With the JXS system we can compete with other heavy-haul systems designed for highway travel, but which normally are limited to carrying around 140 tons. We think our new system also gives us the potential to compete with the railroads on cross-country hauls." □

APPENDIX D1 JAKE'S HEAVY TRANSPORT SYSTEM SHT D1-4



JAKE'S

CRANE, RIGGING & TRANSPORT INTERNATIONAL

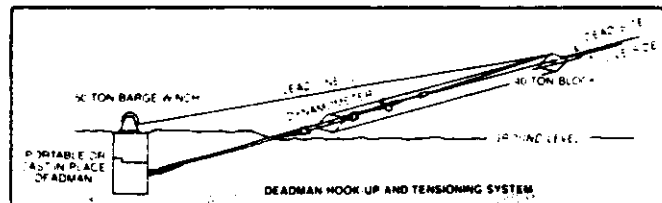
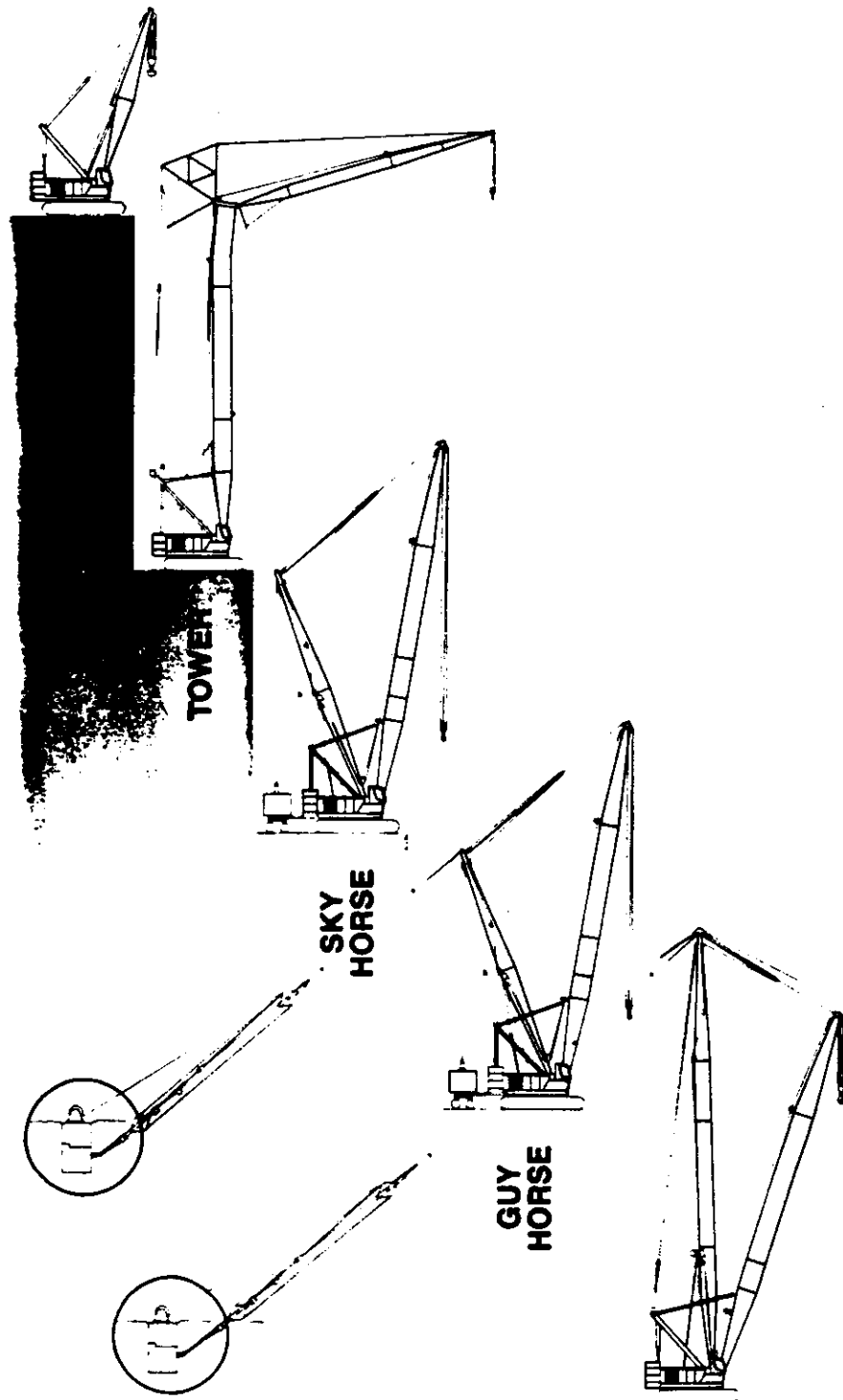
1-800-553-JAKE

6109 INDUSTRIAL ROAD
 LAS VEGAS, NEVADA 89116 USA
 FAX 1-702-736-1582

TYPICAL JXS HIGHWAY PAYLOADS* (1,000 lbs.)

LOAD SUPPORT CONFIGURATIONS**		TFLR DIRECT	SCHNABEL	SIDE-BEAM BRIDGE		OPEN GOOSENECK		CLOSED GOOSENECK	
		Any Length Load	Any Length Load	16' Clear Span	86' Clear Span	16' Clear Deck	56' Clear Deck	16' Clear Deck	86' Clear Deck
12' WIDE:	13 AXLE	270	228	234	201	219	200	NA	NA
	17 AXLE	363	317	320	285	NA	NA	260	260
	21 AXLE	456	351	394	352	NA	NA	NA	NA
14' WIDE:	13 AXLE	301	260	265	232	251	230	NA	NA
	17 AXLE	407	362	364	329	NA	NA	324	304
	21 AXLE	500	408	450	408	NA	NA	NA	NA

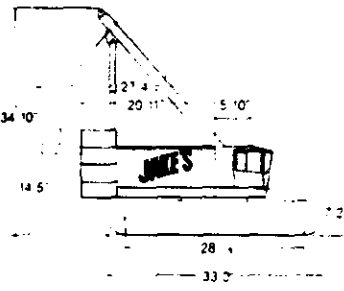
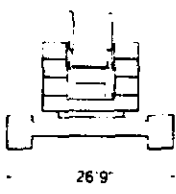
FOOTNOTES:
 *California legal loadings. Depending on load support methodologies, off-highway payloads can be approximately 90% higher.
 **Typical. Other axle combinations and support structures and lengths are also available.



**GUY
DERRICK**

CAPACITY CHARTS

AMERICAN MODEL 11320

Side View of Crane 	Radius in Feet	Conventional		Sky Horse		Guy Derrick																																															
		Boom Length	Lift Ratings	Boom Length	Lift Ratings Over Side	Lift Ratings Over End	Boom Length	Full Hoisting Capacity	Limited Hoisting Capacity																																												
End View of Crane 	17	70 PL. Boom	900000	100 PL. Boom	750000	750000	100 PL. Boom																																														
	20		758510							100 PL. Boom, 100 PL. Mast	681990	681990	1200000	1200000																																							
	25		574380												100 PL. Boom, 100 PL. Mast	560300	560300	865850	865850																																		
	28		496806																	100 PL. Boom, 100 PL. Mast	360940	360940	590710	590710																													
	30		445090																						100 PL. Boom, 100 PL. Mast	240450	240450	396820	396820																								
	35		348650																											100 PL. Boom, 100 PL. Mast	155370	155370	274450	274450																			
	50		208680																																100 PL. Boom, 100 PL. Mast	92990	92990																
	70	123670	100 PL. Boom, 100 PL. Mast																																																		
	100							100 PL. Boom, 100 PL. Mast																																													
	130		100 PL. Boom, 100 PL. Mast																																																		
	150							100 PL. Boom, 100 PL. Mast																																													
	31	170 PL. Boom	362810	200 PL. Boom, 140 PL. Mast	345090	345090	200 PL. Boom, 270 PL. Mast																																														
	35		312590					200 PL. Boom, 140 PL. Mast	281110	281110	550000	588520																																									
	41		268500												200 PL. Boom, 140 PL. Mast	231620	231620	550000	570080																																		
	60		159200																	200 PL. Boom, 140 PL. Mast	167800	167800	410840	410840																													
70	129410		200 PL. Boom, 140 PL. Mast																						114270	114270	314180	314180																									
90	92390																												200 PL. Boom, 140 PL. Mast	83360	83360	247870	247870																				
120	62060																																	200 PL. Boom, 140 PL. Mast	62830	62830	197300	197300															
150	45150	200 PL. Boom, 140 PL. Mast	48900	48900	137620	137620																																															
180							200 PL. Boom, 140 PL. Mast																																														
210		200 PL. Boom, 140 PL. Mast																																																			
250							200 PL. Boom, 140 PL. Mast																																														
45	200 PL. Boom	168250	200 PL. Boom, 270 PL. Mast	124500	124500	200 PL. Boom, 270 PL. Mast																																															
50		167700					200 PL. Boom, 270 PL. Mast	119410	119410	189870	189870																																										
60		142220												200 PL. Boom, 270 PL. Mast	83030	83030	189870	189870																																			
89		85750																	200 PL. Boom, 270 PL. Mast	53350	53350	189870	189870																														
110		64080																						200 PL. Boom, 270 PL. Mast	35880	35880	158040	158040																									
140		44210																											200 PL. Boom, 270 PL. Mast	23340	23340	131500	131500																				
180		28130																																200 PL. Boom, 270 PL. Mast	14320	14320	108500	108500															
220		16850																																					200 PL. Boom, 270 PL. Mast	6220	6220	84240	84240										
260		6590																																										200 PL. Boom, 270 PL. Mast									
300																																																	200 PL. Boom, 270 PL. Mast				
350																																																					

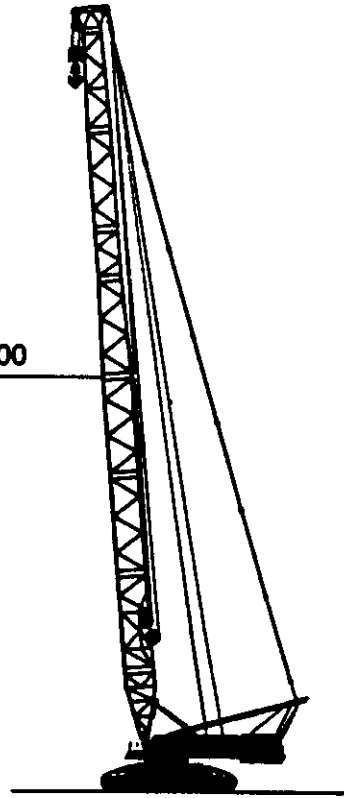
NOTE: Capacity ratings, shown in pounds, are typical and for reference only. They are not intended to replace American's charts of capacity "ratings".

Memo to: Ray Stefanski
July 12, 1990
Page 44

APPENDIX E. ANTHONY - DEMAG CC-12000 SH/LH SHT E-1

Typ 900/800
54-90 m

SH/LH



Tragfähigkeiten mit Hauptausleger
Main-Boom Lifting Capacities
Forces de levage avec flèche
Capacità di sollevamento con braccio principale

SH/LH

400 t		Gegengewicht Counterweight de contrepoids di contrappeso				75%	360°
Ausladung Radius Portée Strada	Hauptauslegerlänge · Length of Main Boom · Longueur de flèche · Lunghezza braccio					Ausladung Radius Portée Strada	
	54 m	66 m	78 m	90 m			
m	t	t	t	t	m		
10	950	-	-	-	10		
12	930	930	-	-	12		
14	910	910	959	936	14		
16	789	794	795	746	16		
18	661	648	632	615	18		
20	561	560	535	520	20		
22	485	475	461	447	22		
24	428	416	403	389	24		
26	379	369	356	343	26		
28	339	330	317	304	28		
30	306	297	285	272	30		
34	255	246	234	222	34		
38	216	208	196	183	38		
42	187	179	166	153	42		
46	157	154	142	129	46		
50	128	135	122	107	50		
54	-	119	106	90	54		
58	-	99	91	76	58		
62	-	-	79	64	62		
66	-	-	64	-	66		

Anmerkungen über Tragfähigkeiten

Tragfähigkeiten überschreiten nicht 75% der Kipplast und entsprechen DIN 15019.2 (Prüflast = 1,25 x Hublast + 0,1 x Auslegergewicht, auf die Auslegerspitze reduziert).

Das Gewicht der Unterflaschen, sowie der Lastaufnahmemittel, ist Bestandteil der Last und ist von den Tragfähigkeitsangaben abzuziehen.

Kranbetrieb bei max. Auslegerlänge zulässig bis:

Staudruck 60 Nm²
 Windgeschwindigkeit 9,8 m/s
 Windfläche der Last 1 m²/t Last

Die Auenutzung der maximalen Tragfähigkeit nach der Tabelle setzt eine völlig ebene und tragfähige Aufstandsfläche voraus. Bei Schräglage und Fahren über unebenes Gelände sind Auslegerlängen und Last zu reduzieren.

Weitere Angaben über höhere Windgeschwindigkeiten in der Bedienungsanweisung des Kranes.

Crane-Capacity Notes

Gross capacities do not exceed 75% of tipping load and are in conformance with DIN 15019.2 (test load = 1.25 x lifting load + 0.1 x dead weight of boom reduced to boom point).

The weight of hook block and all other load-handling accessories is considered part of the load, and suitable allowance for them should be made.

Crane with maximum length of boom can still operate safely up to a

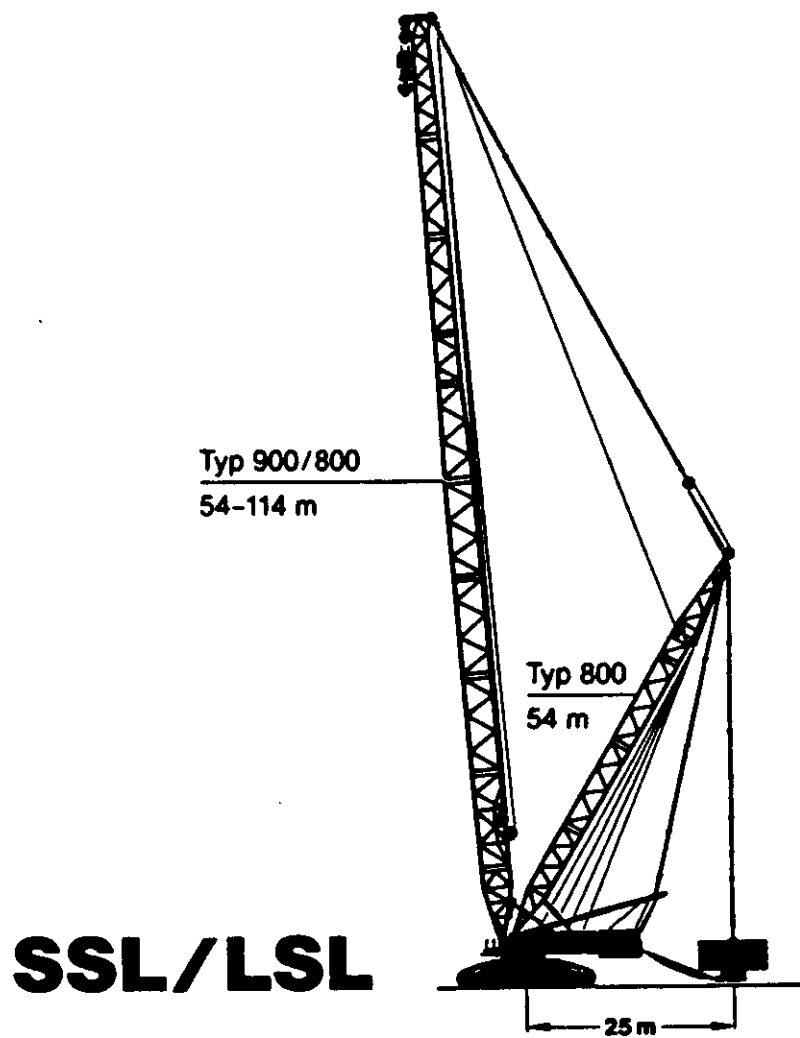
Wind Pressure of 60 Nm²
 and a Wind Speed of 9.8 m/s
 Wind Surface of Load 1 m²/t load

The maximum safe loads shown in the charts depend on a firm, level, uniformly supporting surface. Shorter boom lengths and lower capacities apply to sloping positions and travel over uneven ground.

Consult operation manual for further particulars and higher wind speeds.

Memo to: Ray Stefanski
July 12, 1990
Page 46

APPENDIX E. ANTHONY - DEMAG CC-12000 SSL/LSL SHT E-3



APPENDIX E. ANTHONY - DEMAG CC-12000 SSL/LSL SHT E-4

Tragfähigkeiten mit Superlift
 Lifting Capacities with Superlift
 Forces de levage avec Superlift
 Capacità di sollevamento con Superlift

SSL/LSL

400 t Gegengewicht Counterweight da contrappeso di contrappeso 75% 360°

Hauptausleger Main Boom Piazzo Braccio	Ausladung Radius Portée Strada	Superlift-Gegengewicht (t) Superlift Counterweight (t) Contrappeso da Superlift (t) Contrappeso di Superlift (t)			
		0	400	600	1000
		m	t	t	t
54 m	10	880	-	-	-
	12	880	-	-	-
	14	880	-	-	-
	16	880	-	-	-
	18	880	-	-	-
	20	880	-	-	-
	22	880	-	-	-
	24	880	-	-	-
	26	880	-	-	-
	28	880	-	-	-
	30	880	-	-	-
	32	880	-	-	-
	34	880	-	-	-
	36	880	-	-	-
66 m	10	880	-	-	-
	12	880	-	-	-
	14	880	-	-	-
	16	880	-	-	-
	18	880	-	-	-
	20	880	-	-	-
	22	880	-	-	-
	24	880	-	-	-
	26	880	-	-	-
	28	880	-	-	-
	30	880	-	-	-
	32	880	-	-	-
	34	880	-	-	-
	36	880	-	-	-
78 m	10	880	-	-	-
	12	880	-	-	-
	14	880	-	-	-
	16	880	-	-	-
	18	880	-	-	-
	20	880	-	-	-
	22	880	-	-	-
	24	880	-	-	-
	26	880	-	-	-
	28	880	-	-	-
	30	880	-	-	-
	32	880	-	-	-
	34	880	-	-	-
	36	880	-	-	-
90 m	10	880	-	-	-
	12	880	-	-	-
	14	880	-	-	-
	16	880	-	-	-
	18	880	-	-	-
	20	880	-	-	-
	22	880	-	-	-
	24	880	-	-	-
	26	880	-	-	-
	28	880	-	-	-
	30	880	-	-	-
	32	880	-	-	-
	34	880	-	-	-
	36	880	-	-	-
102 m	10	880	-	-	-
	12	880	-	-	-
	14	880	-	-	-
	16	880	-	-	-
	18	880	-	-	-
	20	880	-	-	-
	22	880	-	-	-
	24	880	-	-	-
	26	880	-	-	-
	28	880	-	-	-
	30	880	-	-	-
	32	880	-	-	-
	34	880	-	-	-
	36	880	-	-	-

THE STRAND LIFT

This lift system is designed for high lift/lower of large tonnage loads. Each cluster uses 6-270 grade standard pre-stress strand available worldwide.

The system offers a central control console for precise lifting and lowering and uses standard hydraulic components. For complete safety, loads can be mechanically locked off at any point. Variable speeds are possible depending on strand cluster, size and number. Each pump can handle up to four lift clusters.

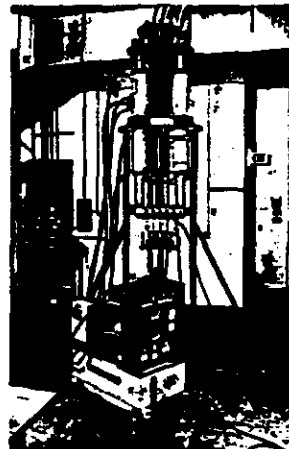
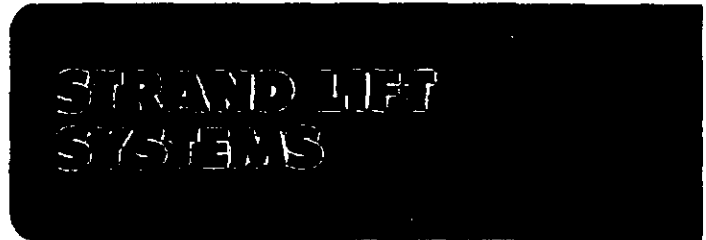
THE APPLICATIONS

- Tubines
- Stators
- Stamping and Forming Presses
- Heavy Machinery
- Pressure Vessels (rigging)
- Bridge Construction
- Concrete Slabs
- Load Skidding
- Refurbishing Container Cranes

SYSTEM OPERATION

Three ENERPAC Cylinders are mounted between two plates. Each plate has tapered holes through which the strands pass. The taper allows hydraulically activated chucks to seat in contact with the strand, locking it in place.

During lifting, the top strand chuck is seated, and the bottom chuck is in the open position. The jacking cylinders then extend to the limit of their stroke. At this point, the bottom strand chuck seats, the top chuck moves into the open position, the jacking cylinders retract and another cycle begins. In the lowering process, these steps are reversed.



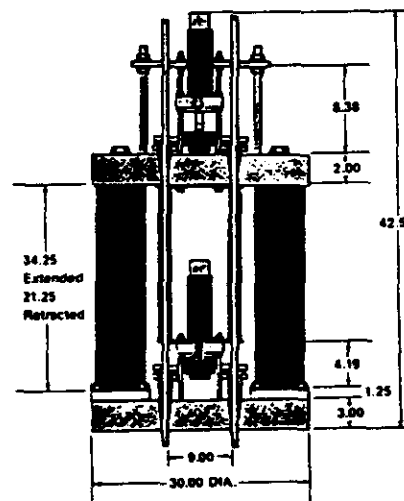
Prior to field release, strand lift system goes through testing to verify performance capabilities.

Strand lift pump (shown) can operate up to four (4) clusters.
ORDER MODEL NO. PST-8418

Specifications:

- 12 H.P.
- 220/440 VAC
- 50/60 Cycle
- 3 Phase

DIMENSIONS ST-132
 (In Inches)



STRAND LIFT CLUSTER SELECTION CHART

Cap. (Tons)	Description	Lifting Speed*	Order Model No.
66	6 Strand Cluster	50 ft/hr	ST-66
88	8 Strand Cluster	37 ft/hr	ST-88
132	12 Strand Cluster	25 ft/hr	ST-132

*Lifting speed shown is with PST-8418 pump powering two (2) given cluster sets.

Need help with your lifting application?
 Write ENERPAC, P.O. Box 325, Milwaukee, WI 53201-0325 or call 1-800-433-2766 with your specifications.

For extra chucks —
 Order Model No. SC-11

ATTACHMENT 2

GANTRY CRANE DIMENSIONS.

Letter

Jim Nelson of Ederer Incorporated to Ron Hoffmann
December 26, 1990
reference: Interaction Stations Gantry Cranes

EDERER
INCORPORATED

E EDERER
CRANES
W WASHINGTON
CRANES
S STAR
CRANES

26 December 1990

Ron Hoffman
c/o Superconducting Super Collider Laboratory
2550 Beckleymeade Avenue
Mail Stop 2000
Dallas, TX 75237-3946

Reference: Interaction Stations Gantry Cranes

Dear Ron:

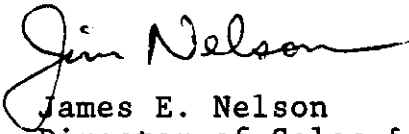
Per your request, we have produced a diagram and chart of preliminary dimensions for gantry cranes.

Please keep in mind that the enclosed information is only approximate. For all the cranes, and particularly for the 500 ton to 1500 ton cranes, dimensions may be affected by design choices made by the manufacturer as well as final specifications.

Please let us know if we may be of further service.

Very truly yours,

EDERER INCORPORATED



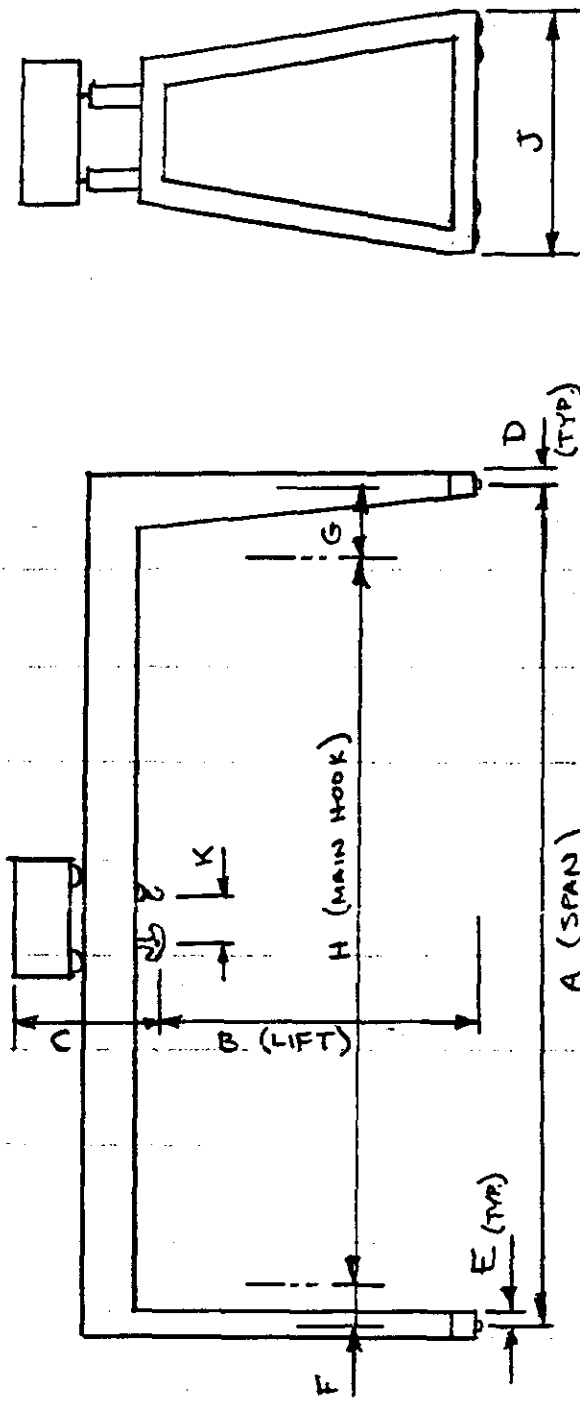
James E. Nelson
Director of Sales & Marketing

jen:ta

enclosure



Subject: SUPERCONDUCTING SUPER COLLIDER
PRELIMINARY CRANE DIMENSIONS



	A	B	C	D	E	F	G	H	J	K
50 TON	150'	75'	8'-6"	2'-0"	3'-0"	4'-6"	8'-0"	137'-6"	25'	6'-0"
100 TON	150'	75'	10'-0"	2'-0"	3'-0"	6'-0"	9'-0"	135'	28'	6'-0"
200 TON	150'	75'	12'-0"	2'-0"	3'-0"	7'-6"	9'-6"	133'	30'	6'-0"
500 TON	150'	75'	20'-0"	2'-6"	4'-0"	11'-0"	14'-0"	125'	36'	7'-6"
1000 TON	150'	75'	25'-0"	2'-6"	6'-0"	18'-0"	22'-0"	110'	42'	10'-0"
1500 TON	150'	75'	30'-0"	2'-6"	6'-0"	20'-0"	24'-0"	106'	54'	12'-0"

Rev.	Descr.	Date	By	Chkd.	Appd.

ATTACHMENT 3

GANTRY CRANE COSTS.

Memorandum
Ron Hoffmann to Ray Stefanski
September 17, 1990
subject: Cost of Gantry Cranes.

*Superconducting Super Collider Laboratory
2550 Beckleymeade, Building 4
Dallas, Texas 75237-3946*

Conventional Construction Division

TO: Ray Stefanski
FROM: Ron Hoffmann *R.H.H.*
DATE: September 17, 1990
SUBJECT: Cost of Gantry Cranes

In accordance with your request, I have obtained rough cost information on gantry cranes. My source has been business acquaintances at Ederer Corporation in Seattle, Washington with whom I have worked in the past. Ederer is not the only company in this country who can provide the types of cranes discussed herein, but the cost information obtained should be good, middle-of-the-road, numbers.

The information on the first three gantry cranes discussed below was obtained from Jim Nelson by phone on August 29, 1990. The information on the fourth crane is summarized from Neil Skogland's letter of September 7, 1990 which is attached to this memorandum.

1. Lift Capacity- 50 short tons (100,000 lbs.)
Span- 80 ft.
Hook Height Above Grade- 26 ft.
Lift- 26 ft.
Rough Estimated Cost- \$500,000
2. Lift Capacity- 100 short tons (200,000 lbs.)
Span- 100 ft.
Hook Height Above Grade- 50 ft.
Lift- 50 ft.
Rough Estimated Cost- \$1,000,000
3. Lift Capacity- 200 short tons (400,000 lbs.)
Span- 100 ft.
Hook Height Above Grade- 50 ft.
Lift- 50 ft.
Rough Estimated Cost- \$1,500,000
4. Lift Capacity- 1,500 short tons (3,000,000 lbs.)
Span- 164 ft. (50m)
Hook Height Above Grade- 66 ft (20m)
Lift- 263 ft (80m)
Rough Estimated Cost- \$10,000,000 plus?

A final note: I have very high regard for Ederer's work based on past experience and recommend that they be included in all bidders lists for cranes, either bridge or gantry.

cc. S. Archer, J. Sanford, T. Toohig, R Tener, M. Harris.



7 September 1990

Ron Hoffmann
c/o Superconducting Supercollider Laboratory
2550 Beckleymeade
Building 4, Mail Stop 2011
Dallas, TX 75237-3946

Reference: Interaction Stations Gantry Cranes

Dear Ron:

Thank you for thinking of Ederer when considering the requirements for large capacity cranes for the Superconducting Supercollider project. We are sorry that it has taken a while to respond, but we would like to express a high interest level in the project.

As you know, Ederer specializes in crane requirements that are beyond the ordinary, and the proposed gantry cranes certainly qualify as extraordinary. While Ederer has designed and manufactured cranes of 320 foot span, 240 foot lift, and 700 tons capacity, the combination of high capacity, lift, and span together make the interaction station crane requirements truly exciting.

Ederer has performed preliminary design for the crane with the following assumptions:

- 1500 short ton capacity (3,000,000 pounds)
- 50 meter span
- 80 meter total lift, 20 meters from grade to high hook
- 1 meter per minute maximum hoist speed fully loaded; 200:1 hoist control speed range to allow minimum main motor speed of 5 millimeters per minute. 250% field weakening to allow up to 2.5 - 3.0 MPM unloaded hook speed.
- Separate variable speed clutched micro motor with maximum speed of 150 millimeters per minute, with position control loop allowing over 1000:1 speed range, positioning within fractions of a millimeter.
- Multiple layer drums with level wind devices spooling large-scale (over 1½" dia.) high-strength wire rope.

Superconducting Supercollider Project
Ron Hoffmann
7 September 1990



Page 2

Design Assumptions (continued)

Ederer's X-SAM® (eXtra Safety And Monitoring) hoist safety system. The X-SAM system not only offers a second load path for a single-failure-proof system, but also manages the hoist's high speed energy to allow the hoist to withstand the types of incidents which cause other hoists to fail and drop the load.

Other hoist and crane construction details consistent with the class and service of this special application.

Ederer would likely offer a torsionally loaded single girder gantry design for this application, similar to our long-span log cranes and our 320'-0" span gantry for McDonnell Douglas (although at a much larger scale than the 10 ton Douglas crane!). The single girder design offers crane weight economy, and minimizes the number of structural pieces required, which we consider important for an application where the crane will be moved from site to site.

Concerning erection of the crane and transit between interaction stations, our preliminary estimate shows a girder weight of approximately 1.5 million pounds. Ederer assumes that the crane will be erected on-site using prefabricated structure, with significant assembly required. Ederer assumes that crawler transporters will be used to move the nearly 4,000,000 pound structure from station to station without having to completely disassemble it into manageable pieces.

As you suggested during our telephone conversation, we will certainly be prepared to consider creative means to handle the extreme loads involved; standard crane practices such as using 36" maximum diameter wheels on 171# rail may not be practical for runway support. Ederer is investigating use of lubricated Teflon sliding surfaces or high-pressure water films to support the gantry, allowing even load distribution over a large area.

For budget planning purposes, Ederer expects that the crane described would cost in the range of 8 to 10 million dollars for the equipment FOB the Supercollider site, not including one-time erection costs or transporter.

Superconducting Supercollider Project
Ron Hoffmann
7 September 1990



Page 3

We hope that this information is helpful. We would be pleased to meet discuss the crane project further, and hope that we have a chance to meet with you soon.

Very truly yours,

EDERER INCORPORATED

A handwritten signature in black ink, appearing to read 'Neil Skogland'.

Neil Skogland
Manager, Special Projects.

NES/mmo

ATTACHMENT 4

BRIDGE CRANE DIMENSIONS

Excrete

Overhead Crane Handbook

published by Whiting Corporation

fourth edition, 1979

5 TO 50 TON, PENDANT CONTROL

pages 38 through 51.

10 TO 50 TON, CAB CONTROL

pages 52 through 63.

60 TO 500 TON, PENDANT OR CAB CONTROL

pages 64 through 79

Part A—Pendant Control

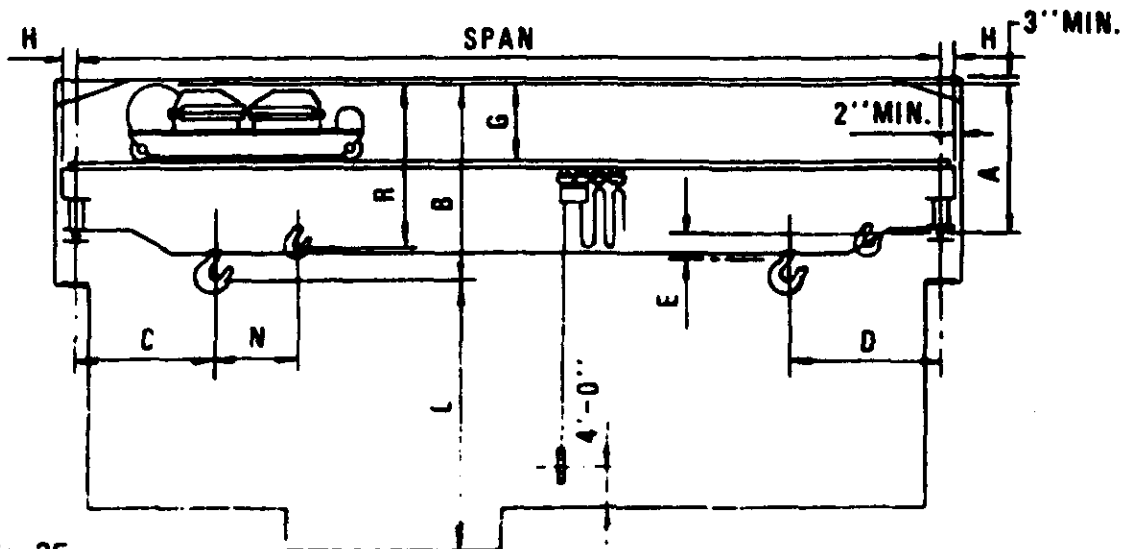


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L	
5 TON NO AUX. For each 17'-0" add 1 ft., add 12" to J and K, and add 6" to X and Y.	20'0"	4'5"	4'10"	2'6"	2'9"	5"	2'7"	6"	8'8"	6'0"	56'7"	
	30'0"	4'5"	4'10"	2'6"	2'9"	5"	2'7"	6"	8'8"	6'0"	56'7"	
	40'0"	4'5"	4'7"	2'6"	2'9"	5"	2'4"	6"	8'8"	6'0"	56'7"	
	50'0"	4'6"	4'5"	2'6"	2'9"	5"	2'2"	6"	8'8"	6'0"	56'7"	
	60'0"	4'6"	4'5"	2'6"	2'9"	5"	2'2"	6"	8'8"	6'0"	56'7"	
	70'0"	4'4"	4'5"	3'0"	3'6"	1'0"	2'2"	6"	12'0"	6'0"	56'7"	
	80'0"	4'4"	4'5"	3'0"	3'6"	1'4"	2'2"	6"	12'0"	6'0"	56'7"	
10 TON NO AUX. For each 11'-0" add 1 ft., add 12" to J and K, and add 6" to X and Y.	20'0"	4'5"	5'0"	2'6"	2'9"	5"	2'7"	6"	8'8"	7'0"	49'6"	
	30'0"	4'5"	5'0"	2'6"	2'9"	5"	2'7"	6"	8'8"	6'0"	37'9"	
	40'0"	4'6"	4'7"	2'6"	2'9"	5"	2'2"	6"	8'8"	7'0"	49'6"	
	50'0"	4'6"	4'7"	2'6"	2'9"	5"	2'2"	6"	8'8"	6'0"	37'9"	
	60'0"	4'9"	4'7"	2'6"	2'9"	5"	2'2"	6"	8'8"	7'0"	49'6"	
	70'0"	4'10"	4'7"	3'0"	3'6"	10"	2'2"	6"	12'0"	6'0"	37'9"	
	80'0"	4'10"	4'7"	3'0"	3'6"	1'3"	2'2"	6"	12'0"	7'0"	49'6"	
15 TON NO AUX. For each 7'-0" add 1 ft., add 12" to J and K, and add 6" to X and Y.	20'0"	4'5"	5'7"	2'6"	2'9"	5"	2'7"	6"	8'8"	6'0"	22'8"	
	30'0"	4'6"	5'2"	2'6"	2'9"	5"	2'2"	6"	8'8"	7'0"	29'8"	
	40'0"	4'6"	5'2"	2'6"	2'9"	5"	2'2"	6"	8'8"	8'0"	36'8"	
	50'0"	4'6"	5'2"	2'6"	2'9"	5"	2'2"	6"	8'8"	7'0"	29'8"	
	60'0"	4'9"	5'2"	2'6"	2'9"	5"	2'2"	6"	8'8"	8'0"	36'8"	
	70'0"	4'9"	5'2"	2'6"	2'9"	5"	2'2"	6"	8'8"	6'0"	22'8"	
	80'0"	4'10"	5'2"	3'0"	3'6"	1'2"	2'2"	6"	12'0"	7'0"	29'8"	
										12'0"	8'0"	36'8"
										13'0"	9'0"	43'8"
										12'0"	7'0"	29'8"
										12'0"	8'0"	36'8"
									13'0"	9'0"	43'8"	

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL
 FOR MOTORIZED VERT. TRAVEL USE 2'-0"-18 TO 48 FT. LIFT
 3'-0"-48 TO 60 FT. LIFT
 4'-0"-60 TO 100 FT. LIFT

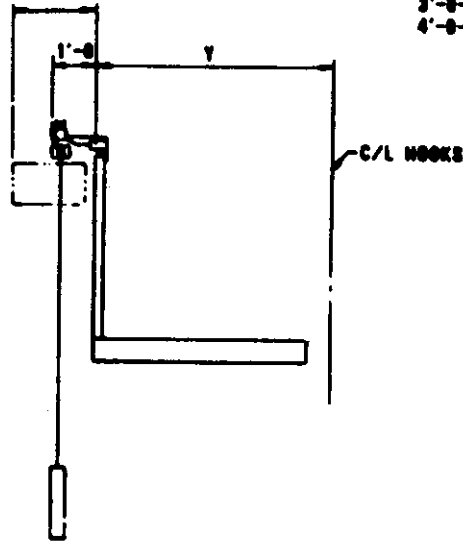


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
5 TON	20'0"	-	-	5'7"	7'9"	8,500	30 lb.	3,900	10,300
	30'0"	-	-	5'7"	7'9"	9,500	30 lb.	3,900	11,900
	40'0"	-	-	5'7"	7'9"	10,500	30 lb.	3,900	14,600
	50'0"	-	-	5'7"	7'9"	12,300	30 lb.	3,900	20,100
	60'0"	-	-	5'7"	7'9"	14,200	30 lb.	3,900	26,300
	70'0"	-	-	7'3"	8'3"	14,300	30 lb.	3,900	25,900
	80'0"	-	-	7'3"	8'3"	15,900	30 lb.	3,900	31,000
	20'0"	-	-	5'9"	7'9"	13,400	40 lb.	4,600	11,500
10 TON	30'0"	-	-	6'3"	8'3"	13,600	40 lb.	4,900	11,900
	40'0"	-	-	5'9"	7'9"	14,800	40 lb.	4,600	13,800
	50'0"	-	-	6'3"	8'3"	15,000	40 lb.	4,900	14,200
	60'0"	-	-	5'9"	7'9"	16,100	40 lb.	4,600	17,000
	70'0"	-	-	6'3"	8'3"	16,300	40 lb.	4,900	17,400
	80'0"	-	-	5'9"	7'9"	17,600	40 lb.	4,600	21,300
	90'0"	-	-	6'3"	8'3"	17,800	40 lb.	4,900	21,700
	100'0"	-	-	7'3"	8'3"	20,200	40 lb.	4,600	28,800
15 TON	20'0"	-	-	7'3"	8'9"	20,400	40 lb.	4,900	29,200
	30'0"	-	-	7'3"	8'3"	21,900	40 lb.	4,600	34,400
	40'0"	-	-	7'3"	8'9"	22,100	40 lb.	4,900	34,800
	50'0"	-	-	5'9"	7'9"	17,900	30 lb.	4,900	11,800
	60'0"	-	-	6'3"	8'3"	18,100	30 lb.	5,200	12,200
	70'0"	-	-	6'9"	8'9"	18,300	30 lb.	5,500	12,600
	80'0"	-	-	5'9"	7'9"	19,700	30 lb.	4,900	14,900
	90'0"	-	-	6'3"	8'3"	19,900	30 lb.	5,200	15,300
	100'0"	-	-	6'9"	8'9"	20,100	30 lb.	5,500	15,700
	110'0"	-	-	5'9"	7'9"	21,500	40 lb.	4,900	19,500
	120'0"	-	-	6'3"	8'3"	21,700	40 lb.	5,200	19,900
	130'0"	-	-	6'9"	8'9"	21,900	40 lb.	5,500	20,300
	140'0"	-	-	5'9"	7'9"	23,800	40 lb.	4,900	26,500
	150'0"	-	-	6'3"	8'3"	24,000	40 lb.	5,200	26,900
	160'0"	-	-	6'9"	8'9"	24,200	40 lb.	5,500	27,400
	170'0"	-	-	5'9"	7'9"	25,600	60 lb.	4,900	30,400
180'0"	-	-	6'3"	8'3"	25,800	60 lb.	5,200	30,800	
190'0"	-	-	6'9"	8'9"	26,000	60 lb.	5,500	31,200	
200'0"	-	-	7'3"	8'9"	25,500	60 lb.	5,200	30,800	
210'0"	-	-	7'3"	9'3"	25,700	60 lb.	5,500	31,200	
220'0"	-	-	7'9"	9'9"	25,900	60 lb.	5,800	31,600	
230'0"	-	-	7'3"	8'9"	27,500	60 lb.	5,200	37,400	
240'0"	-	-	7'3"	9'3"	27,700	60 lb.	5,500	37,800	
250'0"	-	-	7'9"	9'9"	27,900	60 lb.	5,800	38,200	

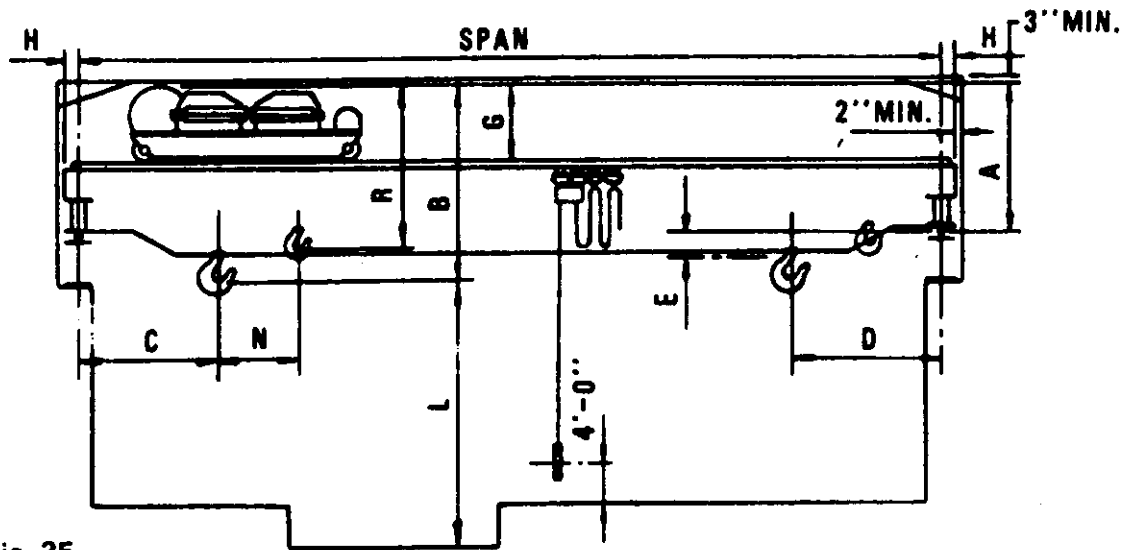


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
15 TON 5 T. AUX. For each 7'-0" add 1 lb., add 12" to J and K, and add 6" to X and Y.	20'0"	4'3"	5'7"	2'6"	7'2"	5"	2'7"	6"	8'8" 9'8"	6'0" 7'0"	22'8" 29'8"
	30'0"	4'6"	5'2"	2'6"	7'2"	5"	2'2"	6"	8'8" 9'8" 10'8"	6'0" 7'0" 8'0"	22'8" 29'8" 36'8"
	40'0"	4'6"	5'2"	2'6"	7'2"	5"	2'2"	6"	8'8" 9'8" 10'8"	6'0" 7'0" 8'0"	22'8" 29'8" 36'8"
	50'0"	4'9"	5'2"	2'6"	7'2"	5"	2'2"	6"	8'8" 9'8" 10'8"	6'0" 7'0" 8'0"	22'8" 29'8" 36'8"
	60'0"	4'9"	5'2"	2'6"	7'2"	5"	2'2"	6"	8'8" 9'8" 10'8"	6'0" 7'0" 8'0"	22'8" 29'8" 36'8"
	70'0"	4'10"	5'2"	3'0"	7'11"	1'2"	2'2"	6"	12'0" 12'0" 13'0"	7'0" 8'0" 9'0"	29'8" 36'8" 43'8"
	80'0"	4'10"	5'2"	3'0"	7'11"	1'7"	2'2"	6"	12'0" 12'0" 13'0"	7'0" 8'0" 9'0"	29'8" 36'8" 43'8"
	90'0"	4'10"	5'2"	3'0"	7'11"	1'7"	2'2"	6"	12'0" 12'0" 13'0"	7'0" 8'0" 9'0"	29'8" 36'8" 43'8"
20 TON NO AUX. For each 7'-8" add 1 lb., add 12" to J and K, and add 6" to X and Y.	30'0"	5'0"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0" 11'0"	7'0" 8'0"	39'0" 46'6"
	40'0"	5'3"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0" 11'0"	7'0" 8'0"	39'0" 46'6"
	50'0"	5'6"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0" 11'0"	7'0" 8'0"	39'0" 46'6"
	60'0"	5'9"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0" 11'0"	7'0" 8'0"	39'0" 46'6"
	70'0"	5'5"	4'10"	3'0"	3'6"	1'2"	2'5"	7"	12'0" 12'0"	7'0" 8'0"	39'0" 46'6"
	80'0"	5'5"	4'10"	3'0"	3'6"	1'10"	2'5"	7"	12'0" 12'0"	7'0" 8'0"	39'0" 46'6"
	90'0"	5'5"	4'10"	3'0"	3'6"	2'0"	2'5"	7"	13'0" 14'0"	8'0" 9'0"	46'6" 54'0"

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL
 FOR MOTORIZED VERT. TRAVEL USE 2'-0"-10 TO 40 FT. LIFT
 3'-0"-40 TO 60 FT. LIFT
 4'-0"-60 TO 100 FT. LIFT

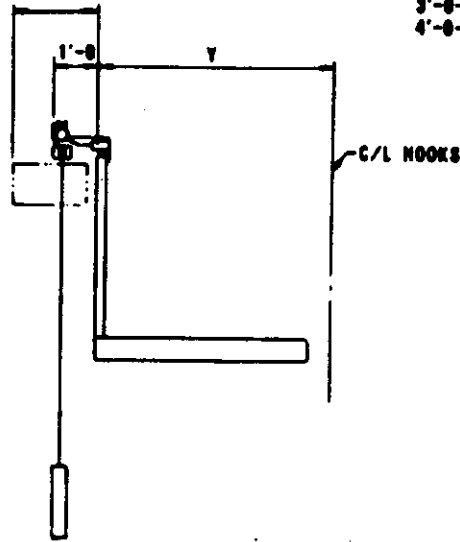


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
15 TON 5 T. AUX.	20'0"	4'5"	4'5"	5'9"	7'9"	18,900	30 lb.	7,200	14,100
				6'3"	8'3"	19,200		7,700	14,700
				6'9"	8'9"	19,500		8,200	15,300
	30'0"	4'5"	4'5"	5'9"	7'9"	20,700	40 lb.	7,200	17,200
				6'3"	8'3"	21,000		7,700	17,800
				6'9"	8'9"	21,300		8,200	18,400
	40'0"	4'5"	4'5"	5'9"	7'9"	22,500	40 lb.	7,200	21,800
				6'3"	8'3"	22,800		7,700	22,400
				6'9"	8'9"	23,100		8,200	23,000
	50'0"	4'5"	4'5"	5'9"	7'9"	24,800	60 lb.	7,200	28,800
				6'3"	8'3"	25,100		7,700	29,400
				6'9"	8'9"	25,400		8,200	30,100
	60'0"	4'5"	4'5"	5'9"	7'9"	26,600	60 lb.	7,200	32,700
				6'3"	8'3"	26,900		7,700	33,300
6'9"				8'9"	27,200	8,200		33,900	
70'0"	4'5"	4'5"	7'3"	8'9"	26,700	60 lb.	7,700	33,800	
			7'3"	9'3"	27,000		8,200	34,400	
			7'9"	9'9"	27,300		8,700	35,000	
80'0"	4'5"	4'5"	7'3"	8'9"	28,700	60 lb.	7,700	40,400	
			7'3"	9'3"	29,000		8,200	41,000	
			7'9"	9'9"	29,300		8,700	41,600	
20 TON	30'0"	-	-	6'6"	8'0"	25,600	40 lb.	7,400	23,400
				7'0"	8'6"	25,900		7,800	24,000
	40'0"	-	-	6'6"	8'0"	27,600	40 lb.	7,400	28,700
				7'0"	8'6"	27,900		7,800	29,300
	50'0"	-	-	6'6"	8'0"	29,600	40 lb.	7,400	34,800
				7'0"	8'6"	29,900		7,800	35,400
	60'0"	-	-	6'6"	8'0"	32,600	60 lb.	7,400	45,200
				7'0"	8'6"	32,900		7,800	45,800
	70'0"	-	-	7'9"	8'6"	32,300	60 lb.	7,400	43,500
				7'9"	9'0"	32,600		7,800	44,100
80'0"	-	-	7'9"	8'6"	34,500	60 lb.	7,400	51,400	
			7'9"	9'0"	34,800		7,800	52,000	
90'0"	-	-	8'3"	9'0"	37,400	60 lb.	7,800	62,800	
			8'9"	9'6"	37,700		8,200	63,400	

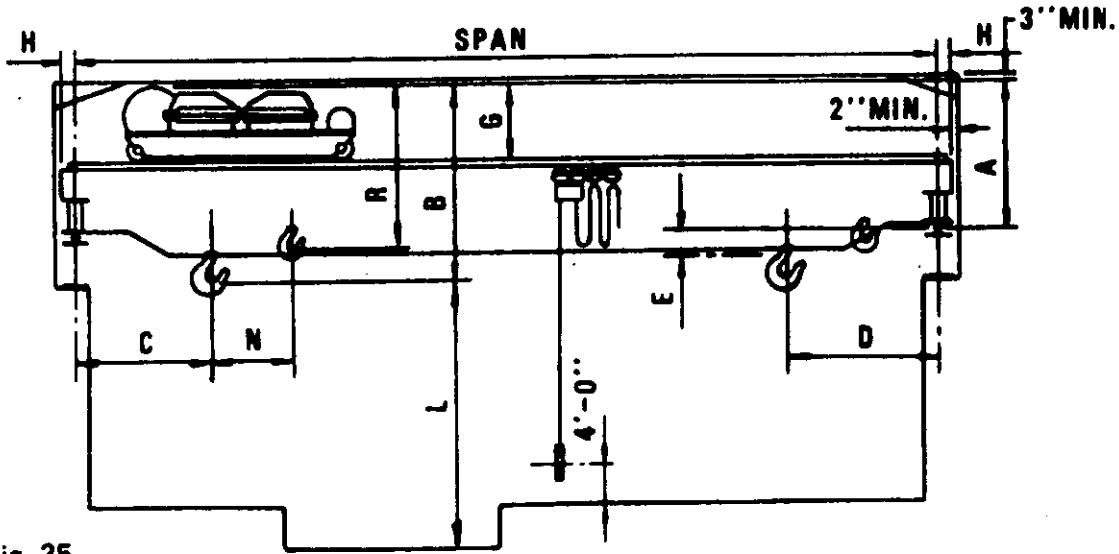


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
20 TON 5 T. AUX. For each 7'-6" add 1 1/2", add 12" to J and K, and add 6" to X and Y.	30'0"	5'0"	4'10"	3'0"	7'11"	5"	2'5"	6"	10'0"	7'0"	39'0"
	40'0"	5'3"	4'10"	3'0"	7'11"	5"	2'5"	6"	11'0"	8'0"	46'6"
									11'0"	8'0"	46'6"
	50'0"	5'6"	4'10"	3'0"	7'11"	5"	2'5"	6"	10'0"	7'0"	39'0"
									11'0"	8'0"	46'6"
	60'0"	5'9"	4'10"	3'0"	7'11"	5"	2'5"	6"	10'0"	7'0"	39'0"
									11'0"	8'0"	46'6"
70'0"	5'5"	4'10"	3'0"	7'11"	1'2"	2'5"	7"	12'0"	7'0"	39'0"	
								12'0"	8'0"	46'6"	
80'0"	5'5"	4'10"	3'0"	7'11"	1'10"	2'5"	7"	12'0"	7'0"	39'0"	
								12'0"	8'0"	46'6"	
90'0"	5'5"	4'10"	3'0"	7'11"	2'0"	2'5"	7"	13'0"	8'0"	46'6"	
								14'0"	9'0"	54'0"	
25 TON NO AUX. For each 6'-0" add 1 1/2", add 12" to J and K, and add 6" to X and Y.	30'0"	5'0"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0"	7'0"	31'0"
									11'0"	8'0"	37'0"
									12'0"	9'0"	43'0"
	40'0"	5'4"	4'10"	3'0"	3'6"	5"	2'5"	6"	10'0"	7'0"	31'0"
									11'0"	8'0"	37'0"
									12'0"	9'0"	43'0"
	50'0"	5'7"	4'10"	3'0"	3'6"	5"	2'5"	7"	10'0"	7'0"	31'0"
									11'0"	8'0"	37'0"
									12'0"	9'0"	43'0"
	60'0"	5'10"	4'10"	3'0"	3'6"	5"	2'5"	7"	10'0"	7'0"	31'0"
11'0"									8'0"	37'0"	
12'0"									9'0"	43'0"	
70'0"	5'5"	4'10"	3'0"	3'6"	1'8"	2'5"	7"	11'6"	7'0"	31'0"	
								12'6"	8'0"	37'0"	
								13'6"	9'0"	43'0"	
80'0"	5'5"	4'10"	3'0"	3'6"	2'2"	2'5"	7"	11'6"	7'0"	31'0"	
								12'6"	8'0"	37'0"	
								13'6"	9'0"	43'0"	
90'0"	5'5"	4'10"	3'0"	3'6"	2'2"	2'5"	7"	13'0"	8'0"	37'0"	
								14'0"	9'0"	43'0"	
								15'0"	10'0"	49'0"	

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL

FOR MOTORIZED VERT. TRAVEL USE 2'-0"-10 TO 40 FT. LIFT

3'-0"-40 TO 80 FT. LIFT

4'-0"-80 TO 100 FT. LIFT

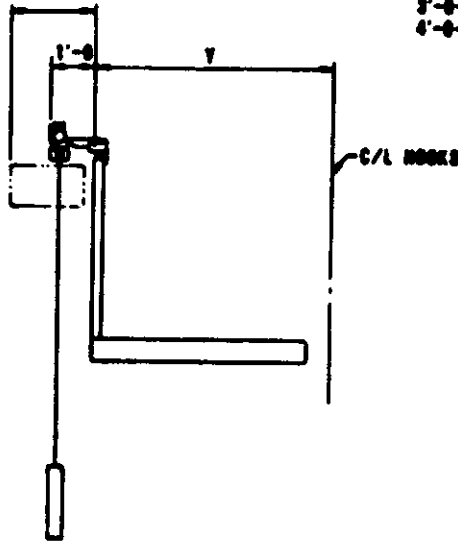


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
20 TON 5 T. AUX.	30'0"	4'5"	4'7"	6'6"	8'0"	26,700	40 lb.	9,900	25,900
				7'0"	8'6"	27,100		10,400	26,600
	40'0"	4'5"	4'7"	6'6"	8'0"	28,700	40 lb.	9,900	31,200
				7'0"	8'6"	29,100		10,400	31,900
	50'0"	4'5"	4'7"	6'6"	8'0"	30,700	60 lb.	9,900	37,300
				7'0"	8'6"	31,100		10,400	38,000
	60'0"	4'5"	4'7"	6'6"	8'0"	33,700	60 lb.	9,900	47,700
				7'0"	8'6"	34,100		10,400	48,400
	70'0"	4'5"	4'7"	7'9"	8'6"	33,400	60 lb.	9,900	46,500
				7'9"	9'0"	33,800		10,400	47,200
80'0"	4'5"	4'7"	7'9"	8'6"	35,600	60 lb.	9,900	54,400	
			7'9"	9'0"	36,000		10,400	55,100	
90'0"	4'5"	4'7"	8'3"	9'0"	38,600	60 lb.	10,400	65,900	
			8'9"	9'6"	39,000		11,000	66,700	
25 TON	30'0"			6'9"	8'0"	30,200	40 lb.	8,100	23,800
				7'3"	8'6"	30,500		8,500	24,400
				7'9"	9'0"	30,800		8,900	25,000
	40'0"			6'9"	8'0"	33,000	40 lb.	8,100	31,500
				7'3"	8'6"	33,300		8,500	32,100
				7'9"	9'0"	33,600		8,900	32,700
	50'0"			7'0"	8'0"	35,200	40 lb.	8,100	38,200
				7'6"	8'6"	35,500		8,500	38,800
				7'9"	9'0"	35,800		8,900	39,400
	60'0"			7'0"	8'0"	38,200	60 lb.	8,100	48,300
				7'6"	8'6"	38,500		8,500	48,900
				7'9"	9'0"	38,800		8,900	49,500
	70'0"			7'9"	8'3"	37,700	60 lb.	8,100	45,900
				8'3"	8'9"	38,000		8,500	46,500
				8'9"	9'3"	38,300		8,900	47,100
	80'0"			7'9"	8'3"	39,900	60 lb.	8,100	53,600
8'3"				8'9"	40,200	8,500		54,200	
8'9"				9'3"	40,500	8,900		54,800	
90'0"			8'0"	8'3"	43,100	60 lb.	8,000	65,600	
			8'6"	8'9"	43,400		8,400	66,200	
			9'0"	9'3"	43,700		8,800	66,800	

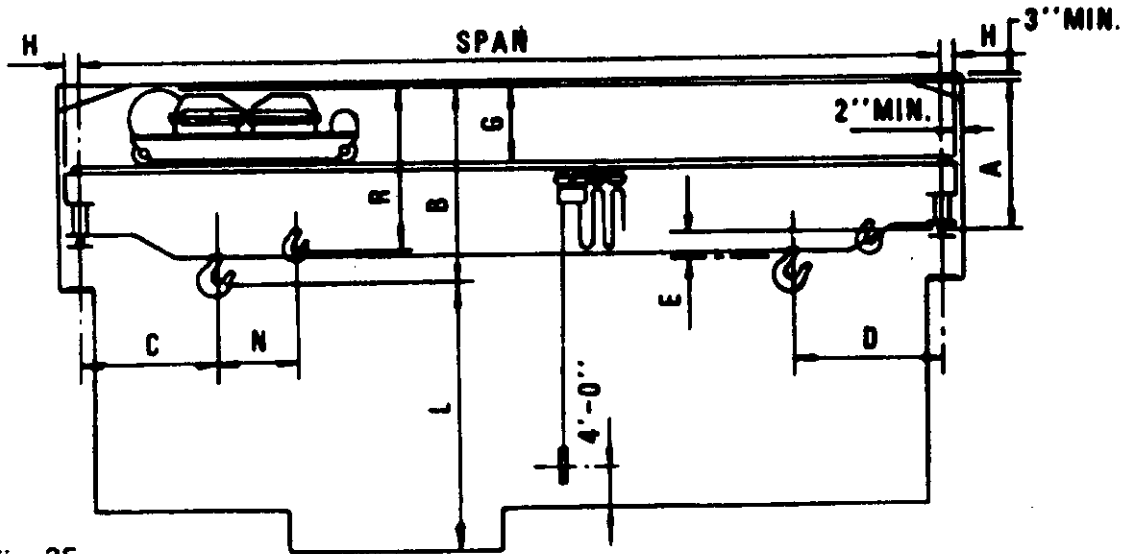


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
25 TON 5 T. AUX For each 6'-0" add 1 lift, add 12" to J and K, and add 6" to X and Y.	30'0"	5'0"	4'10"	3'0"	7'11"	5"	2'5"	6"	10'0" 11'0" 12'0"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	40'0"	5'4"	4'10"	3'0"	7'11"	5"	2'5"	6"	10'0" 11'0" 12'0"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	50'0"	5'7"	4'10"	3'0"	7'11"	5"	2'5"	7"	10'0" 11'0" 12'0"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	61'0"	5'10"	4'10"	3'0"	7'11"	5"	2'5"	7"	10'0" 11'0" 12'0"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	70'0"	5'5"	4'10"	3'0"	7'11"	1'8"	2'5"	7"	11'6" 12'6" 13'6"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	81'0"	5'5"	4'10"	3'0"	7'11"	2'2"	2'5"	7"	11'6" 12'6" 13'6"	7'0" 8'0" 9'0"	31'0" 37'0" 43'0"
	91'0"	5'5"	4'10"	3'0"	7'11"	2'2"	2'5"	7"	13'0" 14'0" 15'0"	8'0" 9'0" 10'0"	37'0" 43'0" 49'0"
30 TON NO AUX. For each 6'-3" add 1 lift, add 12" to J and K, and add 6" to X and Y.	30'0"	5'4"	5'0"	3'0"	3'6"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	40'0"	5'4"	5'0"	3'0"	3'6"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	50'0"	5'9"	5'0"	3'0"	3'6"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	60'0"	5'9"	5'0"	3'0"	3'6"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	70'0"	5'5"	5'0"	3'0"	3'6"	1'11"	2'5"	7"	12'6" 13'6" 14'6"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	80'0"	5'5"	5'0"	3'0"	3'6"	2'5"	2'5"	7"	12'6" 13'6" 14'6"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	90'0"	5'5"	5'0"	3'0"	3'6"	2'5"	2'5"	7"	13'0" 14'0" 15'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL

FOR MOTORIZED VERT. TRAVEL USE 2'-0"-10 TO 40 FT. LIFT
 3'-0"-40 TO 80 FT. LIFT
 4'-0"-80 TO 100 FT. LIFT

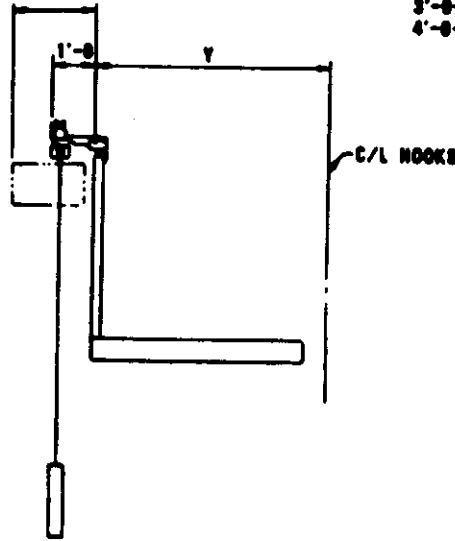


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
25 TON 5 T. AUX.	30'0"	4'5"	4'7"	6'9"	8'0"	31,300	40 lb.	10,900	26,600
				7'3"	8'6"	31,900		11,600	27,500
				7'9"	9'0"	32,500		12,300	28,400
	40'0"	4'5"	4'7"	6'9"	8'0"	34,100	40 lb.	10,900	34,300
				7'3"	8'6"	34,700		11,600	35,200
				7'9"	9'0"	35,300		12,300	36,100
	50'0"	4'5"	4'7"	7'0"	8'0"	36,300	60 lb.	10,900	41,000
				7'6"	8'6"	36,900		11,600	41,900
				7'9"	9'0"	37,500		12,300	42,800
	60'0"	4'5"	4'7"	7'0"	8'0"	39,300	60 lb.	10,900	51,100
				7'6"	8'6"	39,900		11,600	52,000
				7'9"	9'0"	40,500		12,300	52,900
	70'0"	4'5"	4'7"	7'9"	8'3"	38,800	60 lb.	10,900	48,700
				8'3"	8'9"	39,400		11,600	49,600
				8'9"	9'3"	40,000		12,300	50,500
	80'0"	4'5"	4'7"	7'9"	8'3"	41,000	60 lb.	10,900	56,400
				8'3"	8'9"	41,600		11,600	57,300
				8'9"	9'3"	42,200		12,300	58,200
90'0"	4'5"	4'7"	8'0"	8'3"	44,200	60 lb.	11,600	68,400	
			8'6"	8'9"	44,800		12,300	69,300	
			9'0"	9'3"	45,400		13,000	70,200	
30 TON	30'0"	-	-	7'6"	8'6"	36,100	60 lb.	8,900	28,100
				8'0"	9'0"	36,400		9,300	28,700
				8'6"	9'6"	36,700		9,700	29,300
	40'0"	-	-	7'6"	8'6"	38,900	60 lb.	8,900	35,200
				8'0"	9'0"	39,200		9,300	35,800
				8'6"	9'6"	39,500		9,700	36,400
	50'0"	-	-	7'6"	8'6"	41,800	60 lb.	8,900	44,300
				8'0"	9'0"	42,100		9,300	44,900
				8'6"	9'6"	42,400		9,700	45,500
	60'0"	-	-	7'6"	8'6"	45,200	60 lb.	8,900	55,800
				8'0"	9'0"	45,500		9,300	56,400
				8'6"	9'6"	45,800		9,700	57,000
	70'0"	-	-	8'3"	8'9"	43,500	60 lb.	8,900	48,400
				8'9"	9'3"	43,800		9,300	49,000
				9'3"	9'9"	44,100		9,700	49,600
	80'0"	-	-	8'3"	8'9"	45,800	60 lb.	8,900	56,300
				8'9"	9'3"	46,100		9,300	56,900
				9'3"	9'9"	46,400		9,700	57,500
90'0"	-	-	8'6"	9'0"	49,100	60 lb.	8,900	68,700	
			9'0"	9'6"	49,400		9,300	69,300	
			9'6"	10'0"	49,700		9,700	69,900	

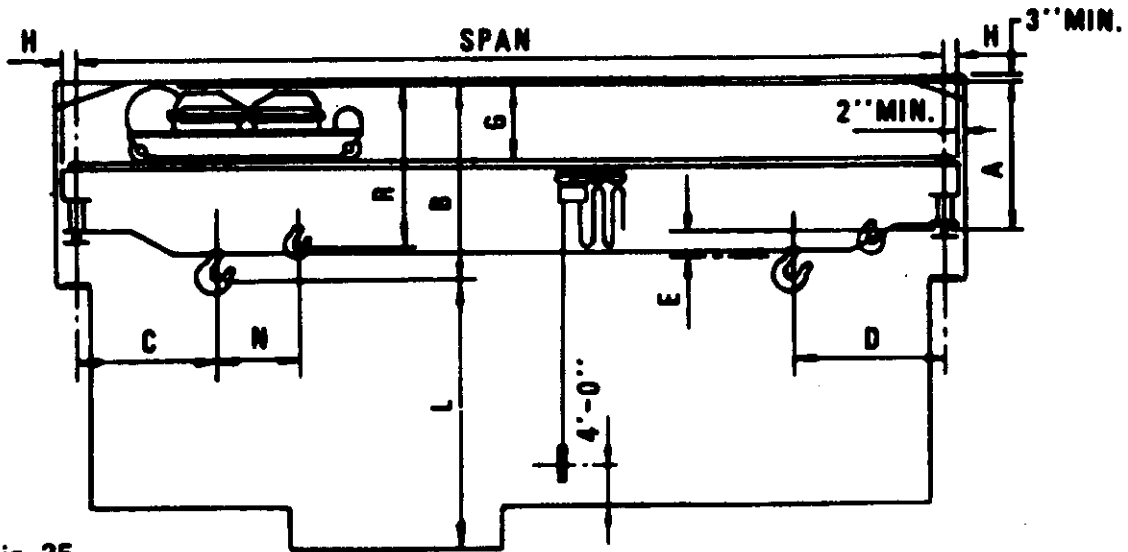


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
30 TON 5 T. AUX. For each 6'-3" add 1 ft, add 12" to J and K, and add 6" to X and Y.	30'0"	5'4"	5'0"	3'0"	8'0"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	40'0"	5'4"	5'0"	3'0"	8'0"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	50'0"	5'9"	5'0"	3'0"	8'0"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	60'0"	5'9"	5'0"	3'0"	8'0"	5"	2'5"	7"	11'0" 12'0" 13'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	70'0"	5'5"	5'0"	3'0"	8'0"	5"	2'5"	7"	12'6" 13'6" 14'6"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	80'0"	5'5"	5'0"	3'0"	8'0"	2'5"	2'5"	7"	12'6" 13'6" 14'6"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	90'0"	5'5"	5'0"	3'0"	8'0"	2'5"	2'5"	7"	13'0" 14'0" 15'0"	8'0" 9'0" 10'0"	29'0" 34'3" 39'6"
	40'0"	7'0"	8'8"	3'9"	3'6"	1'0"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
	50'0"	7'0"	8'8"	3'9"	3'6"	1'0"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
	60'0"	7'4"	8'8"	3'9"	3'6"	1'5"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
40 TON NO AUX For each 6'-6" add 1 ft, add 12" to J and K, and add 6" to X and Y.	70'0"	7'4"	8'8"	3'9"	3'6"	1'7"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	35'9" 42'3" 48'9"
	80'0"	7'4"	8'8"	3'9"	3'6"	1'7"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	34'9" 41'3" 47'9"
	90'0"	7'10"	8'8"	3'9"	3'6"	2'3"	3'7"	8 1/2"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	40'3" 46'9" 53'3"
	100'0"	8'2"	8'8"	3'9"	3'6"	2'3"	3'7"	9 1/2"	14'6" 15'6" 16'6"	10'0" 11'0" 12'0"	45'6" 52'0" 58'6"

USE 2'-6 FOR MOTORIZED HORIZ. TRAVEL

FOR MOTORIZED VERT. TRAVEL USE 2'-0-10 TO 40 FT. LIFT
 3'-0-40 TO 80 FT. LIFT
 4'-0-80 TO 100 FT. LIFT

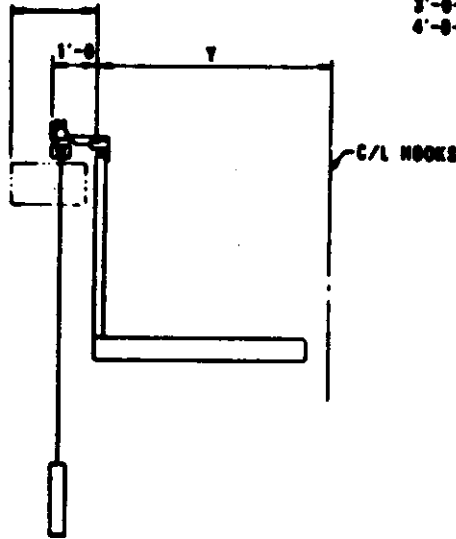


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
30 TON 5 T AUX	30'0"	4'6"	4'7"	7'6"	8'6"	37,900	60 lb.	12,700	31,900
				8'0"	9'0"	38,400		13,500	32,900
				8'6"	9'6"	38,900		14,300	33,900
	40'0"	4'6"	4'7"	7'6"	8'6"	40,700	60 lb.	13,700	39,000
				8'0"	9'0"	41,200		13,500	40,000
				8'6"	9'6"	41,700		14,300	41,000
	50'0"	4'6"	4'7"	7'6"	8'6"	43,500	60 lb.	12,700	48,100
				8'0"	9'0"	44,100		13,500	49,100
				8'6"	9'6"	44,600		14,300	50,100
	60'0"	4'6"	4'7"	7'6"	8'6"	46,900	60 lb.	12,700	59,600
				8'0"	9'0"	47,500		13,500	60,600
				8'6"	9'6"	48,000		14,300	61,600
	70'0"	4'6"	4'7"	8'3"	8'9"	45,200	60 lb.	12,700	52,200
				8'9"	9'3"	45,800		13,500	53,200
				9'3"	9'9"	46,300		14,300	54,200
	80'0"	4'6"	4'7"	8'3"	8'9"	47,500	60 lb.	12,700	60,100
				8'9"	9'3"	48,100		13,500	61,100
				9'3"	9'9"	48,600		14,300	62,100
90'0"	4'6"	4'7"	8'6"	9'0"	50,800	80 lb.	12,700	72,500	
			9'0"	9'6"	51,400		13,500	73,500	
			9'6"	10'0"	51,900		14,300	74,500	
40 TON	40'0"	-	-	8'0"	10'9"	52,700	80 lb.	14,000	48,300
				8'6"	11'3"	53,000		14,500	49,000
				9'0"	11'9"	53,300		15,000	49,700
	50'0"	-	-	8'0"	10'9"	55,900	100 lb.	14,000	54,000
				8'6"	11'3"	55,300		14,500	54,700
				9'0"	11'9"	55,600		15,000	55,400
	60'0"	-	-	8'0"	10'9"	58,500	100 lb.	14,000	65,400
				8'6"	11'3"	58,800		14,500	66,100
				9'0"	11'9"	59,100		15,000	66,800
	70'0"	-	-	8'0"	10'9"	61,000	100 lb.	14,000	73,200
				8'6"	11'3"	61,300		14,500	73,900
				9'0"	11'9"	61,600		15,000	74,600
	80'0"	-	-	8'0"	10'9"	65,800	100 lb.	14,000	90,100
				8'6"	11'3"	66,100		14,500	90,800
				9'0"	11'9"	66,400		15,000	91,500
	90'0"	-	-	8'6"	11'3"	69,300	100 lb.	14,500	102,800
				9'0"	11'9"	69,600		15,000	103,500
				9'6"	12'3"	69,900		15,500	104,200
100'0"	-	-	9'3"	12'0"	72,600	100 lb.	15,000	115,000	
			9'9"	12'6"	72,900		15,500	115,700	
			10'3"	13'0"	73,200		16,000	116,400	

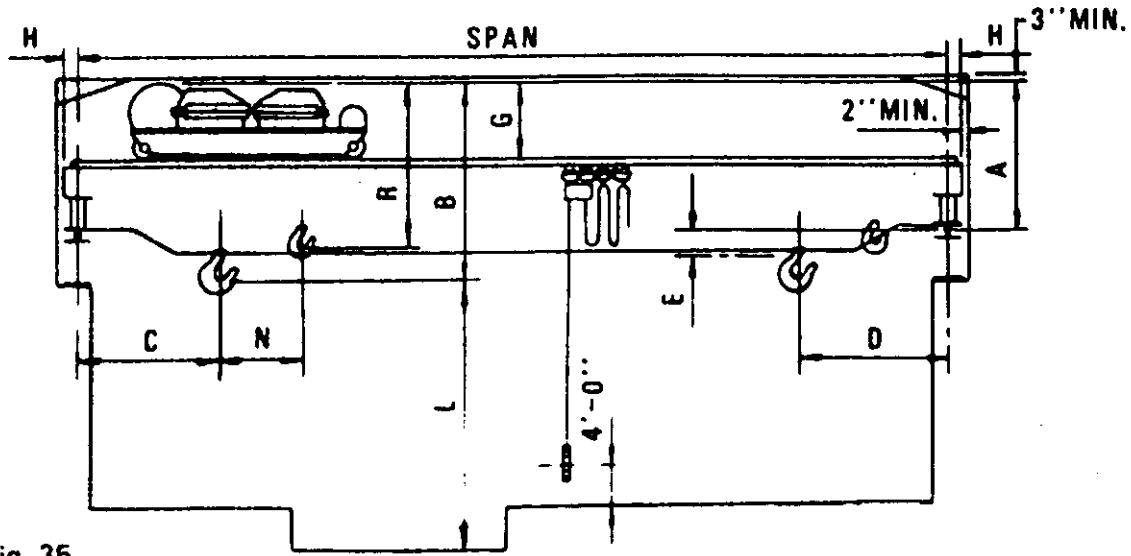


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
40 TON 10 T AUX For each 8'-8" add 1 lb, add 12" to J and K, and add 8" to X and Y.	40'0"	7'11"	8'8"	4'0"	7'3"	1'0"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
	50'0"	7'11"	8'8"	4'0"	7'3"	1'3"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
	60'0"	7'4"	8'8"	4'0"	7'3"	1'7"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	37'0" 43'6" 50'0"
	70'0"	7'4"	8'8"	4'0"	7'3"	1'9"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	35'9" 42'3" 48'9"
	80'0"	7'4"	8'8"	4'0"	7'3"	1'9"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	34'9" 41'3" 47'9"
	90'0"	7'10"	8'8"	4'0"	7'3"	2'5"	3'7"	9 1/2"	12'0" 13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	40'3" 46'9" 53'3"
	100'0"	8'2"	8'8"	4'0"	7'3"	2'5"	3'7"	9 1/2"	14'6" 15'6" 16'6"	10'0" 11'0" 12'0"	45'6" 52'0" 58'6"
50 TON NO AUX. For each 8'-8" add 1 lb, add 12" to J and K, and add 8" to X and Y.	40'0"	7'2"	8'8"	4'0"	3'9"	1'0"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	30'9" 36'2" 41'7"
	50'0"	7'2"	8'8"	4'0"	3'9"	1'5"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	30'9" 36'2" 41'7"
	60'0"	7'6"	8'8"	4'0"	3'9"	1'7"	3'7"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	30'9" 36'2" 41'7"
	70'0"	7'6"	8'8"	4'0"	3'9"	1'7"	3'7"	9 1/2"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	35'2" 40'7" 46'0"
	80'0"	8'0"	8'8"	4'0"	3'9"	1'10"	3'7"	9 1/2"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	34'3" 39'8" 45'1"
	90'0"	8'0"	8'8"	4'0"	3'9"	2'1"	3'7"	9 1/2"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	33'4" 38'9" 44'2"
	100'0"	8'6"	8'8"	4'0"	3'9"	2'4"	3'7"	9 1/2"	14'6" 15'6" 16'6"	10'0" 11'0" 12'0"	37'10" 43'3" 48'9"

USE 2'-0 FOR MOTORIZED HORIZ. TRAVEL

FOR MOTORIZED VERT. TRAVEL USE 2'-0-10 TO 40 FT. LIFT

3'-0-40 TO 80 FT. LIFT

4'-0-80 TO 100 FT. LIFT

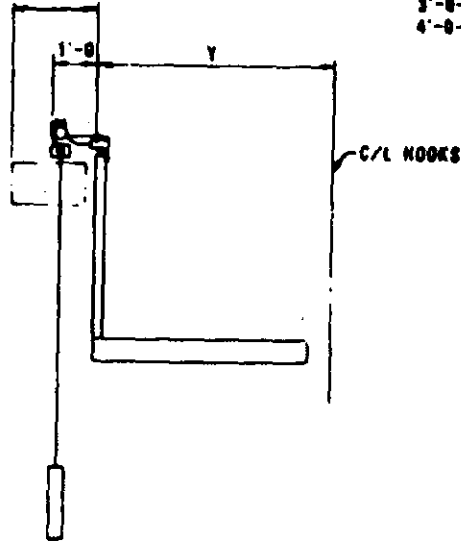


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight	
40 TON 10T AUX	40'0"	3'5"	6'9"	8'0"	10'9"	55.3(K)	1(K) lb	21.0(K)	57.4(K)	
				8'6"	11'3"	55.8(K)		22.0(K)	58.6(K)	
				9'0"	11'9"	56.3(K)		23.0(K)	59.8(K)	
	50'0"	3'5"	6'9"	8'0"	10'9"	58.0(K)	1(K) lb	21.0(K)	63.5(K)	
				8'6"	11'3"	58.5(K)		22.0(K)	64.7(K)	
				9'0"	11'9"	59.0(K)		23.0(K)	65.9(K)	
	60'0"	3'5"	6'9"	8'0"	10'9"	61.8(K)	1(K) lb	21.0(K)	75.4(K)	
				8'6"	11'3"	62.3(K)		22.0(K)	76.6(K)	
				9'0"	11'9"	62.8(K)		23.0(K)	77.8(K)	
	70'0"	3'5"	6'9"	8'0"	10'9"	64.5(K)	1(K) lb	21.0(K)	83.7(K)	
				8'6"	11'3"	65.0(K)		22.0(K)	84.9(K)	
				9'0"	11'9"	65.5(K)		23.0(K)	86.1(K)	
80'0"	3'5"	6'9"	8'0"	10'9"	69.8(K)	1(K) lb	21.0(K)	101.6(K)		
			8'6"	11'3"	70.3(K)		22.0(K)	102.8(K)		
			9'0"	11'9"	70.8(K)		23.0(K)	104.0(K)		
90'0"	3'5"	6'9"	8'6"	11'3"	74.0(K)	1(K) lb	22.0(K)	115.4(K)		
			9'0"	11'9"	74.5(K)		23.0(K)	116.6(K)		
			9'6"	12'3"	75.0(K)		24.0(K)	117.8(K)		
100'0"	3'5"	6'9"	9'3"	12'0"	78.0(K)	1(K) lb	23.0(K)	128.8(K)		
			9'9"	12'6"	78.5(K)		24.0(K)	130.0(K)		
			10'3"	13'0"	79.0(K)		25.0(K)	131.2(K)		
50 TON	40'0"			8'0"	10'9"	61.3(K)	1(K) lb	14.5(K)	50.6(K)	
				8'6"	11'3"	61.6(K)		15.0(K)	51.3(K)	
				9'0"	11'9"	61.9(K)		15.5(K)	52.0(K)	
	50'0"				8'0"	10'9"	64.3(K)	1(K) lb	14.5(K)	57.6(K)
					8'6"	11'3"	64.6(K)		15.0(K)	58.3(K)
					9'0"	11'9"	64.9(K)		15.5(K)	59.0(K)
	60'0"				8'0"	10'9"	67.5(K)	1(K) lb	14.5(K)	66.4(K)
					8'6"	11'3"	67.8(K)		15.0(K)	67.1(K)
					9'0"	11'9"	68.1(K)		15.5(K)	67.8(K)
	70'0"				8'6"	11'3"	71.5(K)	1(K) lb	15.0(K)	79.0(K)
					9'0"	11'9"	71.8(K)		15.5(K)	79.7(K)
					9'6"	12'3"	72.1(K)		16.0(K)	80.4(K)
80'0"				8'6"	11'3"	75.4(K)	1(K) lb	15.0(K)	92.0(K)	
				9'0"	11'9"	75.7(K)		15.5(K)	92.7(K)	
				9'6"	12'3"	76.0(K)		16.0(K)	93.4(K)	
90'0"				8'6"	11'3"	78.9(K)	1(K) lb	15.0(K)	103.8(K)	
				9'0"	11'9"	79.2(K)		15.5(K)	104.5(K)	
				9'6"	12'3"	79.5(K)		16.0(K)	105.2(K)	
100'0"				9'3"	12'0"	82.7(K)	1.35 lb	15.5(K)	116.4(K)	
				9'9"	12'6"	83.0(K)		16.0(K)	117.1(K)	
				10'3"	13'0"	83.3(K)		16.5(K)	117.8(K)	

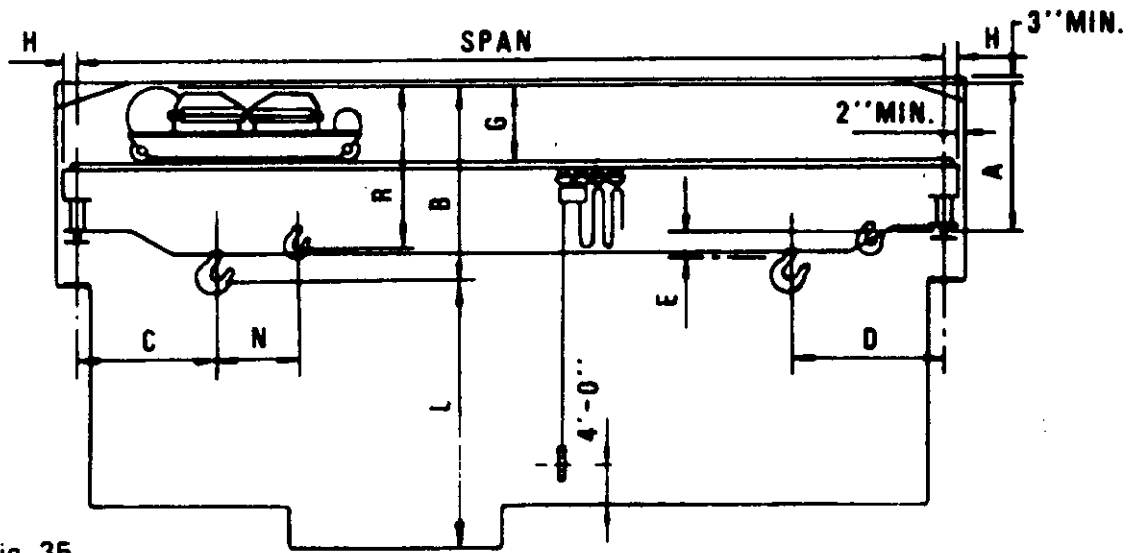


Fig. 35

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
50 TON 10 T. AUX. For each 5'-5" add 1 ft, add 12" to J and K, and add 6" to X and Y.	40'0"	7'2"	8'8"	4'0"	7'3"	1'0"	3'7"	8 1/2"	12'0"	8'0"	30'9"
									13'0"	9'0"	36'2"
									14'0"	10'0"	41'7"
	50'0"	7'2"	8'8"	4'0"	7'3"	1'7"	3'7"	8 1/2"	12'0"	8'0"	30'9"
									13'0"	9'0"	36'2"
									14'0"	10'0"	41'7"
	60'0"	7'6"	8'8"	4'0"	7'3"	1'7"	3'7"	9 1/4"	12'0"	8'0"	30'9"
									13'0"	9'0"	36'2"
									14'0"	10'0"	41'7"
	70'0"	7'6"	8'8"	4'0"	7'3"	1'7"	3'7"	9 1/4"	13'0"	9'0"	35'2"
									14'0"	10'0"	40'7"
									15'0"	11'0"	46'0"
80'0"	8'0"	8'8"	4'0"	7'3"	2'1"	3'7"	9 1/2"	13'0"	9'0"	34'3"	
								14'0"	10'0"	39'8"	
								15'0"	11'0"	45'1"	
90'0"	8'0"	8'8"	4'0"	7'3"	2'4"	3'7"	9 1/2"	13'0"	9'0"	33'4"	
								14'0"	10'0"	38'9"	
								15'0"	11'0"	44'2"	
100'0"	8'6"	8'8"	4'0"	7'3"	2'5"	3'7"	9 1/2"	14'6"	10'0"	37'10"	
								15'6"	11'0"	43'3"	
								16'6"	12'0"	48'9"	

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL
 FOR MOTORIZED VERT. TRAVEL USE 2'-0"-10 TO 40 FT. LIFT
 3'-0"-40 TO 80 FT. LIFT
 4'-0"-80 TO 100 FT. LIFT

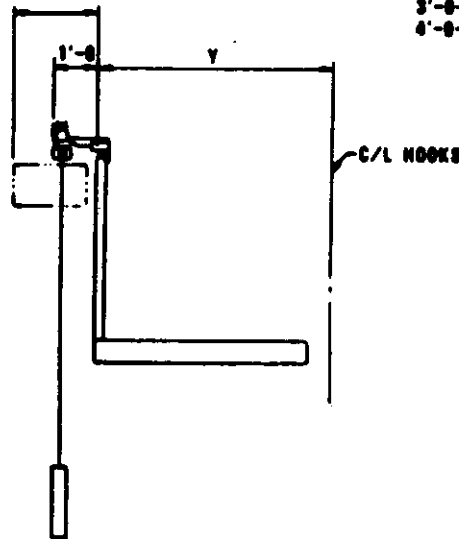


Fig. 37

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
50 TON 10T AUX	40'0"	3'4"	6'9"	8'0"	10'9"	65,200	100 lb.	22,000	60,100
				8'6"	11'3"	65,700		23,000	61,300
				9'0"	11'9"	66,200		24,000	62,500
	50'0"	3'4"	6'9"	8'0"	10'9"	68,400	100 lb.	22,000	67,500
				8'6"	11'3"	68,900		23,000	68,700
				9'0"	11'9"	69,400		24,000	69,900
	60'0"	3'4"	6'9"	8'0"	10'9"	71,700	100 lb.	22,000	76,800
				8'6"	11'3"	72,200		23,000	78,000
				9'0"	11'9"	72,700		24,000	79,200
	70'0"	3'4"	6'9"	8'6"	11'3"	76,300	100 lb.	23,000	90,600
				9'0"	11'9"	76,800		24,000	91,800
				9'6"	12'3"	77,300		25,000	93,000
	80'0"	3'4"	6'9"	8'6"	11'3"	80,500	100 lb.	23,000	104,400
				9'0"	11'9"	81,000		24,000	105,600
				9'6"	12'3"	81,500		25,000	106,800
	90'0"	3'4"	6'9"	8'6"	11'3"	84,000	135 lb.	23,000	116,700
				9'0"	11'9"	84,500		24,000	117,900
				9'6"	12'3"	85,000		25,000	119,100
	100'0"	3'4"	6'9"	9'3"	12'0"	88,300	175 lb.	24,000	130,500
				9'9"	12'6"	88,800		25,000	131,700
				10'3"	13'0"	89,300		26,000	132,900

Part B—Cab Control

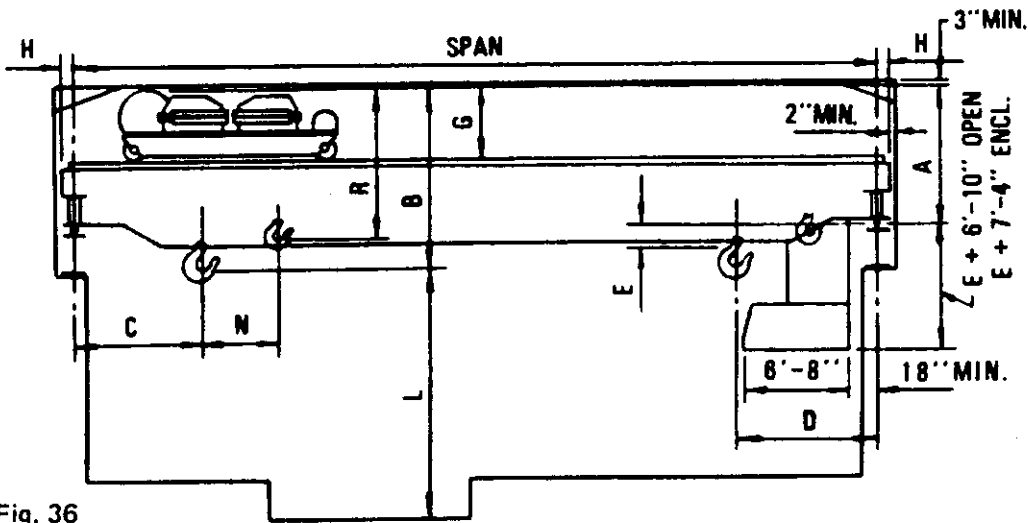


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
10 TON NO AUX. For each 8'-6" add 1 WT. add 6" to J and K, and add 3" to X and Y.	50'0"	5'2"	6'1"	2'6"	3'6"	1'1"	3'0"	8"	8'0" 9'0" 10'0"	5'0" 6'0" 7'0"	31'0" 49'0" 66'0"
	60'0"	5'5"	6'1"	2'6"	3'6"	1'3"	3'0"	8"	8'6" 9'6" 10'6"	5'0" 6'0" 7'0"	31'0" 49'0" 66'0"
	70'0"	5'9"	6'1"	2'6"	3'6"	1'5"	3'0"	8"	10'0" 10'0" 11'0"	5'0" 6'0" 7'0"	31'0" 49'0" 66'0"
	80'0"	6'1"	6'1"	2'6"	3'6"	1'5"	3'0"	8"	11'6" 11'6" 12'0"	6'0" 7'0" 8'0"	49'0" 66'0" 83'0"
	90'0"	6'7"	6'1"	2'6"	3'6"	1'8"	3'0"	8"	13'0" 13'0" 13'0"	6'0" 7'0" 8'0"	49'0" 66'0" 83'0"
	100'0"	6'8"	6'1"	2'6"	3'6"	1'8"	3'0"	8 1/4"	14'6" 14'6"	7'0" 8'0"	66'0" 83'0"
	110'0"	6'9"	6'1"	2'6"	3'6"	2'0"	3'0"	8 1/2"	16'0" 16'0"	8'0" 9'0"	83'0" 100'0"
	120'0"	7'5"	6'1"	2'6"	3'6"	2'0"	3'0"	8 1/2"	17'6"	10'0"	117'0"

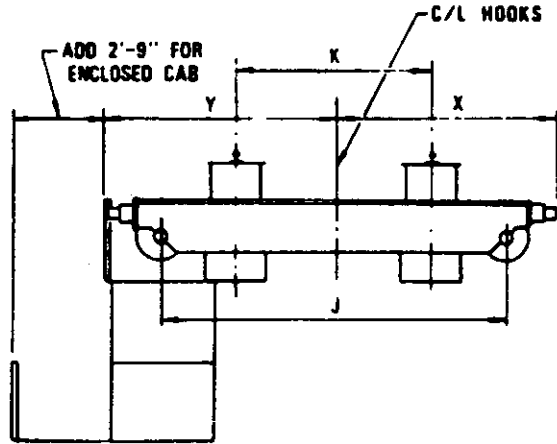


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
10 TON	50'0"	-	-	6'11"	8'3"	21,550	40 lb.	7,800	34,000
				7'5"	8'9"	21,800		8,300	34,500
				7'11"	9'3"	22,050		8,800	35,000
	60'0"	-	-	7'2"	8'6"	23,000	40 lb.	7,800	39,000
				7'8"	9'0"	23,250		8,300	39,500
				8'2"	9'6"	23,500		8,800	40,000
	70'0"	-	-	8'6"	8'9"	25,250	40 lb.	7,800	47,000
				8'0"	9'3"	25,500		8,300	47,500
				8'6"	9'9"	25,750		8,800	48,000
	80'0"	-	-	9'6"	9'3"	27,900	40 lb.	8,300	55,500
				9'0"	9'9"	28,200		8,800	56,000
				9'0"	10'3"	28,500		9,400	56,600
	90'0"	-	-	10'0"	10'3"	30,400	60 lb.	8,300	64,500
				10'0"	10'3"	30,700		8,800	65,000
				9'6"	10'9"	31,000		9,400	65,600
	100'0"	-	-	9'9"	10'3"	34,000	60 lb.	8,800	77,400
				10'0"	10'9"	34,300		9,400	78,000
	110'0"	-	-	11'0"	11'3"	40,600	60 lb.	9,400	101,000
				10'6"	11'9"	40,900		10,000	101,600
	120'0"	-	-	12'6"	12'3"	47,500	60 lb.	10,800	125,600

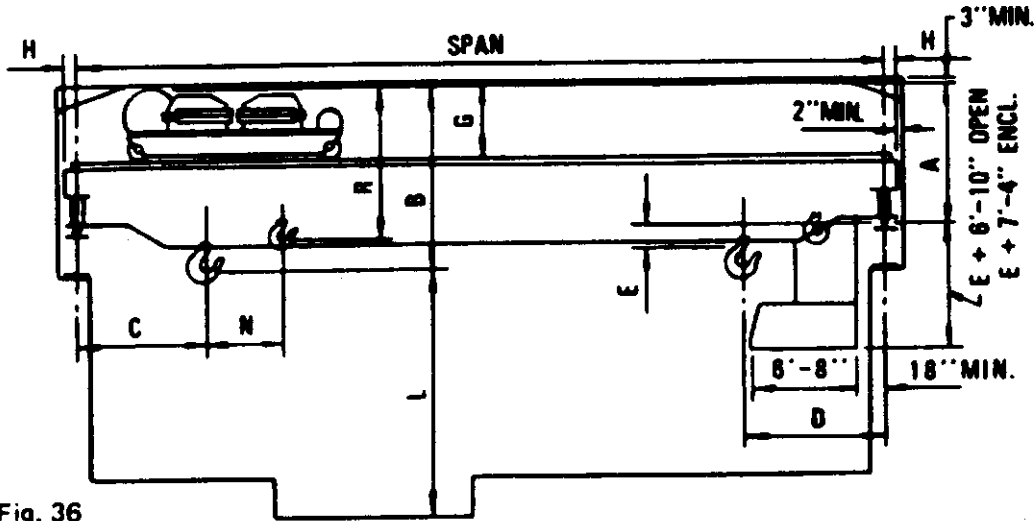


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L	
15 TON NO AUX. For each 4'-0" add 1 lb, add 6" to J and K, and add 3" to X and Y.	50'0"	5'5"	6'11"	3'0"	3'6"	1'0"	3'0"	8"	9'0" 10'0" 11'0"	5'6" 6'6" 7'6"	22'3" 32'9" 41'3"	
	60'0"	5'9"	6'11"	3'0"	3'6"	1'3"	3'0"	8"	9'0" 10'0" 11'0"	5'6" 6'6" 7'6"	22'3" 32'9" 41'3"	
	70'0"	6'0"	6'11"	3'0"	3'6"	1'6"	3'0"	8"	10'0" 10'0" 11'0"	5'6" 6'6" 7'6"	22'3" 32'9" 41'3"	
	80'0"	6'6"	6'11"	3'0"	3'6"	1'6"	3'0"	8 1/4"	11'6" 11'6" 12'6"	6'6" 7'6" 8'6"	32'9" 41'3" 50'9"	
	90'0"	6'6"	6'11"	3'0"	3'6"	1'8"	3'0"	8 1/4"	13'0" 13'0" 13'0"	7'0" 8'0" 9'0"	36'6" 46'0" 55'6"	
	100'0"	6'7"	6'11"	3'0"	3'6"	1'8"	3'0"	8 1/4"	14'6" 14'6" 14'6"	8'0" 9'0" 10'0"	46'0" 55'6" 65'0"	
	110'0"	7'2"	6'11"	3'3"	3'9"	2'0"	3'0"	8 1/4"	16'0" 16'0"	10'0" 11'0"	65'0" 74'6"	
	120'0"	7'6"	6'11"	3'3"	3'9"	2'2"	3'0"	8 1/4"	17'6" 17'6"	10'0" 13'0"	65'0" 93'6"	
	15 TON 5 T. AUX For each 4'-0" add 1 lb, add 6" to J and K, and add 3" to X and Y.	50'0"	5'7"	7'1"	3'6"	8'0"	1'3"	3'2"	8"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	27'0" 36'6" 46'0"
		60'0"	5'11"	7'1"	3'6"	8'0"	1'6"	3'2"	8 1/4"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	27'0" 36'6" 46'0"
70'0"		6'2"	7'1"	3'6"	8'0"	1'9"	3'2"	8 1/4"	10'0" 11'0" 12'0"	6'0" 7'0" 8'0"	27'0" 36'6" 46'0"	
80'0"		6'8"	7'1"	3'6"	8'0"	1'9"	3'2"	8 1/4"	11'6" 12'0" 13'0"	7'0" 8'0" 9'0"	36'6" 46'0" 55'6"	
90'0"		6'8"	7'1"	3'6"	8'0"	1'10"	3'2"	8 1/4"	13'0" 13'0" 13'0"	7'0" 8'0" 9'0"	36'6" 46'0" 55'6"	
100'0"		7'0"	7'1"	3'6"	8'0"	1'10"	3'2"	8 1/4"	14'6" 14'6" 14'6"	8'0" 9'0" 10'0"	46'0" 55'6" 65'0"	
110'0"		7'4"	7'1"	3'6"	8'0"	2'3"	3'2"	8 1/4"	16'0" 16'0"	10'0" 11'0"	65'0" 74'6"	
120'0"		7'8"	7'1"	3'6"	8'0"	2'6"	3'2"	8 1/4"	17'6" 17'6"	10'0" 13'0"	65'0" 93'6"	

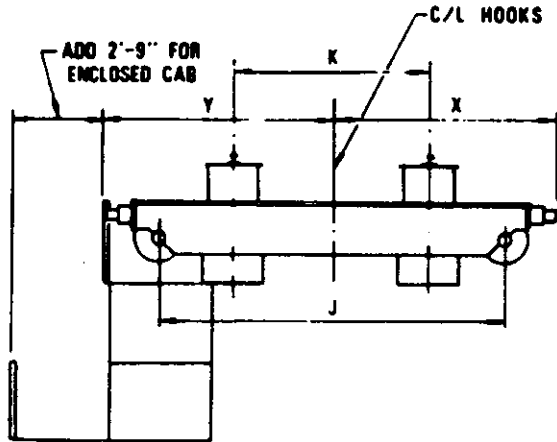


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
15 TON	50'0"	-	-	7'6"	9'3"	28,000	40 lb.	9,000	39,300
				8'0"	9'9"	28,300		9,500	40,000
				8'6"	10'3"	28,600		10,000	40,700
	60'0"	-	-	7'6"	9'3"	29,300	40 lb.	9,000	43,400
				8'0"	9'9"	29,600		9,500	44,100
				8'6"	10'3"	30,000		10,000	44,800
	70'0"	-	-	8'3"	9'6"	31,000	60 lb.	9,000	49,100
				8'0"	9'9"	31,300		9,500	49,800
				8'6"	10'3"	31,600		10,000	50,500
	80'0"	-	-	9'3"	10'0"	33,600	60 lb.	9,500	58,200
				8'9"	10'6"	34,000		10,000	58,900
				9'3"	11'0"	34,400		10,500	59,600
90'0"	-	-	8'9"	10'6"	36,600	60 lb.	9,800	68,800	
			10'0"	11'0"	37,000		10,300	69,400	
			9'6"	11'3"	37,400		10,800	70,000	
100'0"	-	-	9'9"	11'0"	41,700	60 lb.	10,300	86,800	
			10'9"	11'6"	42,000		10,800	87,400	
			10'3"	12'0"	42,400		11,300	88,000	
110'0"	-	-	10'3"	12'6"	46,300	60 lb.	11,300	103,000	
			11'3"	13'6"	46,700		12,000	104,000	
			11'9"	12'0"	49,800		11,300	116,000	
120'0"	-	-	11'9"	13'9"	50,600	60 lb.	13,000	118,000	
			11'9"	13'9"	50,600		13,000	118,000	
			11'9"	13'9"	50,600		13,000	118,000	
15 TON 5 T AUX	50'0"	4'10"	6'1"	7'9"	9'6"	29,800	60 lb.	13,400	43,800
				8'3"	10'0"	30,000		14,000	44,600
				8'9"	10'6"	30,200		14,600	45,400
	60'0"	4'10"	6'1"	7'9"	9'6"	31,200	60 lb.	13,400	48,000
				8'3"	10'0"	31,500		14,000	48,800
				8'9"	10'6"	31,800		14,600	49,600
	70'0"	4'10"	6'1"	8'0"	9'9"	33,000	60 lb.	13,400	53,800
				8'6"	10'3"	33,300		14,000	54,600
				9'0"	10'9"	33,600		14,600	55,400
	80'0"	4'10"	6'1"	9'0"	10'3"	35,600	60 lb.	14,000	62,600
				9'0"	10'9"	36,000		14,600	63,400
				9'6"	11'3"	36,400		15,200	64,200
90'0"	4'10"	6'1"	8'9"	10'6"	38,300	60 lb.	14,000	72,400	
			10'0"	11'0"	38,600		14,600	73,000	
			9'6"	11'3"	39,000		15,200	73,600	
100'0"	4'10"	6'1"	9'9"	11'0"	43,400	60 lb.	14,600	90,400	
			10'9"	11'6"	43,800		15,200	91,000	
			10'3"	12'0"	44,200		16,000	91,600	
110'0"	4'10"	6'1"	10'3"	12'6"	48,300	60 lb.	16,000	107,000	
			11'3"	12'6"	49,000		17,000	108,000	
			11'9"	12'0"	51,600		16,000	119,000	
120'0"	4'10"	6'1"	11'9"	13'9"	53,000	80 lb.	19,000	122,000	
			11'9"	13'9"	53,000		19,000	122,000	
			11'9"	13'9"	53,000		19,000	122,000	

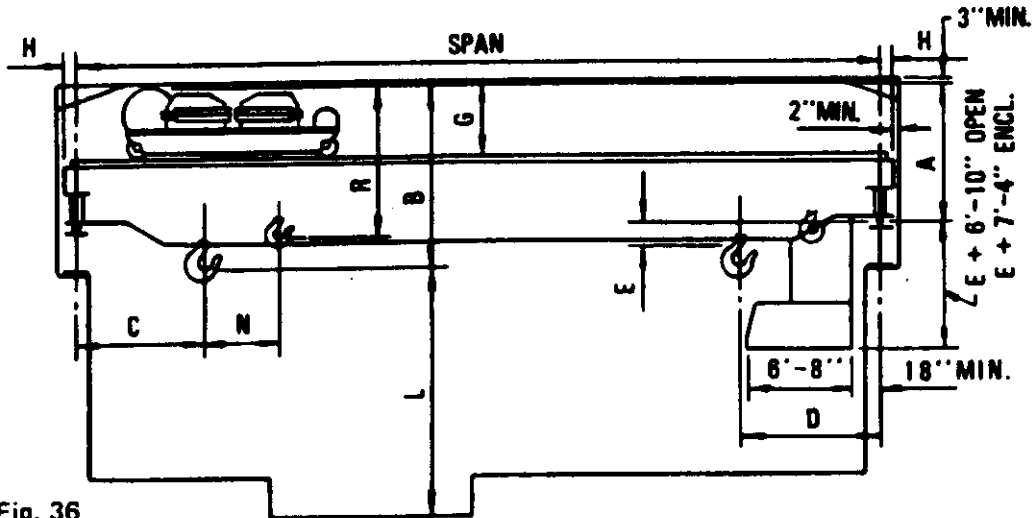


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
20 TON NO AUX. For each 4'-3" add 1 lb, add 6" to J and K, and add 3" to X and Y.	50'0"	5'5"	7'0"	3'0"	3'6"	1'3"	3'0"	8 1/4"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	60'0"	5'9"	7'0"	3'0"	3'6"	1'6"	3'0"	8 1/4"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	70'0"	6'0"	7'0"	3'0"	3'6"	1'9"	3'0"	8 1/4"	10'0" 11'0" 12'0"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	80'0"	6'6"	7'0"	3'0"	3'6"	1'9"	3'0"	8 1/4"	11'6" 12'0" 13'0"	7'0" 8'0" 9'0"	33'0" 41'6" 50'0"
	90'0"	6'6"	7'0"	3'0"	3'6"	1'9"	3'0"	8 1/4"	13'0" 13'0" 13'0"	8'0" 9'0"	41'6" 50'0"
	100'0"	6'7"	7'0"	3'0"	3'6"	1'9"	3'0"	8 1/4"	14'6" 14'6" 14'6"	8'0" 9'0" 10'0"	41'6" 50'0" 58'6"
	110'0"	7'2"	7'0"	3'3"	3'9"	2'3"	3'0"	8 1/4"	16'0" 16'0"	10'0" 11'0"	58'6" 67'0"
120'0"	7'6"	7'0"	3'3"	3'9"	2'5"	3'0"	8 1/4"	17'6" 17'6" 17'6"	10'0" 11'0" 13'0"	58'6" 67'0" 84'0"	
20 TON 5 T. AUX. For each 4'-3" add 1 lb, add 6" to J and K, and add 3" to X and Y.	50'0"	5'7"	7'2"	3'6"	8'0"	1'5"	3'2"	8 1/4"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	60'0"	5'11"	7'2"	3'6"	8'0"	1'8"	3'2"	8 1/4"	9'6" 10'6" 11'6"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	70'0"	6'2"	7'2"	3'6"	8'0"	1'11"	3'2"	8 1/4"	10'0" 11'0" 12'0"	6'0" 7'0" 8'0"	24'6" 33'0" 41'6"
	80'0"	6'8"	7'2"	3'6"	8'0"	1'9"	3'2"	8 1/4"	11'6" 12'0" 13'0"	7'0" 8'0" 9'0"	33'0" 41'6" 50'0"
	90'0"	6'8"	7'2"	3'6"	8'0"	1'9"	3'2"	8 1/4"	13'0" 13'0" 13'0"	7'0" 8'0" 9'0"	33'0" 41'6" 50'0"
	100'0"	7'0"	7'2"	3'6"	8'0"	2'3"	3'2"	8 1/4"	14'6" 14'6" 14'6"	8'0" 9'0" 10'0"	41'6" 50'0" 58'6"
	110'0"	7'4"	7'2"	3'6"	8'0"	2'5"	3'2"	8 1/4"	16'0" 16'0"	10'0" 11'0"	58'6" 67'0"
120'0"	7'8"	7'2"	3'6"	8'0"	2'8"	3'2"	8 1/4"	17'6" 17'6" 17'6"	10'0" 11'0" 13'0"	58'6" 67'0" 84'0"	

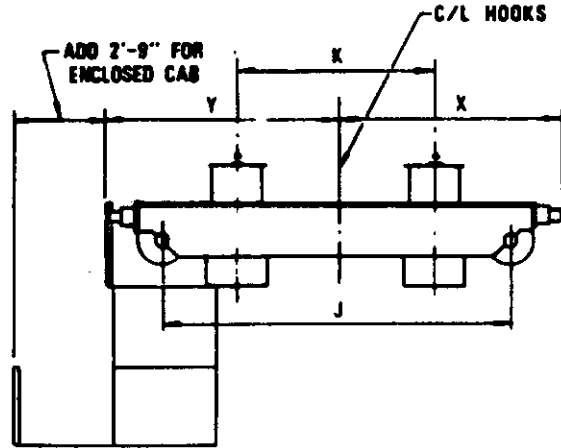


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
20 TON	50'0"	-	-	7'9"	9'6"	33,900	40 lb.	9,400	43,400
				8'3"	10'0"	34,200		10,000	44,200
				8'9"	10'6"	34,500		10,600	45,000
	60'0"	-	-	7'9"	9'6"	34,800	40 lb.	9,400	45,800
				8'3"	10'0"	35,100		10,000	46,600
				8'9"	10'6"	35,400		10,600	47,400
	70'0"	-	-	8'0"	9'9"	37,500	60 lb.	9,400	55,600
				8'6"	10'3"	37,800		10,000	56,400
				9'0"	10'9"	38,100		10,600	57,200
	80'0"	-	-	9'0"	10'3"	40,100	60 lb.	10,000	64,000
				9'6"	10'9"	40,400		10,600	64,600
				9'6"	11'3"	40,700		11,200	65,400
90'0"	-	-	8'9"	10'6"	44,400	60 lb.	10,000	79,600	
			10'0"	11'0"	44,700		10,600	80,200	
			9'6"	11'3"	45,000		11,200	80,800	
100'0"	-	-	9'9"	11'0"	48,300	60 lb.	10,600	93,400	
			10'9"	11'6"	48,600		11,200	94,000	
			10'3"	12'0"	49,000		11,800	94,600	
110'0"	-	-	10'3"	12'6"	52,500	80 lb.	11,800	108,000	
			11'3"	12'6"	53,000		12,600	110,000	
			11'9"	13'0"	56,500		14,400	124,000	
20 TON S T. AUX.	50'0"	4'10"	6'1"	7'9"	9'6"	35,600	60 lb.	13,600	47,600
				8'3"	10'0"	36,200		14,200	48,400
				8'9"	10'6"	36,800		14,800	49,200
	60'0"	4'10"	6'1"	7'9"	9'6"	37,400	60 lb.	13,600	53,200
				8'3"	10'0"	38,000		14,200	54,000
				8'9"	10'6"	38,600		14,800	54,800
	70'0"	4'10"	6'1"	8'0"	9'9"	39,200	60 lb.	13,600	59,200
				8'6"	10'3"	39,800		14,200	60,000
				9'0"	10'9"	40,400		14,800	60,800
	80'0"	4'10"	6'1"	9'0"	10'3"	42,000	60 lb.	14,200	68,000
				9'6"	10'9"	42,600		14,800	68,600
				9'6"	11'3"	43,200		15,400	69,400
90'0"	4'10"	6'1"	8'9"	10'6"	46,800	60 lb.	14,200	86,000	
			10'0"	11'0"	47,400		14,800	86,600	
			9'6"	11'3"	48,000		15,400	87,200	
100'0"	4'10"	6'1"	9'9"	11'0"	50,000	80 lb.	14,800	97,000	
			10'9"	11'6"	50,600		15,400	97,600	
			10'3"	12'0"	51,200		16,300	98,200	
110'0"	4'10"	6'1"	10'3"	12'6"	54,600	80 lb.	16,300	112,000	
			11'3"	12'6"	55,400		17,400	114,000	
			11'9"	12'0"	58,200		16,300	125,000	
120'0"	4'10"	6'1"	11'9"	12'0"	59,000	80 lb.	20,200	129,000	
			11'9"	13'0"	59,000		20,200	129,000	

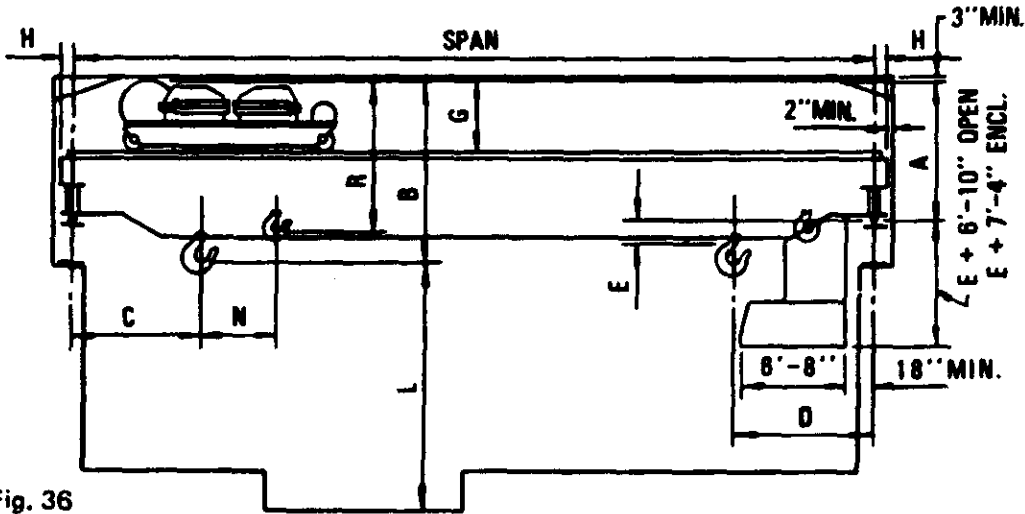


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L	
25 TON NO AUX. For each 5'-0" add 1 ft, add 12" to J and K, and add 6" to X and Y.	50'0"	6'0"	7'3"	3'6"	4'0"	1'0"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	60'0"	6'4"	7'3"	3'6"	4'0"	1'6"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	70'0"	6'7"	7'3"	3'6"	4'0"	1'8"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	80'0"	6'9"	7'3"	3'6"	4'0"	1'8"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	90'0"	6'9"	7'3"	3'6"	4'0"	1'8"	3'2"	8 1/4"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	33'6" 39'3" 45'0"	
	100'0"	7'4"	7'3"	3'6"	4'0"	1'11"	3'2"	8 1/4"	14'6" 15'0" 16'0"	10'0" 11'0" 12'0"	39'3" 45'0" 50'9"	
	110'0"	7'6"	7'3"	3'6"	4'0"	2'4"	3'2"	8 1/4"	16'0" 17'0" 17'6"	12'0" 13'0" 13'0"	50'9" 56'5" 56'5"	
	120'0"	7'9"	7'3"	3'6"	4'0"	2'9"	3'2"	8 1/4"	17'6" 18'0" 18'6"	13'0" 14'0" 14'0"	56'5" 62'1" 62'1"	
	25 TON 10 T. AUX. For each 5'-0" add 1 ft, add 12" to J and K, and add 6" to X and Y.	50'0"	6'2"	7'5"	3'9"	8'6"	1'1"	3'4"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"
		60'0"	6'8"	7'5"	3'9"	8'6"	1'7"	3'4"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"
70'0"		7'0"	7'5"	3'9"	8'6"	1'9"	3'4"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
80'0"		7'0"	7'5"	3'9"	8'6"	1'9"	3'4"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
90'0"		7'0"	7'5"	3'9"	8'6"	1'9"	3'4"	8 1/4"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	33'6" 39'3" 45'0"	
100'0"		7'6"	7'5"	3'9"	8'6"	2'4"	3'4"	8 1/4"	14'6" 15'0" 16'0"	10'0" 11'0" 12'0"	39'3" 45'0" 50'9"	
110'0"		7'9"	7'5"	3'9"	8'6"	2'9"	3'4"	8 1/4"	16'0" 17'0" 17'6"	12'0" 13'0" 13'0"	50'9" 56'5" 56'5"	
120'0"		8'0"	7'5"	3'9"	8'6"	3'3"	3'4"	8 1/4"	17'6" 18'0" 18'6"	13'0" 14'0" 14'0"	56'5" 62'1" 62'1"	

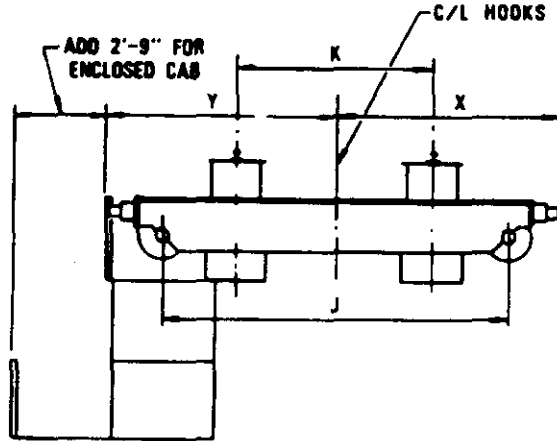


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
25 TON	50'0"	-	-	9'0"	10'9"	39,100	60 lb.	11,400	45,000
				9'6"	11'3"	39,700		12,000	45,800
				10'0"	11'9"	40,300		12,600	46,600
	60'0"	-	-	9'0"	10'9"	41,100	80 lb.	11,400	51,000
				9'6"	11'3"	41,700		12,000	51,800
				10'0"	11'9"	42,300		12,600	52,600
	70'0"	-	-	9'0"	10'9"	44,000	100 lb.	11,400	61,000
				9'6"	11'3"	44,600		12,000	61,800
				10'0"	11'9"	45,200		12,600	62,600
	80'0"	-	-	9'0"	10'9"	46,800	100 lb.	11,400	70,500
				9'6"	11'3"	47,400		12,000	71,400
				10'0"	11'9"	48,000		12,600	72,200
	90'0"	-	-	9'6"	11'3"	52,300	60 lb.	12,000	90,000
				10'0"	11'9"	53,000		12,600	91,000
10'6"				12'3"	53,600	13,200		92,000	
100'0"	-	-	10'3"	12'0"	54,700	60 lb.	12,600	99,000	
			10'6"	12'3"	55,400		13,200	100,000	
			11'0"	12'9"	56,000		13,800	101,000	
110'0"	-	-	11'0"	12'3"	58,800	80 lb.	13,800	112,000	
			11'6"	12'9"	59,600		14,400	114,000	
			11'9"	13'9"	63,400		100 lb.	14,400	128,000
25 TON 10 T AUX	50'0"	5'4"	6'4"	9'0"	10'9"	42,900	60 lb.	20,000	53,600
				9'6"	11'3"	43,500		21,000	55,000
				10'0"	11'9"	44,000		22,000	56,400
	60'0"	5'4"	6'4"	9'0"	10'9"	45,000	60 lb.	20,000	59,600
				9'6"	11'3"	45,600		21,000	61,000
				10'0"	11'9"	46,400		22,000	62,400
	70'0"	5'4"	6'4"	9'0"	10'9"	47,800	60 lb.	20,000	69,000
				9'6"	11'3"	48,400		21,000	70,400
				10'0"	11'9"	49,000		22,000	71,800
	80'0"	5'4"	6'4"	9'0"	10'9"	50,800	80 lb.	20,000	79,000
				9'6"	11'3"	51,400		21,000	80,500
				10'0"	11'9"	52,000		22,000	82,000
	90'0"	5'4"	6'4"	9'6"	11'3"	56,400	80 lb.	21,000	99,000
				10'0"	11'9"	57,000		22,000	100,500
10'6"				12'3"	57,600	23,000		102,000	
100'0"	5'4"	6'4"	10'3"	12'0"	60,000	80 lb.	22,000	110,000	
			10'6"	12'3"	60,600		23,000	111,500	
			11'0"	12'9"	61,200		24,000	113,000	
110'0"	5'4"	6'4"	11'0"	12'3"	65,000	100 lb.	24,000	125,000	
			11'6"	12'9"	65,800		25,000	126,000	
			11'9"	13'9"	69,000		100 lb.	25,000	140,000

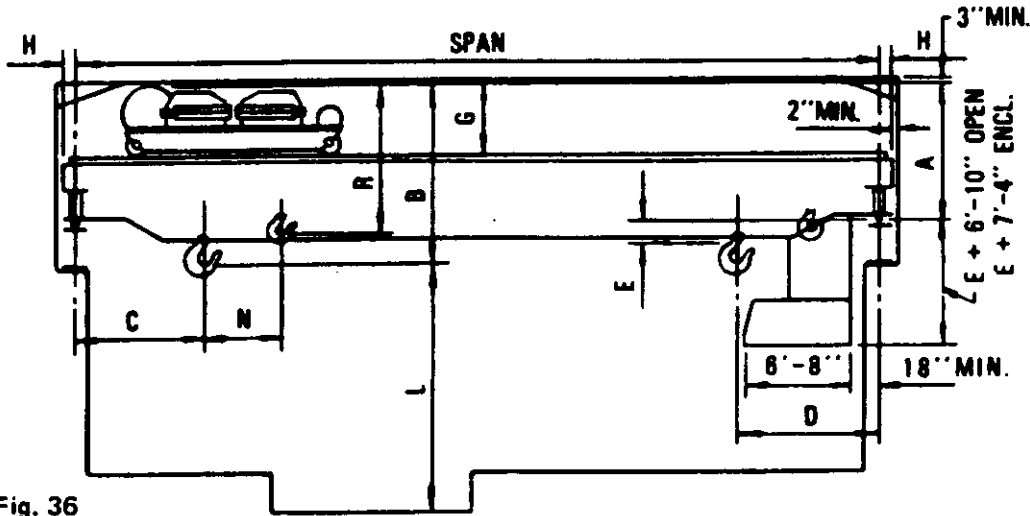


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L	
30 TON NO AUX For each 5'-0" add 1 lb, add 12" to J and K, and add 6" to X and Y.	50'0"	6'0"	7'5"	3'6"	4'0"	1'0"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	60'0"	6'4"	7'5"	3'6"	4'0"	1'7"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	70'0"	6'9"	7'5"	3'6"	4'0"	1'8"	3'2"	8 1/4"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
	80'0"	6'9"	7'5"	3'6"	4'0"	1'8"	3'2"	8 3/4"	12'0" 13'0" 14'0"	8'11" 9'0" 10'0"	27'9" 33'6" 39'3"	
	90'0"	6'9"	7'5"	3'6"	4'0"	1'8"	3'2"	8 3/4"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	33'6" 39'3" 45'0"	
	100'0"	7'4"	7'5"	3'6"	4'0"	2'4"	3'2"	8 3/4"	14'6" 15'0" 16'0"	10'0" 11'0" 12'0"	39'3" 45'0" 50'9"	
	110'0"	7'6"	7'5"	3'6"	4'0"	2'9"	3'2"	8 3/4"	16'0" 17'0"	12'0" 13'0"	50'9" 56'5"	
	120'0"	8'0"	7'5"	3'6"	4'0"	3'1"	3'2"	8 3/4"	17'6" 18'0"	13'0" 14'0"	56'5" 62'1"	
	30 TON 10 T AUX. For each 5'-0" add 1 lb, add 12" to J and K, and add 6" to X and Y.	50'0"	6'2"	7'7"	3'9"	4'6"	1'1"	3'4"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"
		60'0"	6'8"	7'7"	3'9"	4'6"	1'9"	3'4"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"
70'0"		7'0"	7'7"	3'9"	4'6"	1'9"	3'4"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
80'0"		7'0"	7'7"	3'9"	4'6"	1'9"	3'4"	8 1/2"	13'0" 13'11" 14'0"	8'0" 9'0" 10'0"	27'9" 33'6" 39'3"	
90'0"		7'0"	7'7"	3'9"	4'6"	1'9"	3'4"	8 1/2"	13'0" 14'0" 15'0"	9'0" 10'0" 11'0"	33'6" 39'3" 45'0"	
100'0"		7'6"	7'7"	3'9"	4'6"	2'7"	3'4"	8 1/2"	14'6" 15'0" 16'0"	10'0" 11'0" 12'0"	39'3" 45'0" 50'9"	
110'0"		7'11"	7'7"	3'9"	4'6"	2'9"	3'4"	9'1"	16'0" 17'0"	12'0" 13'0"	50'9" 56'5"	
120'0"		8'0"	7'7"	3'9"	4'6"	3'9"	3'4"	9'1"	17'6" 18'0"	13'0" 14'0"	56'5" 62'1"	

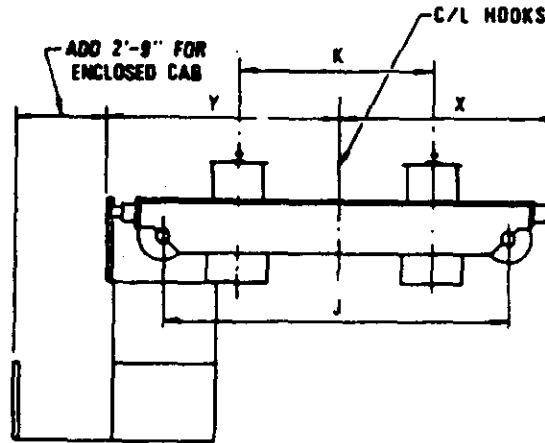


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
30 TON	50'0"	-	-	9'0"	10'9"	45,000	60 lb.	11,400	50,000
				9'6"	11'3"	45,400		12,000	50,800
				10'0"	11'9"	46,000		12,600	51,600
	60'0"	-	-	9'0"	10'9"	47,200	60 lb.	11,400	56,400
				9'6"	11'3"	47,800		12,000	57,200
				10'0"	11'9"	48,400		12,600	58,000
	70'0"	-	-	9'0"	10'9"	50,400	80 lb.	11,400	67,000
				9'6"	11'3"	51,000		12,000	68,000
				10'0"	11'9"	51,600		12,600	69,000
	80'0"	-	-	9'0"	10'9"	54,200	80 lb.	11,400	80,500
				9'6"	11'3"	54,800		12,000	81,500
				10'0"	11'9"	55,400		12,600	82,500
90'0"	-	-	9'6"	11'3"	58,000	80 lb.	12,000	93,000	
			10'0"	11'9"	58,600		12,600	94,000	
			10'6"	12'3"	59,200		13,400	95,000	
100'0"	-	-	10'3"	12'0"	61,800	80 lb.	12,600	106,000	
			10'6"	12'3"	62,400		13,400	107,000	
			11'0"	12'9"	63,000		14,200	108,000	
110'0"	-	-	11'0"	12'3"	66,000	100 lb.	14,200	119,000	
			11'6"	12'9"	67,000		15,000	120,000	
			11'9"	13'3"	70,500		15,000	135,000	
30 TON 10 T AUX	50'0"	5'4"	6'4"	9'0"	10'9"	48,900	60 lb.	20,000	58,600
				9'6"	11'3"	49,500		21,000	60,000
				10'0"	11'9"	50,000		22,000	61,400
	60'0"	5'4"	6'4"	9'0"	10'9"	51,300	80 lb.	20,000	65,600
				9'6"	11'3"	51,800		21,000	67,000
				10'0"	11'9"	52,400		22,000	68,400
	70'0"	5'4"	6'4"	9'0"	10'9"	54,600	80 lb.	20,000	76,600
				9'6"	11'3"	55,300		21,000	78,000
				10'0"	11'9"	56,000		22,000	79,400
	80'0"	5'4"	6'4"	9'0"	10'9"	58,400	80 lb.	20,000	89,600
				9'6"	11'3"	59,000		21,000	91,000
				10'0"	11'9"	59,600		22,000	92,400
90'0"	5'4"	6'4"	9'6"	11'3"	62,000	100 lb.	21,000	102,000	
			10'0"	11'9"	62,600		22,000	103,500	
			10'6"	12'3"	63,200		23,000	105,000	
110'0"	5'4"	6'4"	10'3"	12'0"	65,800	100 lb.	22,000	114,000	
			10'6"	12'3"	66,400		23,000	115,500	
			11'0"	12'9"	67,000		24,000	117,000	
110'0"	5'4"	6'4"	11'0"	12'3"	70,400	100 lb.	24,000	129,000	
			11'6"	12'9"	71,400		25,000	130,000	
			11'9"	13'3"	75,300		25,000	146,000	

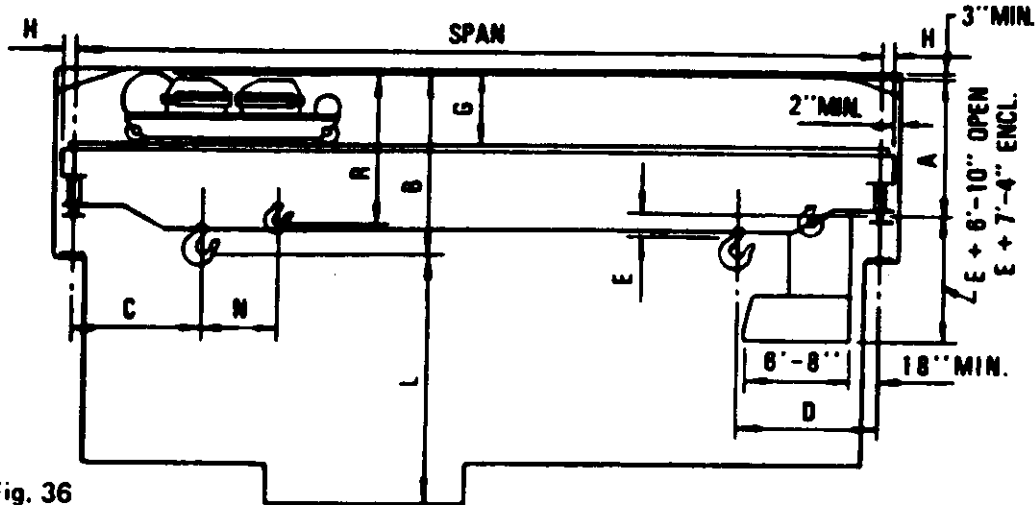


Fig. 36

Rated Load	Span	A	B	C	D	F	G	H	J	K	L	
40 TON 10 T. AUX. For each 5'-4" add 1 Wt. add 8" to J and K, and add 3" to X and Y.	50'0"	7'5"	8'10"	4'9"	8'0"	1'3"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	37'10" 48'6" 59'2"	
	60'0"	7'9"	8'10"	4'9"	8'0"	1'7"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	37'10" 48'6" 59'2"	
	70'0"	7'9"	8'10"	4'9"	8'0"	1'9"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	37'10" 48'6" 59'2"	
	80'0"	7'9"	8'10"	4'9"	8'0"	1'9"	4'0"	8 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	48'6" 59'2" 69'10"	
	90'0"	8'3"	8'10"	4'9"	8'0"	2'7"	4'0"	8 1/2"	13'0" 13'0" 14'0"	8'0" 9'0" 10'0"	48'6" 59'2" 69'10"	
	100'0"	8'7"	8'10"	4'9"	8'0"	2'9"	4'0"	8 1/2"	14'6" 14'6" 14'6"	8'0" 9'0" 10'0"	48'6" 59'2" 69'10"	
	110'0"	9'0"	8'10"	4'9"	8'0"	3'3"	4'0"	9 1/2"	16'0" 16'0" 17'6"	9'0" 11'0" 11'0"	59'2" 80'6" 80'6"	
	120'0"	9'2"	8'10"	4'9"	8'0"	3'3"	4'0"	9 1/2"	17'6" 17'6" 17'6"	10'0" 11'0" 11'0"	69'10" 80'6" 80'6"	
	50 TON 10 T. AUX. For each 4'-8" add 1 Wt. add 8" to J and K, and add 3" to X and Y.	50'0"	7'7"	8'10"	4'9"	8'0"	1'7"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	33'0" 42'4" 51'8"
		60'0"	7'11"	8'10"	4'9"	8'0"	1'7"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	33'0" 42'4" 51'8"
70'0"		7'11"	8'10"	4'9"	8'0"	1'7"	4'0"	8 1/2"	11'0" 12'0" 13'0"	7'0" 8'0" 9'0"	33'0" 42'4" 51'8"	
80'0"		8'5"	8'10"	4'9"	8'0"	2'1"	4'0"	9 1/2"	12'0" 13'0" 14'0"	8'0" 9'0" 10'0"	42'4" 51'8" 61'0"	
90'0"		8'9"	8'10"	4'9"	8'0"	2'4"	4'0"	9 1/2"	13'0" 13'0" 14'0"	8'0" 9'0" 10'0"	42'4" 51'8" 61'0"	
100'0"		9'0"	8'10"	4'9"	8'0"	2'8"	4'0"	10 1/2"	14'6" 14'6" 15'6"	9'0" 10'0" 11'0"	51'8" 61'0" 70'4"	
110'0"		9'0"	8'10"	4'9"	8'0"	3'0"	4'0"	10 1/2"	16'0" 16'0" 17'6"	9'0" 11'0" 11'0"	51'8" 61'0" 70'4"	
120'0"		9'3"	8'10"	4'9"	8'0"	3'3"	4'0"	10 1/2"	17'6" 17'6" 17'6"	10'0" 11'0" 12'0"	61'0" 70'4" 79'8"	

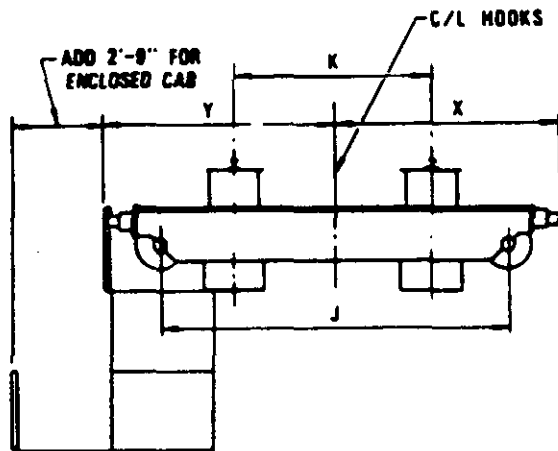


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
40 TON 10 T. AUX	50'0"	4'11"	7'6"	8'6"	10'3"	64,200	100 lb.	31,000	77,500
				9'0"	10'9"	64,600		31,700	78,400
				9'6"	11'3"	64,800		32,700	79,600
	60'0"	4'11"	7'6"	8'6"	10'3"	68,500	100 lb.	31,000	90,000
				9'0"	10'9"	69,000		31,700	91,000
				9'6"	11'3"	69,500		32,700	92,200
	70'0"	4'11"	7'6"	8'6"	10'3"	71,500	135 lb.	31,000	98,800
				9'0"	10'9"	72,000		31,700	99,700
				9'6"	11'3"	72,500		32,700	100,800
	80'0"	4'11"	7'6"	9'0"	10'9"	77,800	175 lb.	31,700	118,000
				9'6"	11'3"	78,300		32,700	119,000
				10'0"	11'9"	78,800		33,800	120,000
90'0"	4'11"	7'6"	9'9"	11'0"	81,400	175 lb.	31,700	132,000	
			9'6"	11'3"	82,000		32,700	133,000	
			10'0"	11'9"	82,600		33,800	134,000	
100'0"	4'11"	7'6"	9'9"	12'6"	85,200	175 lb.	31,700	145,000	
			10'9"	11'6"	85,800		32,700	146,000	
			10'3"	12'0"	86,400		33,800	147,000	
110'0"	4'11"	7'6"	11'0"	13'0"	90,300	175 lb.	32,700	162,000	
			11'6"	12'6"	91,600		35,000	165,000	
			12'0"	13'6"	95,600		33,800	180,000	
120'0"	4'11"	7'6"	11'6"	14'0"	96,400	175 lb.	35,000	182,000	
			12'0"	13'6"	95,600		33,800	180,000	
			11'6"	14'0"	96,400		35,000	182,000	
50 TON 10 T. AUX	50'0"	4'11"	7'6"	8'6"	10'3"	74,200	135 lb.	31,200	81,000
				9'0"	10'9"	74,600		31,900	81,800
				9'6"	11'3"	75,000		33,000	83,000
	60'0"	4'11"	7'6"	8'6"	10'3"	78,000	175 lb.	31,200	90,800
				9'0"	10'9"	78,500		31,900	91,600
				9'6"	11'3"	79,000		33,000	92,600
	70'0"	4'11"	7'6"	8'6"	10'3"	82,200	175 lb.	31,200	104,000
				9'0"	10'9"	82,700		31,900	105,000
				9'6"	11'3"	83,200		33,000	106,000
	80'0"	4'11"	7'6"	9'0"	10'9"	87,000	175 lb.	31,900	119,000
				9'6"	11'3"	87,500		33,000	120,000
				10'0"	11'9"	88,000		34,200	121,000
90'0"	4'11"	7'6"	9'9"	11'0"	91,000	175 lb.	31,900	132,000	
			9'6"	11'3"	91,500		33,000	133,000	
			10'0"	11'9"	92,000		34,200	134,000	
100'0"	4'11"	7'6"	10'0"	11'6"	95,400	175 lb.	33,000	146,000	
			10'6"	12'0"	96,000		34,200	147,000	
			11'0"	12'6"	96,600		35,500	148,000	
110'0"	4'11"	7'6"	11'0"	13'0"	100,000	175 lb.	33,000	162,000	
			11'6"	12'6"	101,200		35,500	165,000	
			12'0"	13'6"	103,000		34,200	172,000	
120'0"	4'11"	7'6"	12'0"	13'6"	103,000	175 lb.	34,200	172,000	
			12'3"	13'3"	104,500		37,000	175,000	

Part C—Pendant or Cab Control

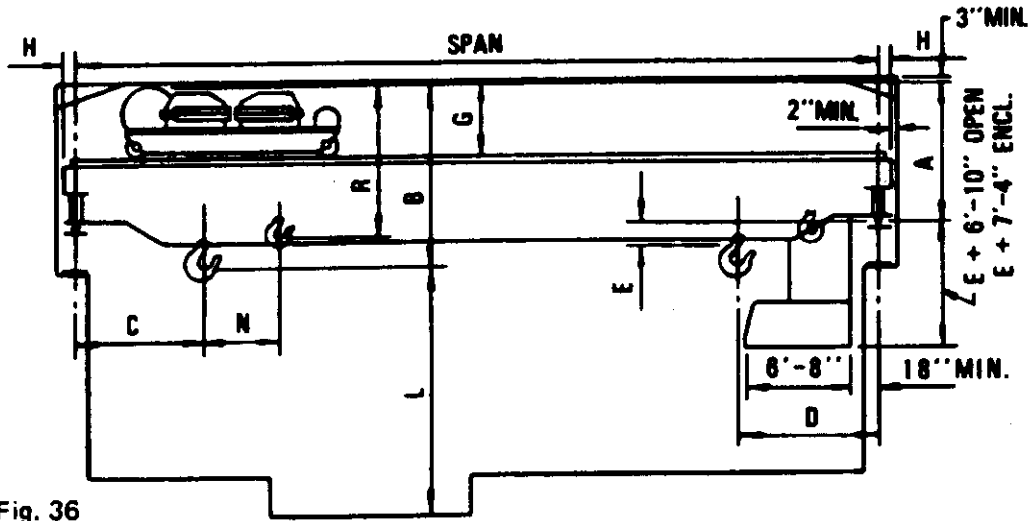


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
60 TON 10 T. AUX. For each 4'-0" add 1 ft., add 6" to J and K, and add 3" to X and Y.	60'0"	8'3"	9'9"	4'6"	8'0"	1'7"	4'4"	10 1/4"	12'0"	8'0"	37'6"
									13'0"	9'0"	45'6"
									14'0"	10'0"	53'6"
	70'0"	8'3"	9'9"	4'6"	8'0"	1'8"	4'4"	10 1/4"	12'0"	8'0"	37'6"
									13'0"	9'0"	45'6"
									14'0"	10'0"	53'6"
	80'0"	9'1"	9'9"	4'6"	8'0"	2'2"	4'4"	10 1/4"	12'0"	8'0"	37'6"
								13'0"	9'0"	45'6"	
								14'0"	10'0"	53'6"	
	90'0"	9'6"	9'9"	4'6"	8'0"	2'5"	4'4"	10 1/4"	13'0"	8'0"	37'6"
									13'0"	9'0"	45'6"
									14'0"	10'0"	53'6"
	100'0"	10'0"	9'9"	4'6"	8'0"	2'8"	4'4"	10 1/4"	14'6"	9'0"	45'6"
									14'6"	10'0"	53'6"
									15'6"	11'0"	61'6"
	110'0"	10'0"	9'9"	4'6"	8'0"	2'9"	4'4"	10 1/4"	16'0"	9'0"	45'6"
									16'0"	11'0"	61'6"
	120'0"	10'3"	9'9"	4'6"	8'0"	3'1"	4'4"	10 1/4"	17'6"	10'0"	53'6"
									17'6"	12'0"	69'6"
75 TON 20 T. AUX. For each 9'-5" add 1 ft., add 12" to J and K, and add 6" to X and Y.	60'0"	9'8"	8'6"	4'9"	8'6"	1'0"	5'0"	10 1/4"	15'0"	10'6"	70'0"
									16'0"	11'6"	79'5"
									17'0"	12'6"	88'10"
	70'0"	10'0"	8'6"	4'9"	8'6"	1'9"	5'0"	10 1/4"	15'0"	10'6"	70'0"
									16'0"	11'6"	79'5"
									17'0"	12'6"	88'10"
	80'0"	10'6"	8'6"	4'9"	8'6"	2'4"	5'0"	10 1/4"	15'0"	10'6"	70'0"
								16'0"	11'6"	79'5"	
								17'0"	12'6"	88'10"	
	90'0"	10'6"	8'6"	4'9"	8'6"	2'4"	5'0"	12"	15'0"	10'6"	70'0"
									16'0"	11'6"	79'5"
									17'0"	12'6"	88'10"
	100'0"	10'9"	8'6"	4'9"	8'6"	2'8"	5'0"	12"	15'6"	10'6"	70'0"
									16'6"	11'6"	79'5"
									17'6"	12'6"	88'10"
	110'0"	11'0"	8'6"	4'9"	8'6"	3'1"	5'0"	12"	16'6"	11'6"	79'5"
									17'6"	12'6"	88'10"
									18'6"	13'6"	98'3"
	120'0"	11'0"	8'6"	4'9"	8'6"	3'4"	5'0"	12"	17'6"	12'6"	88'10"
									18'6"	13'6"	98'3"
									19'6"	14'6"	107'9"

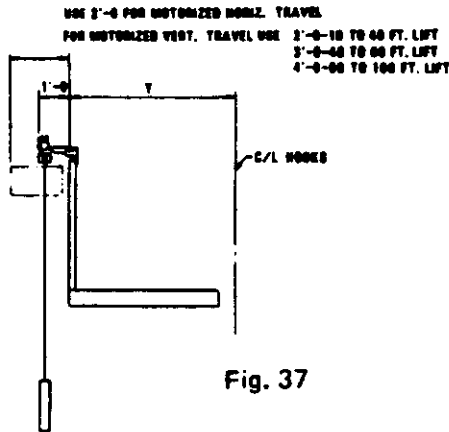


Fig. 37

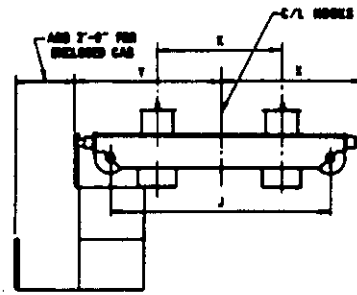


Fig. 38

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
60 TON 10 T. AUX.	60'0"	4'11"	8'4"	9'3"	10'9"	90,300	135 lb.	33,000	100,000
				9'9"	11'3"	91,000		34,200	101,500
				10'3"	11'9"	91,700		35,400	102,000
	70'0"	4'11"	8'4"	9'3"	10'9"	94,400	135 lb.	33,000	112,000
				9'9"	11'3"	95,000		34,200	113,500
				10'3"	11'9"	95,600		35,400	115,000
	80'0"	4'11"	8'4"	9'3"	10'9"	98,500	175 lb.	33,000	125,000
				9'9"	11'3"	99,200		34,200	126,500
				10'3"	11'9"	100,000		35,400	128,000
	90'0"	4'11"	8'4"	9'9"	10'9"	102,500	175 lb.	33,000	138,000
				9'6"	11'3"	103,200		34,200	139,500
				10'0"	11'9"	104,000		35,400	141,000
	100'0"	4'11"	8'4"	10'0"	11'6"	109,000	175 lb.	34,200	160,000
				10'6"	12'0"	110,000		35,400	161,500
11'0"				12'6"	111,000	36,600		163,000	
110'0"	4'11"	8'4"	11'0"	13'0"	113,400	175 lb.	34,200	175,000	
			11'6"	12'6"	114,800		36,600	178,000	
			12'0"	13'6"	118,300		35,400	191,000	
120'0"	4'11"	8'4"	12'3"	13'3"	119,600	175 lb.	37,800	194,000	
			11'3"	11'9"	111,200		46,600	118,000	
			11'9"	12'3"	112,000		48,200	120,000	
75 TON 20 T. AUX.	60'0"	4'6"	8'9"	10'9"	11'3"	110,500	175 lb.	45,100	116,000
				11'3"	11'9"	111,200		46,600	118,000
				11'9"	12'3"	112,000		48,200	120,000
	70'0"	4'6"	8'9"	10'9"	11'3"	115,300	175 lb.	45,100	130,000
				11'3"	11'9"	116,000		46,600	132,000
				11'9"	12'3"	117,000		48,200	134,000
	80'0"	4'6"	8'9"	10'9"	11'3"	120,000	175 lb.	45,100	144,000
				11'3"	11'9"	121,000		46,600	146,000
				11'9"	12'3"	122,000		48,200	148,000
	90'0"	4'6"	8'9"	11'0"	11'6"	127,000	175 lb.	45,100	168,000
				11'6"	12'0"	128,000		46,600	170,000
				12'0"	12'6"	129,000		48,200	172,000
	100'0"	4'6"	8'9"	11'3"	11'6"	131,000	175 lb.	45,100	182,000
				11'9"	12'0"	132,000		46,600	184,000
12'3"				12'6"	133,000	48,200		186,000	
110'0"	4'6"	8'9"	11'9"	12'0"	137,000	175 lb.	46,600	200,000	
			12'3"	12'6"	138,000		48,200	202,000	
			12'9"	13'0"	139,000		49,800	204,000	
120'0"	4'6"	8'9"	12'3"	12'6"	144,000	175 lb.	48,200	222,000	
			12'9"	13'0"	145,000		49,800	224,000	
			13'3"	13'6"	146,000		51,400	226,000	

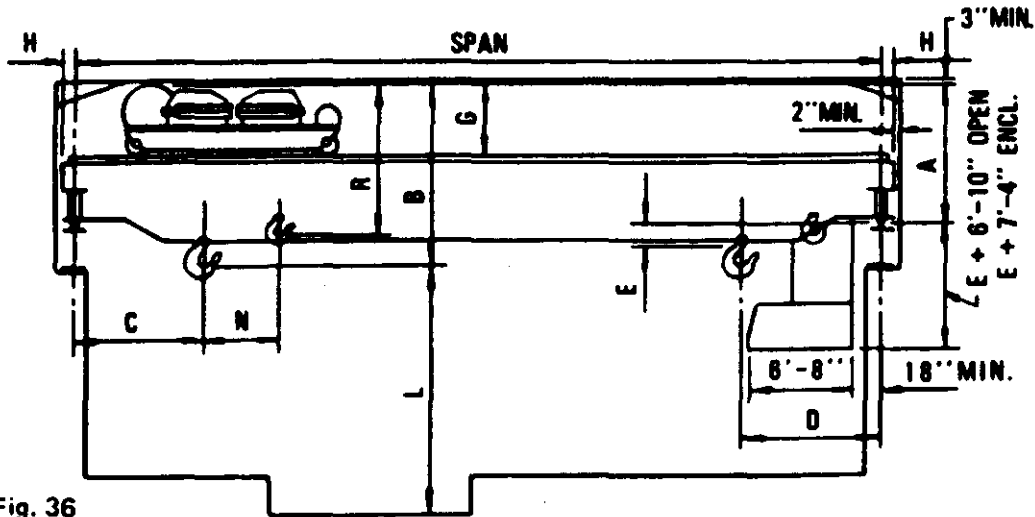
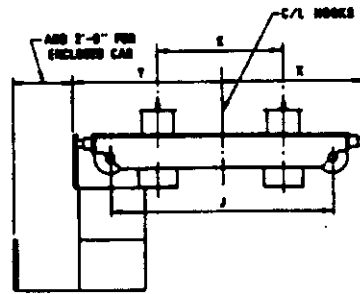
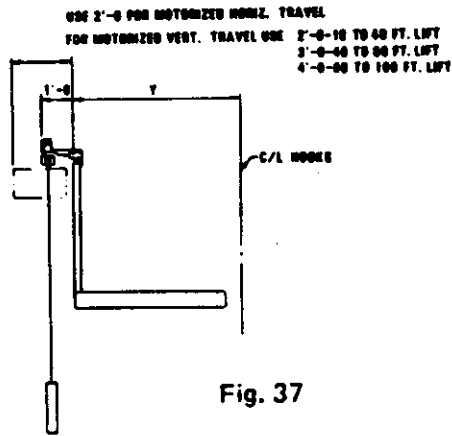


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
100 TON 20 T. AUX. For each 7'-0" add 1 Wt, add 12" to J and K, and add 6" to X and Y.	70'0"	10'0"	8'6"	4'9"	8'6"	1'6"	5'0"	12"	15'0" 16'0" 17'0"	10'6" 11'6" 12'6"	52'0" 59'0" 66'0"
	80'0"	10'3"	8'6"	4'9"	8'6"	1'8"	5'0"	12"	15'0" 16'0" 17'0"	10'6" 11'6" 12'6"	52'0" 59'0" 66'0"
	90'0"	10'6"	8'6"	4'9"	8'6"	2'0"	5'0"	12"	15'0" 16'0" 17'0"	10'6" 11'6" 12'6"	52'0" 59'0" 66'0"
	100'0"	10'9"	8'6"	4'9"	8'6"	2'4"	5'0"	12"	15'6" 16'6" 17'6"	10'6" 11'6" 12'6"	52'0" 59'0" 66'0"
	110'0"	11'0"	8'6"	4'9"	8'6"	2'7"	5'0"	12"	16'0" 16'6" 17'6"	10'6" 11'6" 12'6"	52'0" 59'0" 66'0"
	120'0"	11'0"	8'6"	4'9"	8'6"	3'3"	5'0"	12"	17'6" 18'6" 19'6"	12'6" 13'6" 14'6"	66'0" 73'0" 80'0"
	130'0"	11'3"	8'6"	4'9"	8'6"	3'5"	5'0"	12"	19'0" 19'6" 20'6"	14'0" 14'6" 15'6"	76'6" 80'0" 87'0"



Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
100 TON 20 T. AUX.	70'0"	4'6"	8'9"	11'0"	11'6"	144,000	175 lb.	46,700	148,000
				11'6"	12'0"	145,000		48,200	150,000
				12'0"	12'6"	146,000		49,700	152,000
	80'0"	4'6"	8'9"	11'0"	11'6"	148,000	175 lb.	46,700	161,000
				11'6"	12'0"	149,000		48,200	163,000
				12'0"	12'6"	150,000		49,700	165,000
	90'0"	4'6"	8'9"	11'0"	11'6"	153,000	175 lb.	46,700	175,000
				11'6"	12'0"	154,000		48,200	177,000
				12'0"	12'6"	155,000		49,700	179,000
	100'0"	4'6"	8'9"	11'3"	11'6"	157,000	175 lb.	46,700	189,000
				11'9"	12'0"	158,000		48,200	191,000
				12'3"	12'6"	159,000		49,700	193,000
	110'0"	4'6"	8'9"	11'6"	11'9"	162,000	175 lb.	46,700	205,000
				11'9"	12'0"	163,000		48,200	207,000
				12'3"	12'6"	164,000		49,700	209,000
	120'0"	4'6"	8'9"	12'3"	12'6"	169,000	175 lb.	49,700	226,000
				12'9"	13'0"	170,000		51,200	228,000
				13'3"	13'6"	171,000		52,700	230,000
	130'0"	4'6"	8'9"	12'9"	13'3"	176,000	175 lb.	52,000	251,000
				13'0"	13'6"	177,000		52,700	253,000
				13'6"	14'0"	178,000		54,200	255,000

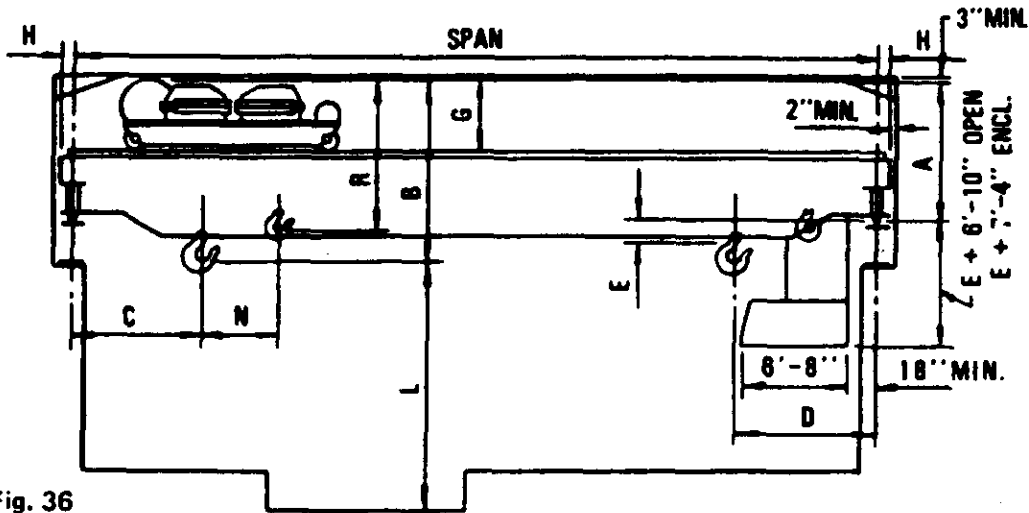
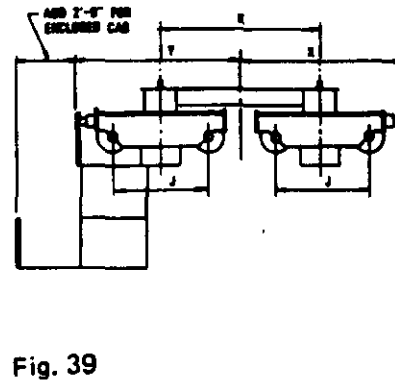
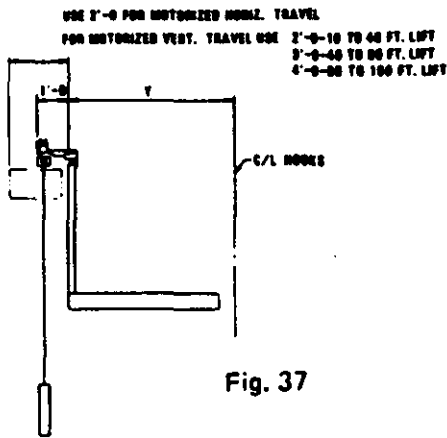


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
100 TON 20 T. AUX. For each 7'-0" add 1 ft., add 12" to K, and add 6" to X and Y.	70'0"	10'0"	8'6"	5'0"	8'9"	1'6"	5'0"	9 1/2"	4'6"	10'6"	57'0"
										11'6"	59'0"
										12'6"	66'0"
	80'0"	10'3"	8'6"	5'0"	8'9"	1'8"	5'0"	9 1/2"	5'0"	10'6"	52'0"
										11'6"	59'0"
										12'6"	66'0"
	90'0"	10'6"	8'6"	5'0"	8'9"	2'0"	5'0"	9 1/2"	5'0"	10'6"	52'0"
										11'6"	59'0"
										12'6"	66'0"
	100'0"	10'9"	8'6"	5'0"	8'9"	2'4"	5'0"	9 1/2"	5'0"	10'6"	52'0"
										11'6"	59'0"
										12'6"	66'0"
	110'0"	11'0"	8'6"	5'3"	9'0"	2'7"	5'0"	9 1/2"	5'6"	10'6"	52'0"
										11'6"	59'0"
										12'6"	66'0"
	120'0"	11'0"	8'6"	5'3"	9'0"	3'3"	5'0"	9 1/2"	6'0"	11'6"	59'0"
										12'6"	66'0"
										13'6"	73'0"
	130'0"	11'3"	8'6"	5'3"	9'0"	3'5"	5'0"	9 1/2"	6'0"	13'0"	69'6"
										14'0"	76'6"
										15'0"	83'6"
125 TON 20 T. AUX. For each 6'-0" add 1 ft., add 12" to K, and add 8" to X and Y.	70'0"	11'6"	10'8"	5'0"	8'0"	1'10"	5'11"	9 1/2"	5'0"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	80'0"	11'9"	10'8"	5'0"	8'0"	2'5"	5'11"	9 1/2"	5'0"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	90'0"	12'0"	10'8"	5'0"	8'0"	2'3"	5'11"	9 1/2"	5'0"	13'0"	88'6"
										14'0"	97'3"
									15'0"	106'0"	
	100'0"	12'3"	10'8"	5'3"	8'0"	2'6"	5'11"	9 1/2"	5'6"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	110'0"	12'6"	10'8"	5'3"	8'0"	2'7"	5'11"	10 1/2"	5'6"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	120'0"	12'6"	10'8"	5'3"	8'0"	2'11"	5'11"	10 1/2"	5'6"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	130'0"	12'9"	10'8"	5'3"	8'0"	3'6"	5'11"	10 1/2"	6'0"	13'0"	88'6"
										14'0"	97'3"
										15'0"	106'0"
	140'0"	13'3"	10'8"	5'3"	8'0"	3'6"	5'11"	10 1/2"	6'0"	14'0"	97'3"
										15'0"	106'0"



Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
100 TON 20 T. AUX.	70'0"	4'6"	8'9"	10'6"	11'3"	71,500	100 lb.	46,700	146,000
				11'0"	11'9"	72,000		48,200	148,000
				11'6"	12'3"	72,500		49,700	150,000
	80'0"	4'6"	8'9"	10'9"	11'6"	73,500	100 lb.	46,700	158,000
				11'3"	12'0"	74,000		48,200	160,000
				11'9"	12'6"	74,500		49,700	162,000
	90'0"	4'6"	8'9"	10'9"	11'6"	77,000	100 lb.	46,700	180,000
				11'3"	12'0"	77,500		48,200	182,000
				11'9"	12'6"	78,000		49,700	184,000
	100'0"	4'6"	8'9"	10'9"	11'6"	80,000	100 lb.	46,700	200,000
				11'3"	12'0"	80,500		48,200	202,000
				11'9"	12'6"	81,000		49,700	204,000
110'0"	4'6"	8'9"	11'0"	11'9"	83,000	135 lb.	46,700	220,000	
			11'6"	12'3"	83,500		48,200	222,000	
			12'0"	12'9"	84,000		49,700	224,000	
120'0"	4'6"	8'9"	11'9"	12'6"	86,000	175 lb.	48,200	240,000	
			12'3"	13'0"	86,500		49,700	242,000	
			12'9"	13'6"	87,000		51,200	244,000	
130'0"	4'6"	8'9"	12'6"	13'6"	90,000	175 lb.	50,500	265,000	
			13'0"	14'0"	90,500		52,000	267,000	
			13'6"	14'6"	91,000		53,500	269,000	
125 TON 20 T. AUX.	70'0"	5'0"	9'8"	12'0"	12'6"	90,000	175 lb.	71,500	184,000
				12'6"	13'0"	90,500		73,200	187,000
				13'0"	13'6"	91,000		74,900	190,000
	80'0"	5'0"	9'8"	12'0"	12'6"	93,000	175 lb.	71,500	202,000
				12'6"	13'0"	93,500		73,200	205,000
				13'0"	13'6"	94,000		74,900	208,000
	90'0"	5'0"	9'8"	12'0"	12'6"	96,500	175 lb.	71,500	224,000
				12'6"	13'0"	97,000		73,200	227,000
				13'0"	13'6"	97,500		74,900	230,000
	100'0"	5'0"	9'8"	12'3"	12'6"	99,500	175 lb.	71,500	243,000
				12'9"	13'0"	100,000		73,200	246,000
				13'3"	13'6"	100,500		74,900	250,000
110'0"	5'0"	9'8"	12'6"	12'6"	103,000	175 lb.	71,500	266,000	
			13'0"	13'0"	104,000		73,200	270,000	
			13'6"	13'6"	105,000		74,900	274,000	
120'0"	5'0"	9'8"	12'6"	12'6"	106,000	175 lb.	71,500	290,000	
			13'0"	13'0"	107,000		73,200	294,000	
			13'6"	13'6"	108,000		74,900	298,000	
130'0"	5'0"	9'8"	12'9"	12'9"	110,000	175 lb.	71,500	315,000	
			13'3"	13'3"	111,000		73,200	320,000	
			13'9"	13'9"	112,000		74,900	325,000	
140'0"	5'0"	9'8"	13'3"	13'3"	115,000	175 lb.	73,200	350,000	
			13'9"	13'9"	116,000		74,900	355,000	

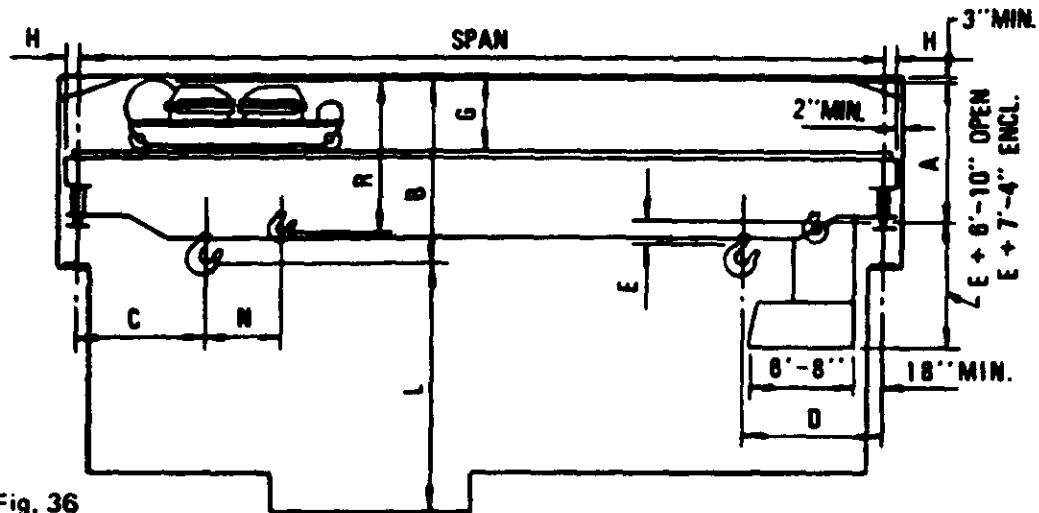


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
150 TON 25 T. AUX. For each 7'-0" add 1 ft. add 12" to K, and add 0" to X and Y.	80'0"	12'0"	10'8"	6'3"	8'0"	2'9"	5'11"	10 1/4"	5'0"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	90'0"	12'3"	10'8"	6'3"	8'0"	2'9"	5'11"	10 1/4"	5'0"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	100'0"	12'3"	10'8"	6'3"	8'0"	2'9"	5'11"	10 1/4"	5'6"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	110'0"	12'6"	10'8"	6'3"	8'0"	3'0"	5'11"	10 1/4"	5'6"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	120'0"	13'0"	10'8"	6'3"	8'0"	3'8"	5'11"	10 1/4"	5'6"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	130'0"	13'3"	10'8"	6'3"	8'0"	3'8"	5'11"	10 1/4"	6'0"	13'0" 14'0" 15'0"	79'3" 87'0" 94'9"
	140'0"	13'3"	10'8"	6'3"	8'0"	3'9"	5'11"	10 1/4"	6'0"	14'0" 15'0" 16'0"	87'0" 94'9" 102'6"
	90'0"	13'0"	12'4"	7'0"	9'0"	3'1"	6'10"	10 1/4"	5'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	100'0"	13'3"	12'4"	7'0"	9'0"	3'1"	6'10"	10 1/4"	5'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	110'0"	13'3"	12'4"	7'0"	9'0"	3'1"	6'10"	10 1/4"	5'6"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
175 TON 30 T. AUX. For each 7'-3" add 1 ft. add 12" to K, and add 0" to X and Y.	120'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'6"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	130'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"

USE 2'-0" FOR MOTORIZED HORIZ. TRAVEL
 FOR MOTORIZED VERT. TRAVEL USE 2'-0-16 TO 48 FT. LIFT
 3'-0-48 TO 88 FT. LIFT
 4'-0-88 TO 128 FT. LIFT

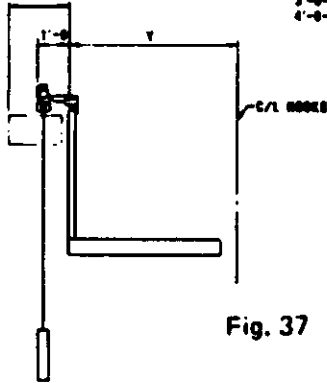


Fig. 37

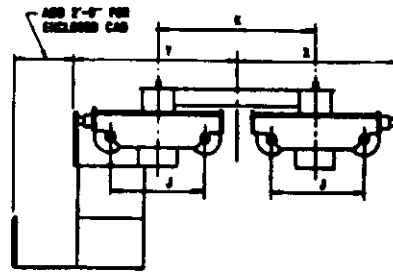


Fig. 39

Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
150 TON 26 T. AUX.	80'0"	5'0"	9'8"	12'3"	12'6"	102,500	175 lb.	65,800	200,000
				12'9"	13'0"	103,000		67,300	203,000
				13'3"	13'6"	103,500		68,800	206,000
	90'0"	5'0"	9'8"	12'3"	12'6"	106,000	175 lb.	65,800	220,000
				12'9"	13'0"	106,500		67,300	223,000
				13'3"	13'6"	107,000		68,800	226,000
	100'0"	5'0"	9'8"	12'6"	12'6"	109,000	175 lb.	65,800	237,000
				13'0"	13'0"	110,000		67,300	240,000
				13'3"	13'6"	111,000		68,800	243,000
	110'0"	5'0"	9'8"	12'6"	12'6"	113,000	175 lb.	65,800	262,000
				13'0"	13'0"	114,000		67,300	265,000
				13'3"	13'6"	115,000		68,800	268,000
120'0"	5'0"	9'8"	12'6"	12'6"	116,000	175 lb.	65,800	284,000	
			13'0"	13'0"	117,000		67,300	287,000	
			13'3"	13'6"	118,000		68,800	290,000	
130'0"	5'0"	9'8"	12'9"	12'9"	120,000	175 lb.	65,800	311,000	
			13'3"	13'3"	121,000		67,300	314,000	
			13'9"	13'9"	122,000		68,800	317,000	
140'0"	5'0"	9'8"	13'3"	13'3"	125,000	175 lb.	67,300	346,000	
			13'9"	13'9"	126,000		68,800	350,000	
			14'3"	14'3"	127,000		70,300	354,000	
175 TON 30 T. AUX.	80'0"	6'0"	10'8"	13'9"	14'0"	120,000	175 lb.	85,400	242,000
				14'9"	15'0"	122,000		89,000	250,000
				15'9"	16'0"	123,000		92,600	258,000
	90'0"	6'0"	10'8"	13'9"	14'0"	124,000	175 lb.	85,400	260,000
				14'9"	15'0"	126,000		89,000	268,000
				15'9"	16'0"	127,000		92,600	276,000
	100'0"	6'0"	10'8"	14'0"	14'0"	128,000	175 lb.	85,400	281,000
				15'0"	15'0"	129,000		89,000	289,000
				16'0"	16'0"	131,000		92,600	297,000
	110'0"	6'0"	10'8"	14'0"	14'0"	131,000	175 lb.	85,400	303,000
				15'0"	15'0"	132,000		89,000	311,000
				16'0"	16'0"	133,000		92,600	319,000
120'0"	6'0"	10'8"	14'3"	14'3"	135,000	175 lb.	85,400	328,000	
			15'3"	15'3"	136,000		89,000	336,000	
			16'3"	16'3"	137,000		92,600	344,000	
130'0"	6'0"	10'8"	14'6"	14'6"	140,000	175 lb.	85,400	358,000	
			15'6"	15'6"	141,000		89,000	368,000	
			16'6"	16'6"	142,000		92,600	378,000	
140'0"	6'0"	10'8"	14'6"	14'6"	146,000	175 lb.	85,400	394,000	
			15'6"	15'6"	148,000		89,000	404,000	
			16'6"	16'6"	150,000		92,600	414,000	

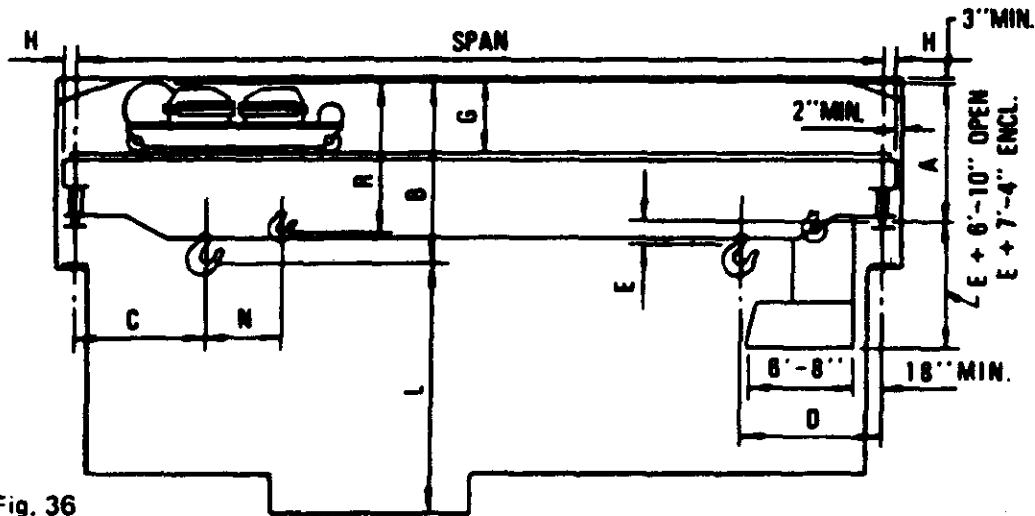
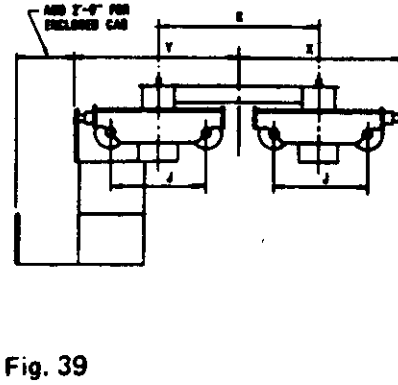
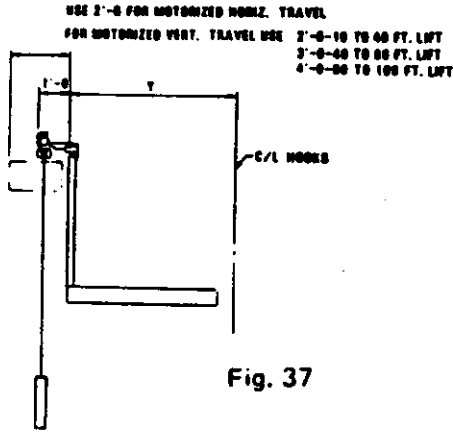


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	K	L
200 TON 30 T. AUX. For each 7'-3" add 1 ft. add 12" to K, and add 6" to X and Y.	80'0"	13'3"	12'4"	7'0"	9'0"	3'2"	6'10"	12"	5'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	90'0"	13'3"	12'4"	7'0"	9'0"	3'2"	6'10"	12"	5'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	100'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'6"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	110'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'6"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	120'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	130'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'9"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	16'0" 18'0" 20'0"	81'6" 96'0" 110'6"
230 TON 30 T. AUX. For each 6'-10" add 1 ft. add 12" to K, and add 6" to X and Y.	80'0"	13'9"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'0"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	90'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'0"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	100'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'6"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	110'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	5'6"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	120'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	130'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"
	140'0"	14'0"	12'4"	7'0"	9'0"	3'9"	6'10"	12"	6'0"	18'0" 20'0" 22'0"	86'3" 100'0" 113'8"



Rated Load	Span	N	R	X	Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
200 TON 30 T. AUX.	80'0"	6'0"	10'8"	14'0"	14'0"	134,000	175 lb.	86,400	260,000
				15'0"	15'0"	135,000		90,000	268,000
				16'0"	16'0"	136,000		93,600	272,000
	90'0"	6'0"	10'8"	14'0"	14'0"	139,000	175 lb.	86,400	283,000
				15'0"	15'0"	140,000		90,000	291,000
				16'0"	16'0"	141,000		93,600	299,000
	100'0"	6'0"	10'8"	14'3"	14'3"	143,000	175 lb.	86,400	307,000
				15'3"	15'3"	144,000		90,000	315,000
				16'3"	16'3"	145,000		93,600	323,000
	110'0"	6'0"	10'8"	14'3"	14'3"	147,000	175 lb.	86,400	335,000
				15'3"	15'3"	148,000		90,000	343,000
				16'3"	16'3"	149,000		93,600	350,000
	120'0"	6'0"	10'8"	14'6"	14'6"	152,000	175 lb.	86,400	363,000
				15'6"	15'6"	154,000		90,000	371,000
				16'6"	16'6"	155,000		93,600	378,000
	130'0"	6'0"	10'8"	14'6"	14'6"	157,000	175 lb.	86,400	397,000
				15'6"	15'6"	159,000		90,000	407,000
				16'6"	16'6"	161,000		93,600	417,000
140'0"	6'0"	10'8"	14'6"	14'6"	163,000	175 lb.	86,400	440,000	
			15'6"	15'6"	165,000		90,000	450,000	
			16'6"	16'6"	167,000		93,600	460,000	
230 TON 30 T. AUX.	80'0"	6'0"	10'8"	15'0"	15'0"	150,000	175 lb.	91,400	270,000
				16'0"	16'0"	151,000		95,200	280,000
				17'0"	17'0"	152,000		99,000	290,000
	90'0"	6'0"	10'8"	15'0"	15'0"	155,000	175 lb.	91,400	300,000
				16'0"	16'0"	156,000		95,200	310,000
				17'0"	17'0"	157,000		99,000	320,000
	100'0"	6'0"	10'8"	15'3"	15'3"	160,000	175 lb.	91,400	325,000
				16'3"	16'3"	161,000		95,200	335,000
				17'3"	17'3"	162,000		99,000	345,000
	110'0"	6'0"	10'8"	15'3"	15'3"	165,000	175 lb.	91,400	355,000
				16'3"	16'3"	166,000		95,200	365,000
				17'3"	17'3"	167,000		99,000	375,000
	120'0"	6'0"	10'8"	14'9"	14'9"	170,000	175 lb.	91,400	390,000
				15'9"	15'9"	171,000		95,200	400,000
				16'9"	16'9"	172,000		99,000	410,000
	130'0"	6'0"	10'8"	14'9"	14'9"	175,000	175 lb.	91,400	420,000
				15'9"	15'9"	176,000		95,200	430,000
				16'9"	16'9"	177,000		99,000	440,000
140'0"	6'0"	10'8"	14'9"	14'9"	182,000	175 lb.	91,400	470,000	
			15'9"	15'9"	183,000		95,200	480,000	
			16'9"	16'9"	184,000		99,000	490,000	

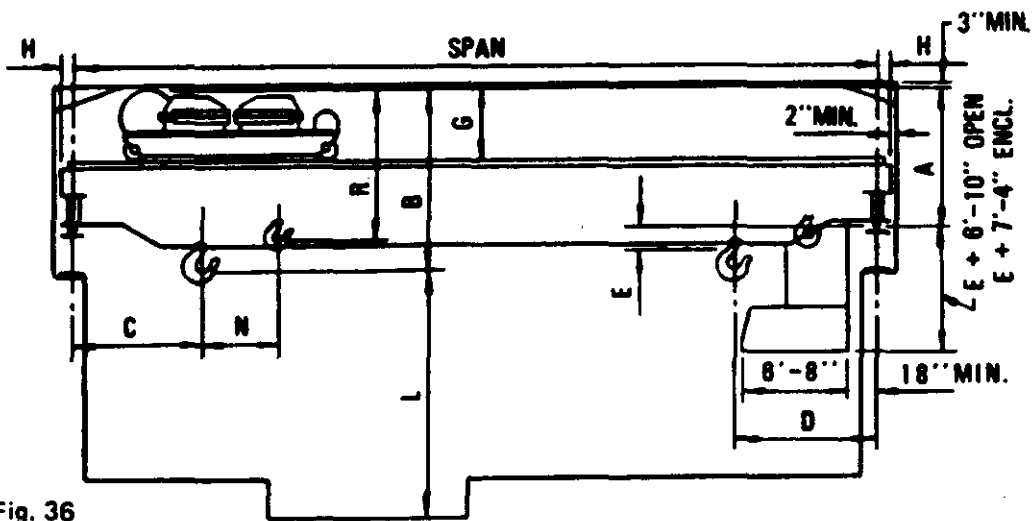


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	J1	K
175 TON 30 T. AUX. For each 7'-3" add 1 wt. add 12" to K, and add 8" to X and Y.	110'0"	15'0"	12'4"	7'6"	9'6"	1'6"	6'10"	12"	4'6"	2'6"	16'0" 18'0" 20'0"
	120'0"	15'0"	12'4"	7'6"	9'6"	2'9"	6'10"	12"	5'0"	2'6"	16'0" 18'0" 20'0"
	130'0"	15'0"	12'4"	7'6"	9'6"	2'9"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	140'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	150'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	160'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
200 TON 30 T. AUX. For each 7'-3" add 1 wt. add 12" to K, and add 8" to X and Y.	100'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'0"	2'6"	16'0" 18'0" 20'0"
	110'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'0"	2'6"	16'0" 18'0" 20'0"
	120'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	130'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	140'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
	150'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"
160'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	5'6"	2'6"	16'0" 18'0" 20'0"	

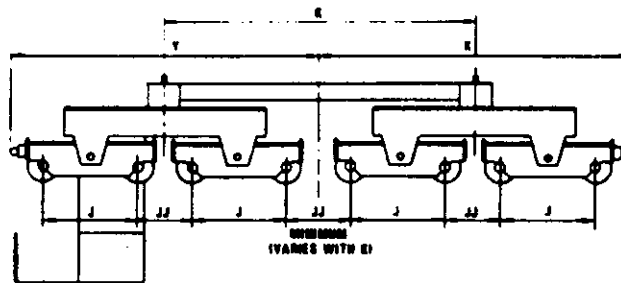


Fig. 40

Rated Load	Span	L	N	R	X=Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
175 TON 30 T. AUX.	110'0"	81'6"	6'0"	10'8"	16'9"	66,600	100 lb.	85,400	322,000
		96'0"			17'9"	67,200		89,000	330,000
		110'6"			18'9"	67,800		92,600	338,000
	120'0"	81'6"	6'0"	10'8"	17'3"	68,400	100 lb.	85,400	344,000
		96'0"			18'3"	69,000		89,000	352,000
		110'6"			19'3"	69,600		92,600	360,000
	130'0"	81'6"	6'0"	10'8"	17'9"	70,700	100 lb.	85,400	374,000
		96'0"			18'9"	71,500		89,000	382,000
		110'6"			19'9"	72,300		92,600	390,000
	140'0"	81'6"	6'0"	10'8"	17'9"	73,400	100 lb.	85,400	410,000
		96'0"			18'9"	74,200		89,000	418,000
		110'6"			19'9"	75,000		92,600	426,000
	150'0"	81'6"	6'0"	10'8"	17'9"	76,600	100 lb.	85,400	454,000
		96'0"			18'9"	77,600		89,000	462,000
		110'6"			19'9"	78,600		92,600	470,000
	160'0"	81'6"	6'0"	10'8"	17'9"	79,900	135 lb.	85,400	502,000
		96'0"			18'9"	80,900		89,000	510,000
		110'6"			19'9"	81,900		92,600	518,000
200 TON 30 T. AUX.	100'0"	81'6"	6'0"	10'8"	17'3"	72,200	100 lb.	86,400	324,000
		96'0"			18'3"	73,200		90,000	332,000
		110'6"			19'3"	74,200		93,600	340,000
	110'0"	81'6"	6'0"	10'8"	17'3"	74,600	100 lb.	86,400	352,000
		96'0"			18'3"	75,600		90,000	360,000
		110'6"			19'3"	76,600		93,600	368,000
	120'0"	81'6"	6'0"	10'8"	17'9"	76,800	100 lb.	86,400	380,000
		96'0"			18'9"	77,800		90,000	388,000
		110'6"			19'9"	78,800		93,600	396,000
	130'0"	81'6"	6'0"	10'8"	17'9"	79,400	135 lb.	86,400	414,000
		96'0"			18'9"	80,400		90,000	422,000
		110'6"			19'9"	81,400		93,600	430,000
	140'0"	81'6"	6'0"	10'8"	17'9"	82,400	135 lb.	86,400	456,000
		96'0"			18'9"	83,600		90,000	466,000
		110'6"			19'9"	84,800		93,600	476,000
	150'0"	81'6"	6'0"	10'8"	17'9"	86,300	175 lb.	86,400	510,000
		96'0"			18'9"	87,400		90,000	520,000
		110'6"			19'9"	88,500		93,600	530,000
160'0"	81'6"	6'0"	10'8"	17'9"	90,600	175 lb.	86,400	570,000	
	96'0"			18'9"	91,700		90,000	580,000	
	110'6"			19'9"	92,800		93,600	590,000	

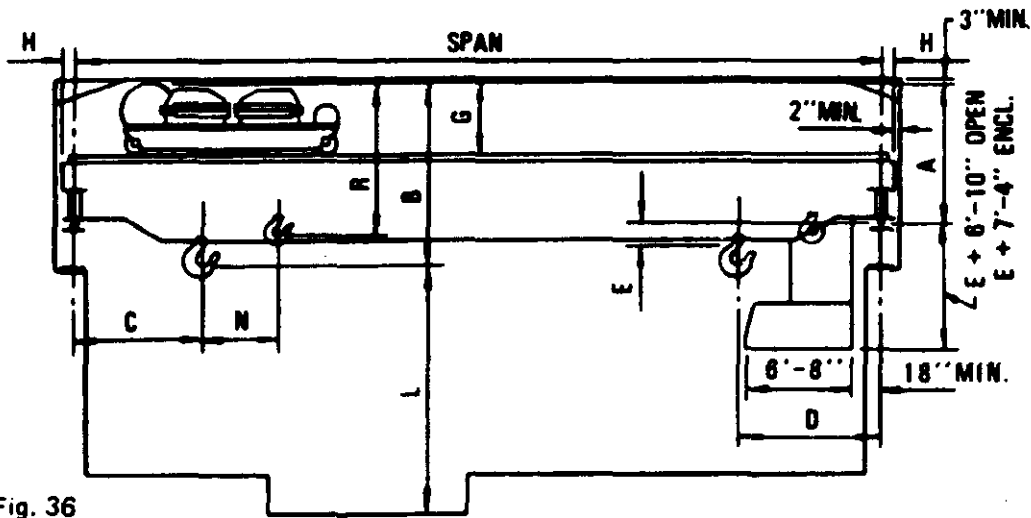


Fig. 36

Rated Load	Span	A	B	C	D	E	G	H	J	JJ	K
230 TON 30 T. AUX. For each 6'-10" add 1 1/2", add 12" to K, and add 6" to X and Y.	100'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	3'0"	18'0" 20'0" 22'0"
	110'0"	15'6"	12'4"	7'6"	9'6"	2'3"	6'10"	12"	5'6"	3'0"	18'0" 20'0" 22'0"
	120'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	5'6"	3'0"	18'0" 20'0" 22'0"
	130'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	6'0"	3'0"	18'0" 20'0" 22'0"
	140'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	6'0"	3'0"	18'0" 20'0" 22'0"
	150'0"	16'0"	12'4"	7'6"	9'6"	1'9"	6'10"	12"	6'0"	3'0"	18'0" 20'0" 22'0"
	160'0"	16'6"	12'4"	7'6"	9'6"	1'6"	6'10"	12"	6'0"	3'0"	18'0" 20'0" 22'0"
300 TON 50 T. AUX. For each 6'-0" add 1 1/2", add 12" to K, and add 6" to X and Y.	70'0"	16'6"	15'0"	7'6"	10'6"	1'6"	8'0"	12"	5'6"	3'6"	20'0" 22'0" 24'0"
	80'0"	16'6"	15'0"	7'6"	10'6"	2'0"	8'0"	12"	5'6"	3'6"	20'0" 22'0" 24'0"
	90'0"	16'6"	15'0"	7'6"	10'6"	2'6"	8'0"	12"	5'6"	3'6"	20'0" 22'0" 24'0"
	100'0"	17'0"	15'0"	7'6"	10'6"	2'3"	8'0"	12"	5'6"	3'6"	20'0" 22'0" 24'0"
	110'0"	17'0"	15'0"	7'6"	10'6"	2'3"	8'0"	12"	6'0"	4'0"	20'0" 22'0" 24'0"
	120'0"	17'0"	15'0"	7'6"	10'6"	2'3"	8'0"	12"	6'0"	4'0"	20'0" 22'0" 24'0"
	130'0"	17'0"	15'0"	7'6"	10'6"	2'3"	8'0"	12"	6'0"	4'0"	20'0" 22'0" 24'0"

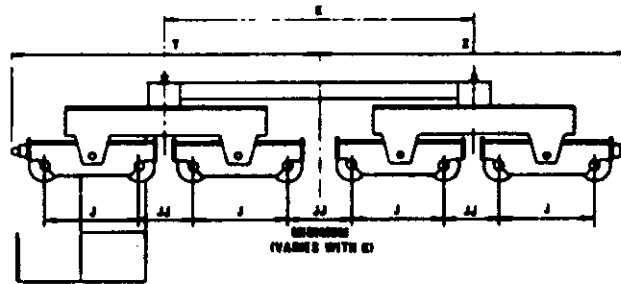


Fig. 40

Rated Load	Span	L	N	R	X=Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
230 TON 30 T. AUX.	100'0"	86'3"	6'0"	10'8"	19'0"	80,700	135 lb.	91,400	342,000
		100'0"			20'0"	81,300		95,200	352,000
		113'8"			21'0"	82,300		99,000	362,000
	110'0"	86'3"	6'0"	10'8"	19'0"	83,100	135 lb.	91,400	372,000
		100'0"			20'0"	84,300		95,200	382,000
		113'8"			21'0"	85,500		99,000	392,000
	120'0"	86'3"	6'0"	10'8"	19'0"	85,800	175 lb.	91,400	406,000
		100'0"			20'0"	86,900		95,200	416,000
		113'8"			21'0"	88,000		99,000	426,000
	130'0"	86'3"	6'0"	10'8"	19'6"	88,200	175 lb.	91,400	436,000
		100'0"			20'6"	89,200		95,200	446,000
		113'8"			21'6"	90,200		99,000	456,000
	140'0"	86'3"	6'0"	10'8"	19'6"	91,800	175 lb.	91,400	486,000
		100'0"			20'6"	92,700		95,200	496,000
		113'8"			21'6"	93,600		99,000	506,000
	150'0"	86'3"	6'0"	10'8"	19'6"	96,400	175 lb.	91,400	530,000
		100'0"			20'6"	97,300		95,200	540,000
		113'8"			21'6"	98,200		99,000	570,000
160'0"	86'3"	6'0"	10'8"	19'6"	101,000	175 lb.	91,400	616,000	
	100'0"			20'6"	102,000		95,200	626,000	
	113'8"			21'6"	103,000		99,000	636,000	
300 TON 50 T. AUX.	70'0"	66'0"	6'0"	10'6"	20'3"	100,000	175 lb.	170,000	390,000
		78'0"			21'3"	101,000		176,000	400,000
		90'0"			22'3"	102,000		182,000	410,000
	80'0"	66'0"	6'0"	10'6"	20'3"	104,000	175 lb.	170,000	420,000
		78'0"			21'3"	106,000		176,000	430,000
		90'0"			22'3"	106,000		182,000	440,000
	90'0"	66'0"	6'0"	10'6"	20'3"	107,000	175 lb.	170,000	450,000
		78'0"			21'3"	108,000		176,000	460,000
		90'0"			22'3"	109,000		182,000	470,000
	100'0"	66'0"	6'0"	10'6"	20'3"	110,000	175 lb.	170,000	483,000
		78'0"			21'3"	111,000		176,000	495,000
		90'0"			22'3"	112,000		182,000	505,000
	110'0"	66'0"	6'0"	10'6"	20'9"	113,000	175 lb.	170,000	520,000
		78'0"			21'9"	114,000		176,000	530,000
		90'0"			22'9"	115,000		182,000	540,000
	120'0"	66'0"	6'0"	10'6"	20'9"	116,000	175 lb.	170,000	560,000
		78'0"			21'9"	117,000		176,000	570,000
		90'0"			22'9"	118,000		182,000	580,000
130'0"	66'0"	6'0"	10'6"	20'9"	119,000	175 lb.	170,000	605,000	
	78'0"			21'9"	120,000		176,000	616,000	
	90'0"			22'9"	121,000		182,000	627,000	

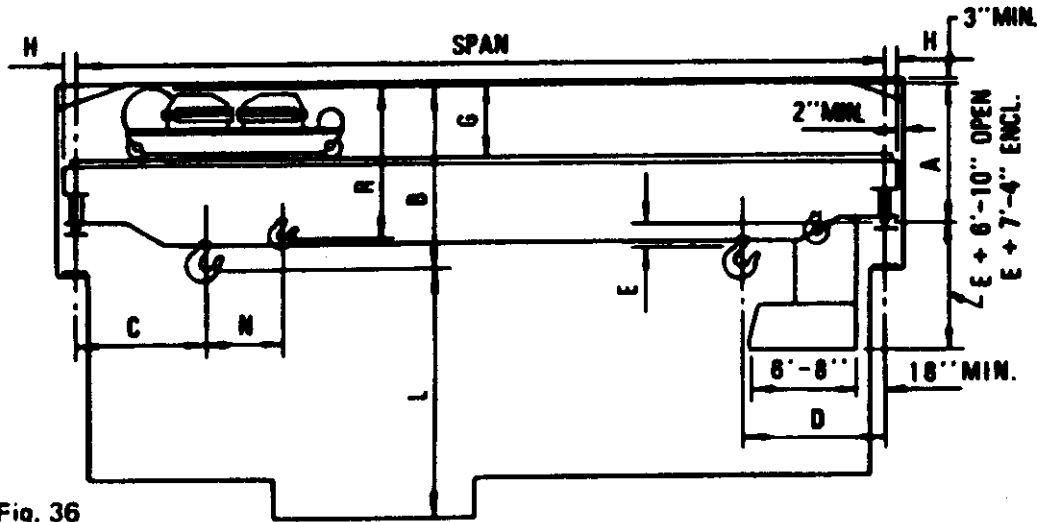


Fig. 36

Rated Load	Span	A	B	C	D	F	G	H	J	JJ	K
400 TON 50 T. AUX. For each 8'-0" add 1 ft, add 12" to K, and add 6" to X and Y.	80'0"	17'6"	14'0"	9'0"	9'6"	2'3"	8'6"	13"	6'0"	4'0"	26'0" 30'0"
	90'0"	17'6"	14'0"	9'0"	9'6"	2'3"	8'6"	13"	6'0"	4'0"	26'0" 30'0"
	100'0"	17'6"	14'0"	9'0"	9'6"	2'6"	8'6"	13"	6'0"	4'0"	26'0" 30'0"
	110'0"	17'6"	14'0"	9'0"	9'6"	2'6"	8'6"	13"	6'0"	4'6"	26'0" 30'0"
	120'0"	17'6"	14'0"	9'0"	9'6"	2'6"	8'6"	13"	6'0"	4'6"	26'0" 30'0"
	130'0"	17'6"	14'0"	9'0"	9'6"	2'6"	8'6"	13"	6'0"	4'6"	26'0" 30'0"
	140'0"	17'6"	14'0"	9'0"	9'6"	2'6"	8'6"	13"	6'0"	4'6"	26'0" 30'0"
500 TON 50 T. AUX. For each 6'-0" Add 1 ft, add 12" to K, and add 6" to X and Y.	80'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'0"	26'0" 30'0"
	90'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'0"	26'0" 30'0"
	100'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'0"	26'0" 30'0"
	110'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'6"	26'0" 30'0"
	120'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'6"	26'0" 30'0"
	130'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'6"	26'0" 30'0"
	140'0"	18'0"	14'0"	13'0"	13'6"	2'6"	9'0"	14"	6'0"	4'6"	26'0" 30'0"

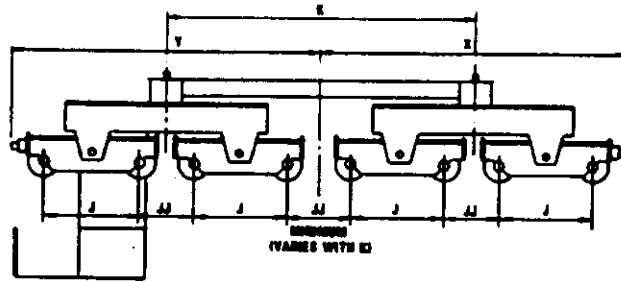


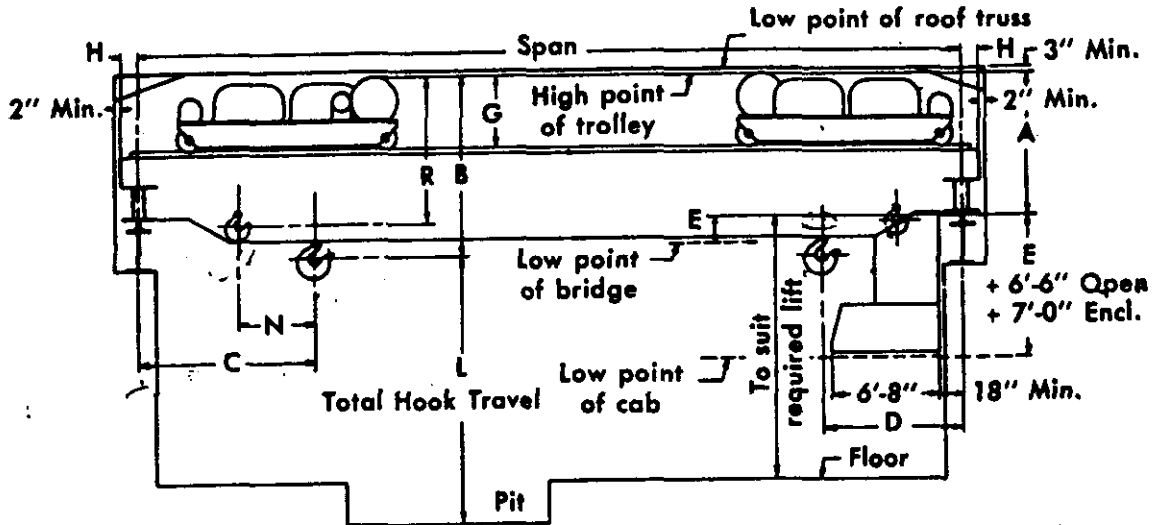
Fig. 40

Rated Load	Span	L	N	R	X=Y	Wheel Load	Rwy Rail	Trolley Weight	Crane Weight
400 TON 50 T. AUX.	80'0"	70'0"	6'0"	15'6"	24'3"	139,000	175 lb.	280,000	570,000
		90'0"	6'0"	15'6"	26'3"	142,000	300,000	600,000	
	90'0"	70'0"	6'0"	15'6"	24'3"	142,000	175 lb.	280,000	600,000
		90'0"	6'0"	15'6"	26'3"	145,000	300,000	630,000	
	100'0"	70'0"	6'0"	15'6"	24'3"	146,000	175 lb.	280,000	630,000
		90'0"	6'0"	15'6"	26'3"	149,000	300,000	660,000	
	110'0"	70'0"	6'0"	15'6"	24'6"	150,000	171 lb.	280,000	670,000
		90'0"	6'0"	15'6"	26'6"	152,000	300,000	700,000	
	120'0"	70'0"	6'0"	15'6"	24'6"	153,000	171 lb.	280,000	710,000
		90'0"	6'0"	15'6"	26'6"	155,000	300,000	740,000	
	130'0"	70'0"	6'0"	15'6"	24'6"	158,000	171 lb.	280,000	770,000
		90'0"	6'0"	15'6"	26'6"	160,000	300,000	800,000	
140'0"	70'0"	6'0"	15'6"	24'6"	161,000	171 lb.	280,000	810,000	
	90'0"	6'0"	15'6"	26'6"	164,000	300,000	840,000		
500 TON 50 T. AUX.	80'0"	96'0"	7'3"	15'6"	24'6"	158,000	175 lb.	310,000	630,000
		122'0"	7'3"	15'6"	26'6"	161,000	330,000	660,000	
	90'0"	96'0"	7'3"	15'6"	24'6"	163,000	175 lb.	310,000	670,000
		122'0"	7'3"	15'6"	26'6"	166,000	330,000	700,000	
	100'0"	96'0"	7'3"	15'6"	24'6"	168,000	175 lb.	310,000	710,000
		122'0"	7'3"	15'6"	26'6"	171,000	330,000	740,000	
	110'0"	96'0"	7'3"	15'6"	24'9"	174,000	175 lb.	310,000	760,000
		122'0"	7'3"	15'6"	26'9"	177,000	330,000	790,000	
	120'0"	96'0"	7'3"	15'6"	24'9"	179,000	171 lb.	310,000	810,000
		122'0"	7'3"	15'6"	26'9"	182,000	330,000	840,000	
	130'0"	96'0"	7'3"	15'6"	24'9"	184,000	171 lb.	310,000	870,000
		122'0"	7'3"	15'6"	26'9"	187,000	330,000	900,000	
140'0"	96'0"	7'3"	15'6"	24'9"	190,000	171 lb.	310,000	950,000	
	122'0"	7'3"	15'6"	26'9"	193,000	330,000	980,000		

ATTACHMENT 5

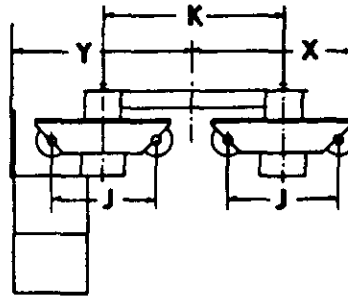
**BRIDGE CRANE DIMENSIONS
DOUBLE TROLLEY, 100 TO 300 TON**

Excrete
Overhead Crane Handbook
published by Whiting Corporation
third edition, 1967
pages 38 through 41.



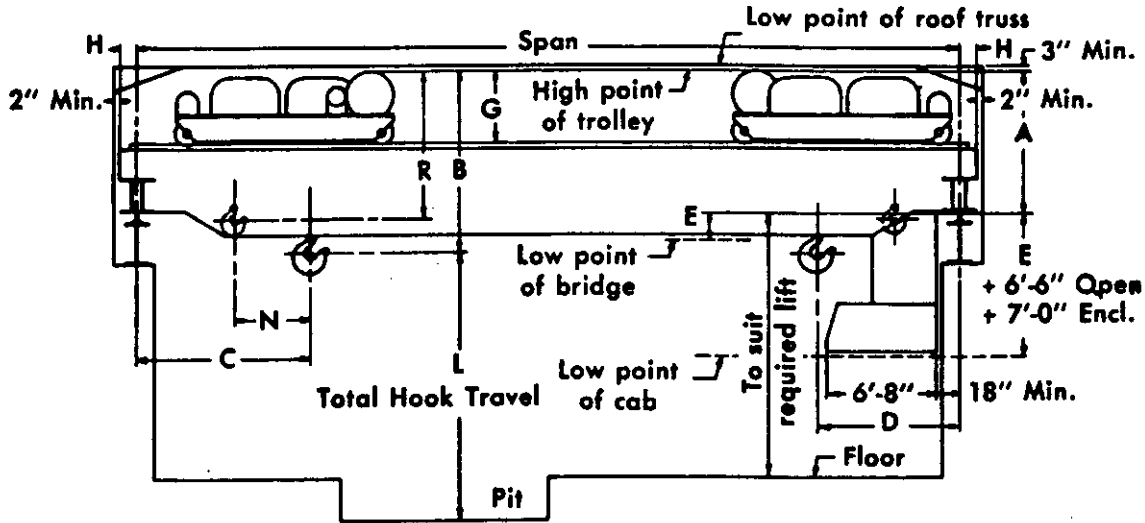
See Notes, Pages 26, 27 and 34

Capacity Tons	Span Ft.	A	B	C	D	E	G	H	J	K	L
100 2 - 50/10 trolleys 7-Motor Add or Deduct 4'2" lift and 1400% trolleys weight for each 6" change of "K"	40	8'10"	6'10"	8'0"	8'0"	4"	4'0"	10 1/4"	12'6"	8'0"	35'10"
	50	9'2"	6'10"	8'0"	8'0"	7"	4'0"	10 1/4"	12'6"	8'0"	35'10"
	60	9'4"	6'10"	8'0"	8'0"	1'5"	4'0"	11"	12'6"	8'0"	35'10"
	70	9'5"	6'10"	8'0"	8'0"	1'8"	4'0"	11"	12'6"	8'0"	35'10"
	80	9'6"	6'10"	8'0"	8'0"	1'10"	4'0"	9 1/2"	5'0"	10'0"	52'0"
	90	9'7"	6'10"	8'0"	8'0"	2'6"	4'0"	9 1/2"	5'6"	10'0"	52'0"
	100	9'8"	6'10"	8'0"	8'0"	2'11"	4'0"	10 1/4"	5'6"	10'0"	52'0"
	110	10'0"	6'10"	8'0"	8'0"	3'0"	4'0"	10 1/4"	5'6"	10'0"	52'0"
120	10'9"	6'10"	8'0"	8'0"	3'0"	4'0"	10 1/4"	5'6"	12'0"	69'0"	
NOTE: Minimum Distance Between Main Hooks = 10'3"											
150 2 - 75/15 trolleys 7-Motor Add or Deduct 3'6" lift and 2500% trolleys weight for each 6" change of "K"	50	10'3"	7'2"	9'6"	9'6"	1'4"	4'11"	9 1/2"	4'6"	10'0"	38'0"
	60	10'9"	7'2"	9'6"	9'6"	1'6"	4'11"	10 1/4"	5'0"	10'0"	38'0"
	70	11'0"	7'2"	9'6"	9'6"	1'11"	4'11"	10 1/4"	5'0"	10'0"	38'0"
	80	11'0"	7'2"	9'6"	9'6"	2'5"	4'11"	10 1/4"	5'0"	10'0"	38'0"
	90	11'3"	7'2"	9'6"	9'6"	2'7"	4'11"	10 1/4"	5'0"	10'0"	38'0"
	100	11'6"	7'2"	9'6"	9'6"	2'8"	4'11"	10 1/4"	5'0"	10'0"	38'0"
	110	11'10"	7'2"	9'6"	9'6"	2'10"	4'11"	10 1/4"	5'6"	10'0"	38'0"
	120	12'1"	7'2"	9'6"	9'6"	3'0"	4'11"	10 1/4"	5'6"	12'0"	52'0"
NOTE: Minimum Distance Between Main Hooks = 10'0"											
200 2 - 100/15 trolleys 7-Motor Add or Deduct 2'9" lift and 2500% trolleys weight for each 6" change of "K"	50	11'6"	7'4"	8'2"	8'2"	1'2"	5'0 1/4"	10 1/4"	5'6"	12'0"	46'6"
	60	11'9"	7'4"	8'2"	8'2"	1'11"	5'0 1/4"	10 1/4"	5'6"	12'0"	46'6"
	70	11'9"	7'4"	8'2"	8'2"	1'11"	5'0 1/4"	10 1/4"	5'6"	12'0"	46'6"
	80	12'3"	7'4"	8'2"	8'2"	2'0"	5'0 1/4"	11"	5'6"	12'0"	46'6"
	90	12'6"	7'4"	8'2"	8'2"	2'7"	5'0 1/4"	11"	6'0"	12'0"	46'6"
	100	12'9"	7'4"	8'2"	8'2"	2'2"	5'0 1/4"	11"	6'0"	12'0"	46'6"
	110	13'3"	7'4"	8'2"	8'2"	1'9"	5'0 1/4"	11"	6'0"	12'0"	46'6"
	120	13'3"	7'4"	8'2"	8'2"	1'9"	5'0 1/4"	11"	6'0"	12'0"	46'6"
NOTE: Minimum Distance Between Main Hooks = 10'4"											



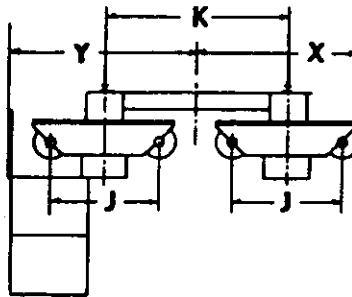
See Notes, Pages 26, 27 and 34

Capacity Tons	Span Ft.	N	R	X	Y	Max. Wheel Load a	Run- way Rail	Trolley Weight Each	Total Crane Wt.	Type of Girder
100 2 - 50/10 trolleys	40	4'11"	7'6"	7'8"	9'3"	108000 ^a	175%	31900	114300	Box
	50	4'11"	7'6"	7'8"	9'3"	120300 ^a	175%	31900	127000	Box
	60	4'11"	7'6"	7'10"	9'3"	130600 ^a	175%	31900	143500	Box
	70	4'11"	7'6"	7'10"	9'3"	138600 ^a	175%	31900	158500	Box
	80	4'11"	7'6"	8'10"	10'6"	74000 ^b	100%	35000	177000	Box
	90	4'11"	7'6"	9'1"	10'9"	77600 ^b	100%	35000	197200	Box
	100	4'11"	7'6"	9'3"	10'9"	81100 ^b	100%	35000	221000	Box
	110	4'11"	7'6"	9'3"	10'9"	84400 ^b	100%	35000	242000	Box
	120	4'11"	7'6"	10'3"	11'9"	90200 ^b	100%	38000	268000	Box
a = Number of wheels per crane.										
150 2 - 75/15 trolleys	50	5'9"	7'8"	8'7"	10'2"	82000 ^b	100%	45400	169000	Box
	60	5'9"	7'8"	8'11"	10'6"	89400 ^b	100%	45400	189600	Box
	70	5'9"	7'8"	8'11"	10'6"	95000 ^b	135%	45400	206400	Box
	80	5'9"	7'8"	8'11"	10'6"	100300 ^a	175%	45400	225200	Box
	90	5'9"	7'8"	8'11"	10'6"	104700 ^a	175%	45400	245000	Box
	100	5'9"	7'8"	8'11"	10'6"	109300 ^b	175%	45400	264800	Box
	120	5'9"	7'8"	10'2"	11'9"	120800 ^b	175%	49800	326000	Box
a = Number of wheels per crane.										
200 2 - 100/15 trolleys	50	4'1"	7'10"	10'1"	11'9"	112700 ^b	175%	61050	229700	Box
	60	4'1"	7'10"	10'1"	11'9"	121300 ^b	175%	61050	248700	Box
	70	4'1"	7'10"	10'1"	11'9"	128400 ^b	175%	61050	265200	Box
	80	4'1"	7'10"	10'3"	11'9"	135100 ^b	175%	61050	289000	Box
	90	4'1"	7'10"	10'6"	12'0"	140000 ^b	175%	61050	315300	Box
	100	4'1"	7'10"	10'6"	12'0"	146100 ^b	175%	61050	341600	Box
	120	4'1"	7'10"	10'9"	12'0"	152000 ^b	175%	61050	376900	Box
a = Number of wheels per crane.										



See Notes, Pages 26, 27 and 34

Capacity Tons	Span Ft.	Dimensions (A-L)										
		A	B	C	D	E	G	H	J	K	L	
250 2 - 125/20 trolleys 7-Motor Add or Deduct 3'6" lift and 2900% trolleys weight for each 6" change of "K"	50	12'3"	7'10"	8'4"	8'4"	8"	5'2"	11"	5'6"	13'0"	43'0"	
	60	12'6"	7'10"	8'4"	8'4"	11"	5'2"	11"	5'6"	13'0"	43'0"	
	70	12'9"	7'10"	8'4"	8'4"	1'1"	5'2"	11"	5'6"	13'0"	43'0"	
	80	13'3"	7'10"	8'4"	8'4"	2'3"	5'2"	11 1/2"	6'0"	13'0"	43'0"	
	90	13'6"	7'10"	8'4"	8'4"	2'0"	5'2"	11 1/2"	6'0"	13'0"	43'0"	
	100	14'0"	7'10"	8'4"	8'4"	1'4"	5'2"	12"	4'6" b	16'6"	67'0"	
	110	14'3"	7'10"	8'4"	8'4"	1'4"	5'2"	12"	4'6" b	16'6"	67'0"	
	120	14'6"	7'10"	8'4"	8'4"	1'1"	5'2"	12"	4'6" b	16'6"	67'0"	
NOTE: Minimum Distance Between Main Hooks = 11'4" b - Wheel spacing = 4'6"-3'0"-4'6"-4'6"-4'6"-3'0"-4'6"												
300 2 - 150/25 trolleys 7-Motor Add or Deduct 2'7" lift and 3500% trolleys weight for each 6" change of "K"	60	13'6"	8'6"	8'0"	8'0"	6"	5'8"	12"	4'6" b	16'6"	59'0"	
	70	13'9"	8'6"	8'0"	8'0"	6"	5'8"	12"	4'6" b	16'6"	59'0"	
	80	14'3"	8'6"	8'0"	8'0"	9"	5'8"	12"	4'6" b	16'6"	59'0"	
	90	14'9"	8'6"	8'0"	8'0"	9"	5'8"	12"	4'6" b	16'6"	59'0"	
	100	15'0"	8'6"	8'0"	8'0"	12"	5'8"	12"	4'6" b	16'6"	59'0"	
	110	15'3"	8'6"	8'0"	8'0"	9"	5'8"	12"	4'6" b	16'6"	59'0"	
	120	15'3"	8'6"	8'0"	8'0"	9"	5'8"	12"	4'6" b	16'6"	59'0"	
	NOTE: Minimum Distance Between Main Hooks = 13'6" b - Wheel spacing = 4'6"-3'0"-4'6"-4'6"-4'6"-3'0"-4'6"											



See Notes, Pages 26, 27 and 34

Capacity Tons	Span Ft.	N	R	X	Y	Max. Wheel Load a	Run- way Rail	Trolley Weight Each	Total Crane Wt.	Type of Girder
250 2 - 125/20 trolleys	50	4'2 1/2"	8'0"	10'10"	12'3"	132500 ^a	175#	63400	243300	Box
	60	4'2 1/2"	8'0"	10'10"	12'3"	142000 ^a	175#	63400	261100	Box
	70	4'2 1/2"	8'0"	10'10"	12'3"	151200 ^a	175#	63400	285500	Box
	80	4'2 1/2"	8'0"	11'3"	12'6"	158800 ^a	175#	63400	316200	Box
	90	4'2 1/2"	8'0"	11'3"	12'6"	165200 ^a	175#	63400	346500	Box
	100	4'2 1/2"	8'0"	15'8"	15'8"	92000 ¹⁶	175#	73400	450300	Box
	110	4'2 1/2"	8'0"	15'8"	15'8"	95700 ¹⁶	175#	73400	496600	Box
	120	4'2 1/2"	8'0"	15'8"	15'8"	99200 ¹⁶	175#	73400	539000	Box
a = Number of wheels per crane.										
300 2 - 150/25 trolleys	60	4'6"	8'11"	15'8"	15'8"	88000 ¹⁶	175#	85000	364000	Box
	70	4'6"	8'11"	15'8"	15'8"	93000 ¹⁶	175#	85000	390000	Box
	80	4'6"	8'11"	15'8"	15'8"	98000 ¹⁶	175#	85000	418000	Box
	90	4'6"	8'11"	15'8"	15'8"	102000 ¹⁶	175#	85000	488100	Box
	100	4'6"	8'11"	15'8"	15'8"	106300 ¹⁶	175#	85000	538000	Box
	110	4'6"	8'11"	15'8"	15'8"	111400 ¹⁶	175#	85000	588000	Box
	120	4'6"	8'11"	15'8"	15'8"	115000 ¹⁶	175#	85000	638800	Box
a = Number of wheels per crane.										