USING YOUR ENGINEERING DATA BOOK

Your Engineering Data Book contains seven sections and is arranged in a logical sequence for selecting the components of underhung cranes and monorail systems.

The BASIC DATA SECTION tells why Trambeam is your best buy and briefly describes the types of Trambeam equipment. Ensuing sections provide you with detailed engineering data and specific information for your particular application. This section also contains two informative publications of the Monorail Manufacturers Association, Inc. One is their SPECIFICATIONS FOR UNDERHUNG CRANES AND MONORAIL SYSTEMS which offers technical and design information for the parties engaged in the marketing, buying or use of such systems. Section 15 of the specifications is a glossary of terms appropriate to the industry and will be helpful to the experienced engineer as well as the novice. The other publication is their CONSIDERATIONS IN SPECIFYING UNDERHUNG CRANES AND MONORAIL SYSTEMS. This is a compilation of contractual data to be considered in preparing contracts for the purchase of underhung cranes and monorail systems. Both publications are reproduced with permission of the association.

The equipment selection process begins by determining the method of transporting the product to be handled. Hence, the CARRIER SECTION is the first of the technical sections. This section illustrates and describes the many available combinations of carriers and hoist carriers. Single girder and double girder electric hoist carriers are cataloged for most major hoist manufacturers.

The CRANE SECTION follows as the second step in determining equipment for a crane system. Methods for crane selection are described in this section. Tables are included for selecting light duty and standard hand propelled single girder cranes and motor driven single and double girder cranes. The section also includes data on single and double girder transfer cranes, single girder low headroom cranes, Trambeam TR cranes and gantry cranes.

The TRACTOR DRIVE SECTION has complete information on each of the drives available for propelling carriers and cranes. The section also has motor schedules for determining the motor horsepower, complete descriptions of the electrical equipment for controlling motor driven carriers and cranes and data on the National Electric Code and OSHA electrical standards.

Determining the size of the runway or monorail track is the next step in the selection process. The TRACK AND FITTINGS SECTION describes Trambeam Type SW track and the procedures for calculating track and hanger rod loads. Tables are provided for selecting track size and hanger rod assemblies. Methods for suspending track are shown and dimensional information is provided for determining track elevations and hanger rod lengths. Standard top flange and web fabrication details are also included.

The SWITCH SECTION describes and illustrates the Trambeam switches available for monorail systems. The section illustrates the grouping of switches and provides minimum dimension for mainline bypassing and spur tracks. Other monorail accessories such as turntables, crossovers and lift or drop sections are also described.

The ELECTRIFICATION SECTION completes your Trambeam Engineering Data Book. It describes the electrification systems available for powered applications.

TRAMBEAM IS YOUR BEST BUY

Trambeam crane and monorail systems can be the most versatile equipment you can buy for overhead handling of many materials. They work out of the way of men and machines and achieve maximum use of space by eliminating the need for wide, space consuming aisles necessary when floor handling equipment is used.

A Trambeam system combines unique handling and cost advantages because its hoist and carrier is underhung from the monorail or crane. Also, the crane is underhung from runways suspended from the building structure. Because of this design, a Trambeam crane can transfer loads between bays, between cranes or between cranes and monorails. In addition, costs can often be reduced through savings in equipment and building costs.

- EQUIPMENT SAVINGS are attained by using Trambeam for crane girders and runway and monorail tracks. Trambeam track is a composite section combining a vanadium steel lower load carrying flange with mild steel web and top flange plates. The result is a balanced design providing high strength to weight characteristics. Trambeam track provides more strength per pound than conventional structural shapes such as standard I-beams.

- BUILDING COST SAVINGS can be realized if runways can be installed without major building modi-

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fications. Pre-engineered buildings are particularly suitable for installation of Trambeam cranes and are generally designed so that major modifications are not necessary. A Trambeam crane or monorail system can often minimize installation costs through its relatively light weight and versatility for suspension from the building structure.

EQUIPMENT SELECTION

A wide range of Trambeam equipment is available-hand propelled carriers and cranes, motor driven single or double girder carriers and cranes, straight or curved track monorails, etc. Equipment selection is important and is made in a 6 step procedure that determines the right system for your application:

- ANALYZE YOUR APPLICATION-determine the sizes, shapes and weights of loads, frequency of lifts and moves and best method of handling, i.e., crane or monorail.
- PLAN LOAD HANDLING-determine what below-the-hook devices may be needed and the weights of these devices.
- SELECT HOIST AND CARRIER-hoist is rated to handle the heaviest load plus the weight of any below-the-hook device that may be used.
- SELECT CRANE-determine crane catalog number for span and rated load.
- SELECT CONTROLS AND ELECTRIFICATION-evaluate operating controls and power supply methods.
- SELECT RUNWAY OR MONORAIL TRACK AND SUSPENSION-determine load on track, centers between suspension supports and load on building.

Brief descriptions of the various Trambeam systems follow. Complete and detailed data are provided in ensuing sections.

TRAMBEAM CRANE SYSTEMS offer complete area coverage. Construction for all Trambeam cranes is essentially the same varying only in rated load and span. All are underhung and have a Trambeam girder fitted to end trucks operating on flexibly suspended (recommended method) or rigidly suspended runways. The hoist and carrier operate on the lower flange of the Trambeam girder. The runways have two and as many additional parallel tracks as may be required to provide the desired area coverage.

- TRAMBEAM SINGLE GIRDER are available for rated loads to 10 tons. They are cataloged as 2-runway cranes with spans to 100'-0". Longer span cranes with multiple runways are also available. Single girder cranes may be hand propelled, hand racked or motor drive.
- TRAMBEAM LOW HEADROOM CRANES provide maximum lift by framing the bridge girder into the end trucks. These cranes are limited in span and rated load because of the special girder construction. Also, loads cannot be transferred to other cranes or monorail spurs when the girder is framed into the end truck.
- TRAMBEAM DOUBLE GIRDER CRANES are available for rated loads to 30 tons. They are generally used for heavier loads and longer spans, but may also be used for lighter loads where maximum hook lift is desirable. Double girder cranes are cataloged as 2-runway types with spans to 100'-0". Longer span cranes with multiple runways are also available.
- TRAMBEAM TRANSFER CRANES provide complete coverage of large areas without rehandling of the load. Interlocking mechanisms on the ends of girders allow loads to be transferred from cranes to monorail spurs or to other cranes. These mechanisms can be either manual or motor operated.
- TRAMBEAM GANTRY CRANES are used where a repeated work operation or a particular work area is of an unusual nature. These cranes can be either single or double girder construction and can be hand propelled, hand racked or motor driven.

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- TRAMBEAM TOP RUNNING CRANES are available for applications where a top running runway rail is existing. They are particularly suitable for long span, single girder applications because of the high strength to weight characteristics of the Trambeam girder. They are also available with double girder construction for long spans and heavier rated loads.

- TRAMBEAM MONORAIL SYSTEMS move materials over predetermined paths. These systems can handle loads to 10 tons, but are frequently designed to handle relatively light loads. They are ideal for processing of materials where cleaning, painting, plating and other operations can be accomplished without removing the material from the carrier.

- TRAMBEAM SWITCHES can be used to increase the flexibility of your monorail system. They increase the versatility of the system by diverting loads, bypassing traffic and connecting spur lines to the main system. All Trambeam switches are of the sliding type and may be manual, electric or air operated.

- TRAMBEAM CROSSOVERS, TURNTABLES AND LIFT SECTIONS can also increase the flexibility of your monorail system. Crossovers allow two monorail tracks at the same elevation to cross at right angles and permit carriers to travel through the intersection of the two tracks. Turntables serve a similar purpose except that they rotate the carrier. Lift sections allow for movement of loaded carriers when two or more tracks are at different elevations.

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GENERAL INFORMATION

Trambeam carriers are available for rated loads to 30 tons. They can handle and transport most products manufactured today. Carriers can be equipped with manual or powered hoists or can be attached directly to racks, buckets or similar conveying devices. Selection of the handling device depends on the application.

Carriers are available for single or double girder applications. They can be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation and rated load. When motor driven or equipped with an electric hoist, carriers may be equipped with current collectors as described in the Electrification Section.

Design considerations featured in all Trambeam carriers include:

- **INDUCTION HARDENED WHEELS** in combination with the hard running surface of Trambeam track maximize system life.
- **OPTIMUM CONTACT** between the flat tread wheel and flat running tread contribute to ease of operation and long system life.
- **PROPORTIONED WHEELBASES** provide smooth operation, better load distribution and less effort to move carriers along the track.
- **SWIVEL CARRIER HEADS** provide better tracking of carriers around curve tracks and through switches of a monorail system.

Trambeam carriers are manufactured using as many standard components as possible to provide quality equipment at a reasonable cost. Where standard components are not suitable for a particular application, special combinations are used to provide equipment best suited for the application. Specifications for wheels, carrier heads and accessories are described on subsequent pages.

Lugs are an optional accessory which limit the drop of a carrier to 1 in. or less in the event of wheel or axle failure. Lugs for single girder carriers are illustrated and described on Page CA-10. Lugs for double girder carriers are similar to those used on crane end trucks.

Carrier heads, while listed separately, are not intended to be used individually as they have a tendency to chatter and hop along the track when loaded. Carrier heads may be purchased separately for assembly into special load bars or racks, but are recommended for use only in pairs.

SINGLE GIRDER CARRIERS may be hand propelled, hand racked or motor driven and are available for rated loads to 10 tons. They are used on single girder cranes and monorail systems. Electric hoist carriers are cataloged for most major hoist manufacturers; specifications and dimensional data for these carriers are provided on Pages CA-11 through CA-39.

Special considerations must be given to most carriers operating on monorails with switches. When a carrier operates on a monorail with Type 3, 4 or 5 switches, it is equipped with switch ears to prevent the carrier from running off incoming tracks in the event a switch is only partially thrown. Switch ears are illustrated and described on Page CA-10. Also, the carrier head load should be checked against the switch carrier head rated load; on some applications, an 8-wheel carrier may be required to reduce the carrier head load to or below the switch rated load.

DOUBLE GIRDER CARRIERS may be hand propelled, hand racked or motor driven, but are usually motor driven. They are available for rated loads to 30 tons and are used on double girder cranes and double track systems. Motor driven carriers are cataloged for most major hoist manufacturers and for rated loads to 15 tons. Specifications and dimensional data for these carriers are provided on Pages CA-38 through CA-53.

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WHEEL SPECIFICATIONS

A variety of wheel assemblies are available for the many service conditions encountered in Trambeam underhung crane and monorail systems. Flanged wheels are satisfactory for most applications. Flangeless wheels with side guide rollers are used where an application requires high service factors or where speeds are greater than 200 FPM.

Wheels when assembled into carrier heads can be removed for servicing or replacement without removing the carrier head from the track. Wheels used in carrier heads with one piece yokes have removable axles or the axle is short enough to allow removal.

Wheels are machined from steel forgings and are induction hardened to a 45 Rockwell "C" (425 Brinnell) minimum hardness. After hardening, the bore is finished to the bearing manufacturer's recommended tolerance. Axles are alloy steel.

Bearings provide the minimum B-10 bearing life as stated in ANSI MH 27.1 Specifications for Underhung Cranes and Monorail Systems. Bearing life varies with each application and depends on equipment speed and wheel load; consult factory for bearing life on specific applications. Pregreased bearings are factory "lubricated-for-life"; regreasable bearings are furnished with grease fittings in the wheel axles for periodic lubrication. Bearings are designed for a maximum operating temperature of 150 Deg. F; consult factory for higher temperature applications.

Bronze wheels are available for spark-proofing and operation in hazardous locations; consult factory for recommendations.

Wheel assemblies are illustrated on Page CA-3. Dimensions, rated loads and other pertinent data are listed in the table on this page.

Item Number	Rated Load (Pounds)	Type	Bearing	Lubrication	Figure Number	A	B	C	D
010261	600	Flanged	Single Row Ball	Pregreased	1	11/16	5-1/8	5/8	4
010271	1,000	Flanged	Double Row Ball		2	11/16	6-1/8	3/4	5
010272	1,500	Flanged			2	11/16	6-1/8	3/4	5
010265	2,000	Flanged	Double Row Tapered Roller	Regreasable	3	11/16	6-1/8	3/4	5
010266	2,000	Flangeless			4	11/16	-	3/4	5
010267	3,250	Flanged			3	3/4	7-1/2	1	6-1/2
010268	3,250	Flangeless			4	3/4	-	1	6-1/2
010269	3,750	Flangeless			4	1	-	1-1/2	8

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WHEEL SPECIFICATIONS

FIGURE NO. 1

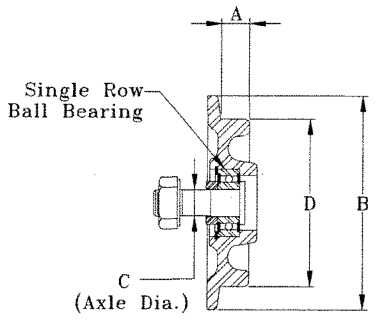


FIGURE NO. 2

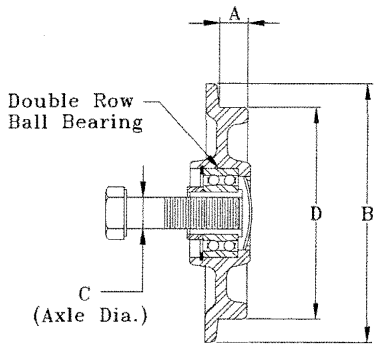
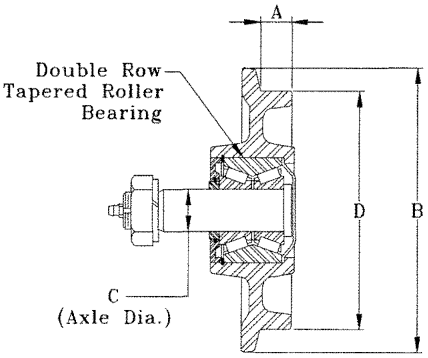


FIGURE NO. 3



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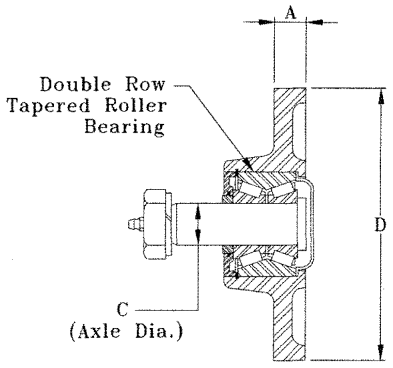

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CARRIER HEAD SPECIFICATIONS

A carrier head is an assembly made up of 2 wheels and a yoke. Two or more carrier heads are used with one or more load bars to make up a carrier or crane end truck. Carrier heads are always used in pairs; they are not intended to be used individually.

Carrier heads are available with flanged wheels or with flangeless wheels and side guide rollers. Heads with flanged wheels are satisfactory for most applications. Heads with flangeless wheels and side guide rollers are used where an application requires high service factors or where speeds are greater than 200 FPM.

Two yoke designs are used. A one piece yoke is used for carrier heads with rated loads to 3,000 pounds. Wheel assemblies for the one piece yoke have removable axles or the axles are short enough to allow wheel removal for servicing or replacement without removing the head from the system. One piece yokes are made from malleable iron castings or are steel weldments. Malleable iron yokes have integral cast crossbars. Welded steel yokes have removable, formed steel crossbars.

A two piece or split yoke design is used for carrier heads with rated loads of 4,000 pounds or more. Two piece yokes are made from forged steel and are machined to maintain alignment of the wheels and vertical pin. Crossbars in all two piece yokes are removable.

Vertical pins connect the carrier heads to the load bar. Pins are supported top and bottom in all Trambeam heads.

Carrier heads are illustrated on Page CA-5. Dimensions, rated loads and other pertinent data are listed in the table on this page.

Item Number	Rated Load (Lbs.)	Wheel Item Number	Yoke Material	Figure Number	A	B	C	D	E	F	G	H	J
010201	1,200	010261	Malleable Iron	1	2	5-1/8	6-7/8	4	3-7/8	2-1/8	5	6-3/4	5/8
010203	2,000	010271		2	2	6-1/8	8-1/8	5	4	2	5-1/8	8	1-1/2
010205	3,000	010272	Welded Steel	2	3	6-1/8	8-7/8	5	4	2	5-5/8	9	1-1/2
010207	4,000	010265		3	3-1/8	6-1/8	8-7/8	5	4-1/8	2	6	8-1/8	1
010208	4,000	010266		4	3-1/8	6-7/8	8-7/8	5	4-1/8	2	6	8-1/8	1
010209	6,500	010267	Forged Steel	3	3-1/8	7-1/2	11-1/4	6-1/2	6-3/8	2-7/8	8-3/8	9-3/4	1-1/4
010210	6,500	010268		4	3-1/8	8	11-1/4	6-1/2	6-3/8	2-7/8	8-3/8	9-3/4	1-1/4
010211	7,500	010269		4	3-1/2	8	14-1/2	8	7	3-3/8	9-1/4	11-5/8	1-1/4

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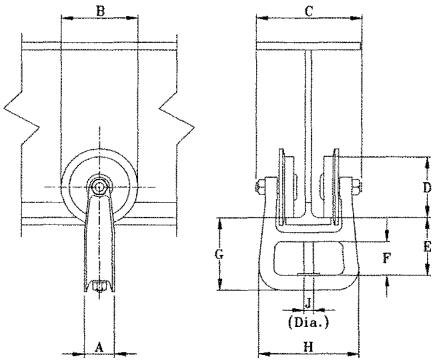
CARRIER HEAD SPECIFICATIONS

FIGURE NO. 1



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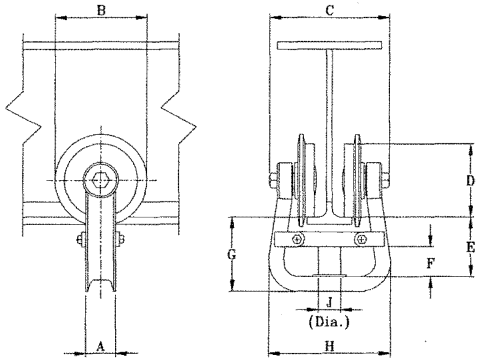
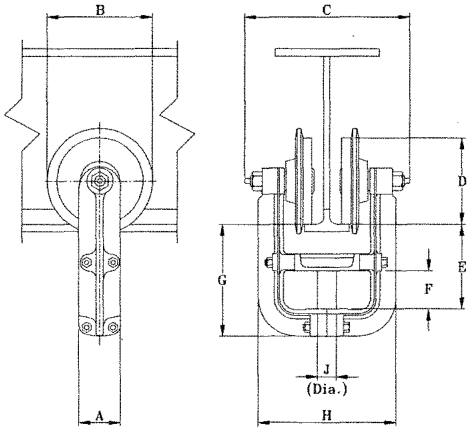


FIGURE NO. 3



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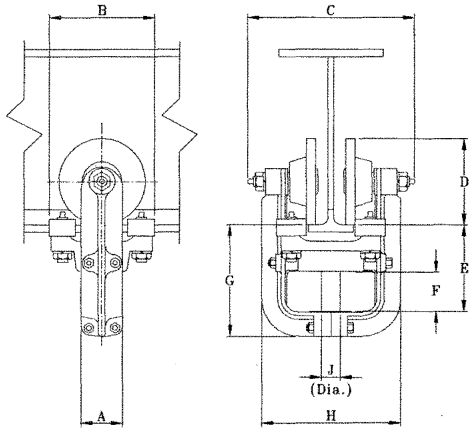

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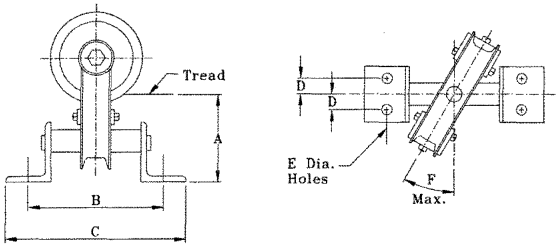
RACK CARRIERS

Rack carriers are available for direct attachment to racks or similar conveying devices. They are particularly suited for handling parts through production processes and on into storage to await further processing or shipment.

Rack carriers are made up of a carrier head, load bar and a pair of mounting angles. They are cataloged with rated loads of 2,000 and 3,000 pounds. Carriers with rated loads to 6,500 pounds are also available; consult factory for data.

Rack carriers are always used in pairs; they are not intended to be used individually. When used on monorails with curves, the curve radius should not be less than the wheelbase of the two rack carriers.



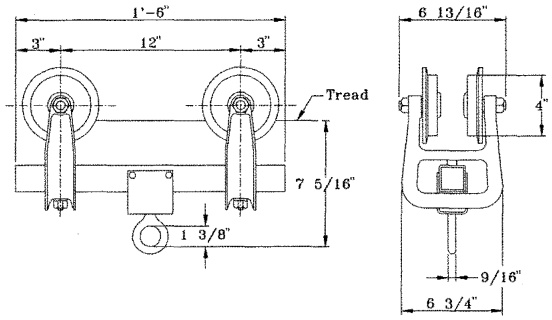
Carrier Item Number	Rated Load (Pounds)	Carrier Head	Net Weight (Pounds)	A	B	C	D	E	F
110345	2,000	010203	29	5-1/4	9	10-3/4	1-1/8	17/32	45 Deg.
110346	3,000	010205	38	5-3/4	10	12-3/4	1-1/8	17/32	35 Deg.

2,400 LBS. RATED LOAD CARRIERS

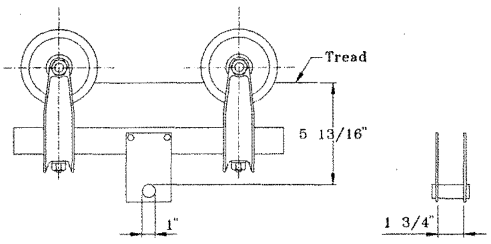
Item. No. 110302 Eyebolt Type - 35 lbs. Net weight.
Item. No. 110303 Pin Type - 35 lbs. Net weight.

These carriers are used with hook-on chain hoists. They consist of a load bar, two No. 010201 carrier heads and a suspension assembly. These carriers are suitable for light duty service. No. 110303 carriers are used where headroom is limited and a swivel is not required.

The load bar is fabricated from steel tubing and has provisions for bolting either the eyebolt assembly or pin suspension assembly to the load bar. The eyebolt assembly for the No. 110302 carrier consists of a forged steel eyebolt, spherical washer set, saddle and attaching hardware. The pin assembly for the No. 110303 carrier consists of two side plates, a pin, two cotter pins and attaching hardware.



CAT. No. 110302 CARRIER



CAT. No. 110303 CARRIER

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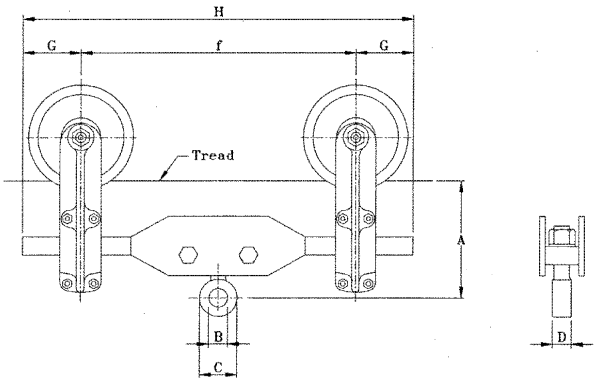
4-WHEEL FLAT EYEBOLT CARRIERS

Flat eyebolt carries are used in 8-wheel carrier assemblies and for direct attachment to racks, buckets or similar conveying devices. They consist of a load bar, two carrier heads and an eyebolt assembly.

Load bars are steel weldments. The eyebolt assemblies are made up of an eyebolt, self-aligning bushing and bushing seat. The assembly is bolted to the load bar. The bushing allows the eyebolt to rotate 360 degrees and oscillate 7 degrees in any direction. The outer and inner races of the bushing have a dry film lubricant of molybdenum disulfide. This lubricant is satisfactory when the carrier is used for straight track operation or for moderate service on curve track monorails. When higher service factors are required for curve track monorails, the eyebolt assembly can be furnished with a grease fitting for periodic lubrication of the bushing.

The 4,000 and 6,000 pound rated load carriers have bronze washers in the carrier head connections for free swivel of the heads. The 8,000, 13,000 and 15,000 pound rated load carriers have self-aligning bushings in the carrier head connections for equal wheel loading and free swivel of the heads.

The drawing illustrates the No. 110331 carrier and is typical for all 4-wheel eyebolt carriers. The table lists all pertinent data for these carriers.



Rated Load (Lbs.)	Carrier Item Number	Carrier Head Item No.	Eyebolt Lubrication	Net Weight (Lbs.)	A	B	C	D	f	G	H
	110327	010203	Dry Film								
4,000	110328	010203	Greased	66	6-5/16	1-9/32	2-1/2	1-1/2	1'-6	3-3/4	2'-1-1/2
	110329	010205	Dry Film								
6,000	110330	010205	Greased	80	6-5/16	1-9/32	2-1/2	1-1/2	1'-6	3-3/4	2'-1-1/2
	110331	010207	Dry Film								
8,000	110332	010207	Greased	94							
	110431	010208	Dry Film		6-7/8	1-9/32	2-1/2	1-1/2	1'-6	3-3/4	2'-1-1/2
	110432	010208	Greased	106							
	110333	010209	Dry Film								
13,000	110334	010209	Greased	181							
	110433	010210	Dry Film		9-3/4	1-21/32	3	1-7/8	1'-9	4-1/4	2'-5-1/2
	110434	010210	Greased	203							
	110435	010211	Dry Film								
15,000	110436	010211	Greased	263	10-5/16	1-21/32	3	1-7/8	1'-9	4-1/4	2'-5-1/2

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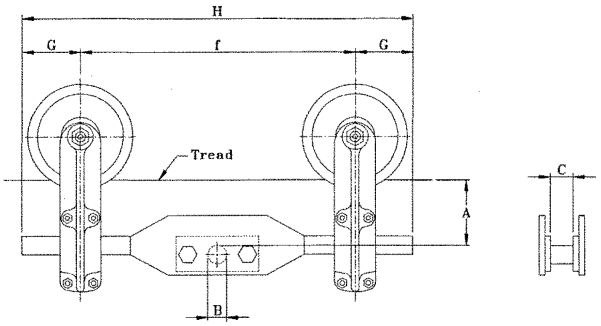
4-WHEEL PIN TYPE CARRIERS

Pin type carriers are used with hook-on hand chain hoists. They consist of a load bar, two carrier heads and a pin suspension assembly.

Load bars are steel weldments. The pin suspension assembly consists of two steel bars bolted to the side plates of the load bar and a pin.

The 4,000 and 6,000 pound rated load carriers have bronze washers in the carrier head connections for free swivel of the heads. The 8,000, 13,000 and 15,000 pound rated load carriers have self-aligning bushings in the carrier head connections for equal wheel loading and free swivel of the heads.

The drawing illustrates the No. 110312 carrier and is typical for all 4-wheel pin type carriers. The table lists all pertinent data for these carriers.



Rated Load (Pounds)	Carrier Item Number	Carrier Head Item Number	Net Weight (Pounds)	A	B	C	f	G	H
4,000	110306	010203	63	2-5/8	1-1/4	2	1'-6	3-3/4	2'-1-1/2
6,000	110309	010205	77						
8.000	110312	010207	92	3-1/16	1-1/2	2	1'-6	3-3/4	2'-1-1/2
	110412	010208	104						
13,000	110315	010209	176	5-1/4	1-3/4	2	1'-9	4-1/4	2'-5-1/2
	110415	010210	198						
15,000	110418	010211	258	5-13/16	1-3/4	2	1'-9	4-1/4	2'-5-1/2

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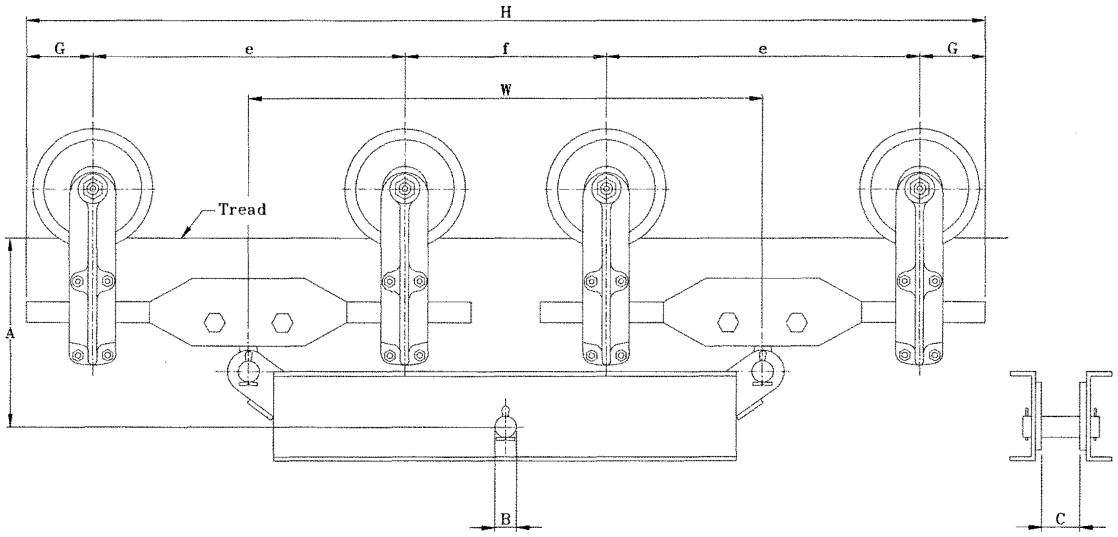
8-WHEEL PIN TYPE CARRIERS

Pin type carriers are used with hook-on hand chain hoists. They consist of a connecting load bar, two 4-wheel flat eyebolt carriers and a pin suspension assembly.

Connecting load bars are steel weldments and are pin connected to the 4-wheel eyebolt carriers. The pin suspension assembly consists of a pin and two cotter pins. The 4-wheel carriers have eyebolt bushings with a dry film lubricant of molybdenum disulfide. This lubricant is satisfactory for straight track operation or moderate service on curve track monorails. When higher service factors are required for curve track monorails, the eyebolt assembly can be furnished with a grease fitting for periodic lubrication of the bushing.

The 8,000 and 12,000 pound rated load carriers have bronze bushings in the carrier head connection for free swivel of the heads. The 16,000 and 26,000 pound rated load carriers have self-aligning bushings in the carrier head connection for equal wheel loading and free swivel of the heads.

The drawing illustrates the No. 110341 carrier and is typical for all 8-wheel pin type carriers. The table lists all pertinent data for these carriers.



Rated Load (Lbs.)	Carrier Item Number	4-Wheel Carrier Item No.	Eyebolt Lubrication	Net Weight (Lbs.)	A	B	C	e	f	G	H	W
8,000	110337	110327	Dry Film	185	9-5/16	1-3/4	2	1'-6	1'-0	3-3/4	4'-7-1/2	2'-6
	110338	110328	Greased									
12,000	110339	110329	Dry Film	213								
	110340	110330	Greased									
16,000	110341	110331	Dry Film	240	9-3/4	1-3/4	2	1'-6	1'-0	3-3/4	4'-7-1/2	2'-6
	110342	110332	Greased									
	110441	110431	Dry Film	264								
	110442	110432	Greased									
26,000	110343	110333	Dry Film	471	1'-1-7/8	2-1/4	2	1'-9	1'-3	4-1/4	5'-5-1/2	3'-0
	110344	110334	Greased									
	110443	110433	Dry Film	515								
	110444	110434	Greased									

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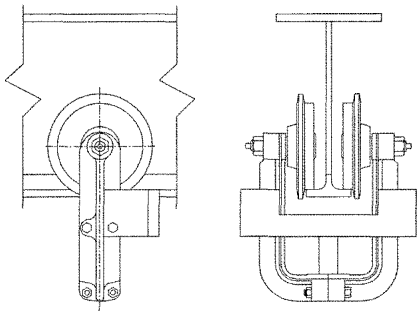
CARRIER ACCESSORIES

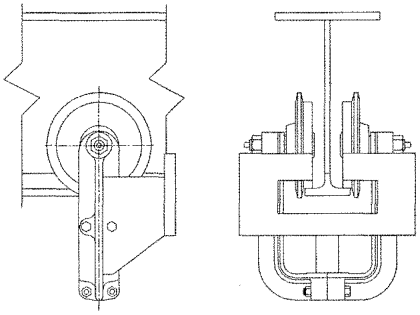
SWITCH EARS

All carriers operating on monorails with Type 3, 4 or 5 switches must be equipped with switch ears on each end of the carrier. Switch ears prevent the carrier from running off incoming tracks in the event a switch is only partially thrown. The drawing illustrates the switch ear for the No. 010207 carrier head. Ears for other carrier heads are similar. On motor driven carriers, switch ears are located on the carrier head at the idler end and on the tractor drive at the drive end.



CARRIER LUGS

Lugs are available to limit the drop of the carrier to 1 in. or less in the event of wheel or axle failure. They are optional equipment, but are recommended for heavy or severe duty applications, cab controlled carriers or where hazardous materials, such as molten metal, are being transported. The drawing illustrates the lugs for the No. 010207 carrier head. Lugs for other carrier heads are similar. The lugs are steel weldments and bolt to the carrier head.



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SINGLE GIRDER ELECTRIC HOIST CARRIERS

Single girder electric hoist carriers are cataloged by (1) rated load and (2) hoist manufacturer. Item numbers have a prefix number indicating the method of propulsion, i.e., 11 for hand propelled and 21 for motor driven carriers. Item numbers on subsequent pages use the 11 prefix number indicating hand propelled carriers. When specifying or ordering motor driven carriers, change the prefix number to 21.

HOIST SPECIFICATIONS

Carriers are cataloged for 1/2, 1, 2, 3, 5, 7-1/2 and 10 ton rated load hoists and for hoists with the more common lifts and speeds. Carriers for hoists with other rated loads, longer lifts and faster speeds are available; consult factory for carrier data on hoists not listed. Information on hoist lifts and speeds is not included in the data, but is readily available from the hoist manufacturers' catalogs.

Service classifications for electric hoists are defined in ANSI/ASME HST-1M Performance Standards for Electric Chain Hoists and ANSI/ASME HST-4M Performance Standards for Overhead Electric Wire Rope Hoists. Hoists should be selected for each application from the data in these standards.

Some carriers require that hoists be furnished with special adaptors. These adaptors have been designed by the hoist manufacturer for direct mounting of carrier heads or 4-wheel carriers to the hoist. The requirement for special adaptors is noted in the hoist data. Hoists must be ordered with the adaptors where indicated.

Hoist dimensions are for single speed hoists operating on 3 phase alternating current. When the hoist has 2-speed or variable speed control or operates on direct current, consult hoist manufacturers' catalog for possible variations in hoist dimensions.

When the hoist cable is single reeved, indicated in the data as 2PS, 4PS or 6PS, the hoist hook follows the cable as it is wound on the drum resulting in the hook not giving a true vertical lift. While the hook movement is not objectionable in many applications, these hoists should not be used where a true vertical lift is specified. Approach dimensions for all carriers with single reeved hoists are based on the hook being at the mid-point of its travel.

CARRIER SPECIFICATIONS

Carriers may be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation, elevation and rated load. They may be equipped with current collectors as described in the Electrification Section.

Service classifications for carriers are defined in ANSI MH 27.1 Specifications for Underhung Cranes and Monorail Systems. Carriers will generally meet the service classification of the hoist used on the carrier and the requirements of the comparable ANSI MH 27.1 service classification. For Class D carriers with speeds greater than 200 FPM and all Class E severe duty carriers, consult factory for recommendations.

The 4-wheel eyebolt carriers used in 8-wheel carriers have eyebolt bushings with a dry film lubricant of molybdenum disulfide. This lubricant is satisfactory for straight track operation or moderate service on curve track monorails. When higher service factors are required for curve track monorails, the eyebolt assembly can be furnished with a grease fitting for periodic lubrication of the bushing.

The weights shown in the data are the net weights of hand propelled carriers and do not include the tractor drive weight used on motor driven carriers, collectors or other accessories. Tractor drive weights are given in the Tractor Drive Section.

Lugs are available to limit the drop of the carrier to 1 in. or less in the event of wheel or axle failure. Lugs are optional and are described on Page CA-10.

Carrier load bars have a minimum extension beyond the carrier heads to provide the best carrier approach. When the hoist projects beyond the end of the load bar, the approach to the end of the track should be checked and, if necessary, the end stop set in to prevent interference with the building structure or other obstructions. When more than one carrier operates on a system, load bar extensions are recommended to prevent the hoists from hitting.

The National Electric Code requires that monorail carriers be provided with a motor circuit switch. A mainline contac-

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SINGLE GIRDER ELECTRIC HOIST CARRIERS

tor is also required when the motor circuit switch is not readily accessible from the operating station. An exception to this requirement is allowed where the monorail installation meets all of the following:

1. The unit is floor controlled.
2. The unit is within view of the power supply disconnecting means.
3. No fixed work platform has been provided for servicing the unit.

Motor circuit switches can be provided on hand propelled and motor driven carriers. The mainline contactor, when required, can be provided on the carrier but generally is provided on the hoist.

CARRIERS DRIVES AND CONTROLS

When there are frequent carrier movements or travel distances are long, motor driven carriers will increase productivity. The additional cost for a motor driven carrier will usually pay for itself in a short period of time. Motor driven carriers will also improve employee morale.

Motor driven carriers are identical to hand propelled carriers with the addition of a tractor drive to propel the carrier. Three tractor drives (Nos. 2408, 2409 and 24010) are available to meet a wide range of applications. All are satisfactory for Class D heavy duty service. Complete data on tractor drives, motor control and horsepower requirements are contained in the Tractor Drive Section.

Nominal speeds for single girder carriers are 55 and 90 FPM when No. 24010 drives are used; 100, 125, 150, 175 and 200 FPM when No. 2409 drives are used; and 100, 150, 200, 250 and 300 FPM when No. 2408 drives are used. Special speeds can be furnished upon request.

Wiring and control panels comply with the requirements of OSHA electrical standards and Article 610 of the National Electric Code. Carrier control panels are furnished with motor overcurrent protection, thermal overload relays in 3 phases and NEMA 12 dust-tight enclosure as standard.

The clearance drawings of single girder carriers on following pages are applicable to hand propelled and motor driven carriers. Dimension 'H' represents the space required for the tractor drive on motor driven carriers with single speed control. Consult factory for dimension 'H' for carriers with 2-speed control.

Motor driven carriers are controlled by (1) a pendant push button station, (2) a trailing operator's cab or (3) remotely by a transmitter using radio or infrared control. The push button station may be suspended from the carrier or from a swivel arm on the carrier if the load being handled is bulky. Carriers with trailing cabs are generally controlled from master switches in the cab. Under some conditions it is desirable to use a trailing cab without controls on floor controlled carriers; this arrangement allows the push button station to be raised into the cab and provides both floor and cab control of the carrier.

When carriers operate on cranes, they may be controlled from a push button station or cab on the crane provided the crane is not a transfer crane. For radio control or other special applications, consult factory for recommendations.

CURVE OPERATION

Carriers operating on curve tracks require special consideration. Most of the cataloged motor driven carriers have the tractor drive coupled directly to the carrier load bar or have a short tow link and are satisfactory for straight track operation only. When operating on monorails with curve tracks, motor driven carriers require a tow link or a longer tow link to negotiate the curve tracks. The addition of a tow link or a longer tow link increases dimension 'H'; consult factory for changes in dimension 'H' for curve track operation.

Curve radii should be as large as practical to allow carriers to negotiate curve tracks with the least effort. Curve radii should not be less than the wheelbase of the carrier.

SWITCH OPERATION

Carriers for operation on monorails with switches also require special consideration. Most of the cataloged motor driven carriers require a tow link or a longer tow link for operation through switches.

On monorails with Type 3, 4 or 5 switches, carriers must be equipped with switch ears to prevent the carrier from running off the incoming track in the event a switch is partially thrown. See Page CA-10 for illustration and description of switch ears.

The carrier head load should also be checked against the rated load of the switch. On some applications, an 8-wheel carrier may be required to reduce the head load to or below

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SINGLE GIRDER ELECTRIC HOIST CARRIERS

the switch rated load.

Four-wheel hand propelled and motor driven carriers for close headroom hoists will not, as a general rule, operate through switches because of interference between the hoist frame and stops on Type 4 and 5 switches or because the carrier head load exceeds the switch rating. Use 8-wheel carriers for these hoists when carrier operates through switches. Also, some 7-1/2 ton carriers and all 10 ton carriers will not operate through switches because the carrier head load exceeds the switch rating; consult factory for recommendations when these carriers are to operate through switches.

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1/2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

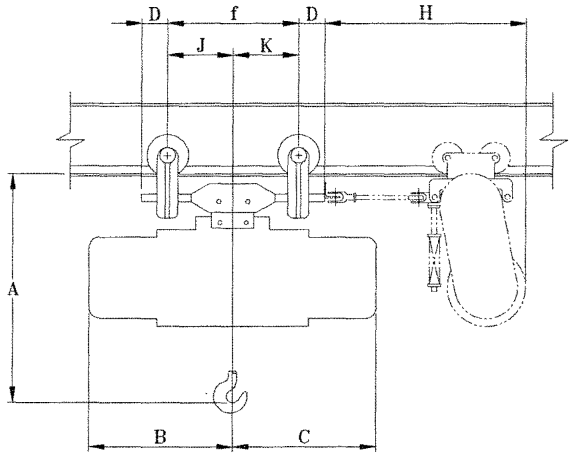
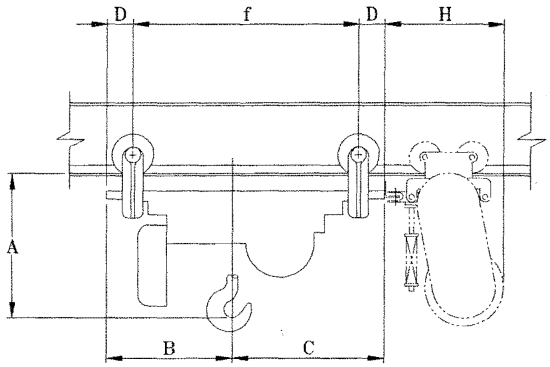


FIGURE NO. 2



Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	f	H	J	K
LIFT-TECH `BUDGIT' (CHAIN)												
1105000	1	010201	35	C356-3R;J356-3R	1'-7	10-1/8	10-3/8	3	1'-0	1'-8-3/8	6	6
CM LODESTAR (CHAIN)												
1102220	1	010201	35	E *	1'-11-1/4	9	11	3	1'-0	1'-8-3/8	6	6
1102221	1	010201	35	F *	1'-8	9	11	3	1'-0	1'-8-3/8	6	6
1102222	1	010201	35	J *	1'-8-7/8	10-3/4	9-1/2	3	1'-0	1'-8-3/8	6	6
				JJ*	1'-9-1/2	10-3/4	9-1/2	3	1'-0	1'-8-3/8	6	6
COFFING MODEL EC (CHAIN)												
1109000	1	010201	35	EC-1016*;EC1032*	1'-9-1/4	11-1/4	1'-0-1/8	3	1'-0	1'-8-3/8	6	6
COFFING MODEL WR (WIRE ROPE)												
1109010	1	010201	35	WR-1021-3;WR-1028-3 WR-1042-3	2'-3-1/8	1'-2-7/8	1'-3-3/8	3	1'-0	1'-0-7/8	6	6
P & H ZIP II (CHAIN)												
1101020	1	010201	35	A216-11;A316-11	1'-6-3/8	9	8-7/8	3	1'-0	1'-3-7/8	6	6

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1/2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model No.	A	B	C	D	f	H	J	K
P & H ZIP-LIFT (WIRE ROPE)												
1101222	1	010201	35	3116-11;3216-11 3516-11	2'-3-1/8	1'-0-3/4	1'-0-7/8	3	1'-0	1'-8-3/8	6	6
P & H BETA (WIRE ROPE)												
1101701	1	010201	35	AF2C-G1 : AG2C-G1	2'-4	1'-3-7/8	1'-4-3/4	3	1'-0	1'-8-3/8	5-1/4	6-3/4
1101702	2	010203	45	DF2C-R1*;DG2C-R1*	11-1/2	1'-4-3/4	1'-10-1/4	3-3/4	2'-7-1/2	1'-3-7/8	-	-
R & M TYPE A (WIRE ROPE)												
1106801	1	010203	65	S1-1/2-24A15 S1-1/2-24A30	2'-4	1'-4-3/8	10-1/8	3-3/4	1'-6	1'-3-7/8	9-3/8	8-5/8
1106802	1	010203	65	S1-1/2-36A15 S1-1/2-36A30	2'-4	1'-10-1/8	10-3/8	3-3/4	1'-6	1'-3-7/8	8-3/8	9-5/8
LIFT-TECH SERIES 800 & 900 (WIRE ROPE)												
1105223	1	010201	35	115884-1L	2'-1-1/2	1'-1-1/8	9-7/8	3	1'-0	1'-4	6-1/8	5-7/8
1105221	1	010201	35	110103-20L	2'-2-5/8	11-3/8	10-1/4	3	1'-0	1'-5-1/8	6	6
SHEPARD NILES (WIRE ROPE)												
1103302	1	010203	65	AA2B1D1	2'-7	1'-3-1/2	1'-8	3-3/4	1'-6	1'-10-7/8	8-3/4	9-1/4
1103303	1	010203	65	AA2B2D1	2'-7	1'-5-3/4	1'-9-3/8	3-3/4	1'-6	2'-0-7/8	9-1/4	8-3/4
1103502	2	010203	45	AE2B2D1*;AE2B3D1*	1'-4	1'-9-1/2	1'-6-3/4	3-3/4	2'-6	1'-3-7/8	-	-
WRIGHT-WAY (CHAIN)												
1107010	1	010201	35	2100470;2100550	1'-9-5/8	9-3/8	10-1/2	3	1'-0	1'-8-3/8	6	6
WRIGHT-WAY (WIRE ROPE)												
1107020	1	010201	35	2200470;2200550	2'-0-3/8	1'-0-1/4	1'-1-1/4	3	1'-0	1'-8-3/8	6	6
WRIGHT (WIRE ROPE)												
1107212	1	010201	35	3103510;3103610	2'-4-3/8	11-5/8	1'-1-5/8	3	1'-0	1'-8-3/8	6	6
1107271	2	010203	45	3104012*;3104112* 3104212*	1'-4-1/2	1'-9-7/8	1'-3-3/8	3-3/4	2'-5-3/4	1'-3-7/8	-	-
YALE KEL (CHAIN)												
1104010	1	010201	35	KEL1/2-10L15S1	1'-5-3/4	1'-0-1/8	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
				KEL1/2-10L30S1	1'-5-3/4	1'-0-5/8	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
				KEL1/2-10L60S1	1'-5-3/4	1'-3-7/8	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
YALE KEW (WIRE ROPE)												
1104020	1	010201	35	KEW1/2-19LG15S2 KEW1/2-19LG30S2	2'-3-1/4	1'-0-7/8	1'-5	3	1'-0	2'-0-7/8	6-1/2	5-1/2

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1 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

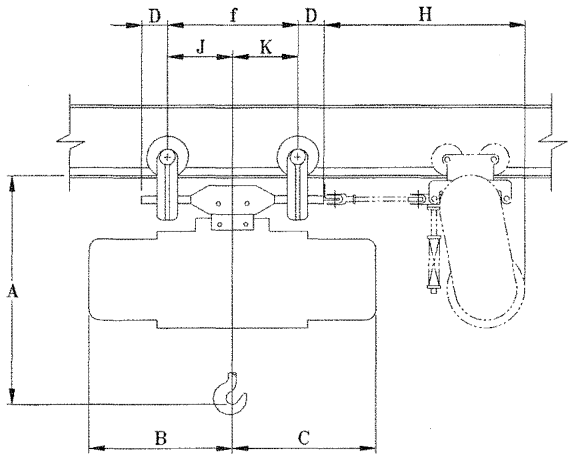
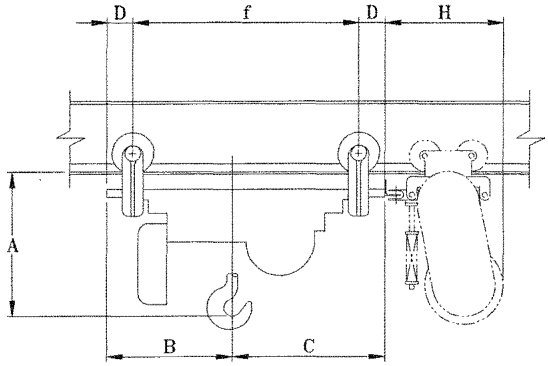


FIGURE NO. 2



Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	f	H	J	K
LIFT-TECH `BUDGIT' (CHAIN)												
1105001	1	010201	35	D356-3R;K356-3R	1'-7-3/4	10-1/8	10-3/8	3	1'-0	1'-8-3/8	6	6
				M356-3R	1'-7-3/4	1'-0-3/4	10-3/8	3	1'-0	1'-8-3/8	6	6
CM LODESTAR (CHAIN)												
1102232	1	010201	35	H*	1'-11-1/8	9	11	3	1'-0	1'-8-3/8	6	6
1102233	1	010201	35	L*	1'-9-7/8	10-3/4	9-1/2	3	1'-0	1'-8-3/8	6	6
				LL*	1'-10-1/2	10-3/4	9-1/2	3	1'-0	1'-8-3/8	6	6
COFFING MODEL EC (CHAIN)												
1109001	1	010201	35	EC-2012*;EC-2016*	1'-9-1/4	11-1/4	1'-0-1/8	3	1'-0	1'-8-3/8	6	6
COFFING MODEL WR (WIRE ROPE)												
1109011	1	010203	65	WR-2010-3;WR-2014-3	2'-3-3/4	1'-2-7/8	1'-3-3/8	3-3/4	1'-6	1'-8-3/8	9	9
				WR2021-3								
CHESTER WORM DRIVE (WIRE ROPE)												
1109100	2	010203	45	WWD-120;WWD-127	1'-10	1'-2-5/8	1'-11-7/8	3-3/4	2'-7	1'-3-7/8	-	-
				WWD-121;WWD-128	1'-10	1'-4-1/4	2'-4-3/4	3-3/4	3'-1-1/2	1'-3-7/8	-	-
ELECTROLIFT (WIRE ROPE)												
1108114	2	010203	45	30**;31**	1'-10-1/2	1'-9-1/2	2'-2	3-3/4	3'-4	1'-3-7/8	-	-
				27**;32**	1'-10-1/2	1'-11-1/4	2'-6-3/4	3-3/4	3'-10-1/2	1'-3-7/8	-	-
P & H ZIP II(CHAIN)												
1101021	1	010201	35	B116-61;B216-61	1'-9	9	8-7/8	3	1'-0	1'-3-7/8	6	6

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1 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	f	H	J	K
P & H ZIP-LIFT (WIRE ROPE)												
1101231	1	010203	65	4116-11;4216-11	2'-6	1'-0-3/4	1'-0-7/8	3-3/4	1'-6	1'-3-7/8	9	9
P & H `BETA' (WIRE ROPE)												
1101704	1	010203	65	BD2C-G1;BF2C-G1	2'-4	1'-3-7/8	1'-4-3/4	3-3/4	1'-6	2'-0	8-1/4	9-3/4
1101705	2	010203	45	ED2C-R1*;EF2C-R1*	11-1/2	1'-4-3/4	1'-10-1/4	3-3/4	2'-7-1/2	1'-3-7/8	-	-
R & M TYPE A (WIRE ROPE)												
1106804	1	010203	65	S1-1-24A15 S1-1-24A30	2'-4	1'-4-3/8	10-1/8	3-3/4	1'-6	1'-3-7/8	9-3/8	8-5/8
1106805	1	010203	65	S1-1-36A15 S1-1-36A30	2'-4	1'-10-1/8	10-3/8	3-3/4	1'-6	1'-3-7/8	8-3/8	9-5/8
LIFT-TECH SERIES 800 & 900 (WIRE ROPE)												
1105224	1	010203	65	15886-1L	2'-2-1/4	1'-1-1/8	9-7/8	3-3/4	1'-6	1'-3-7/8	9-1/8	8-7/8
1105233	1	010203	65	110102-20L	2'-3-1/2	11-3/8	10-1/4	3-3/4	1'-6	1'-3-7/8	9	9
SHEPARD NILES (WIRE ROPE)												
1103315	1	010203	65	BA1C1D1;BA1C1E1	2'-7	1'-4-1/2	1'-8-1/8	3-3/4	1'-6	1'-10-7/8	8-3/4	9-1/4
1103316	1	010203	65	BA1C2D1;BA1C2E1	2'-7	1'-6-5/8	1'-9-3/8	3-3/4	1'-6	2'-0-7/8	9-1/8	8-7/8
1103513	2	010203	45	BE1C2D1*;BE1C3D1*	1'-4	1'-9-1/2	1'-6-3/4	3-3/4	2'-6	1'-3-7/8	-	-
				CE1C2E1*	1'-5	1'-10-1/2	1'-7-7/8	3-3/4	2'-7-5/8	1'-3-7/8	-	-
				CE1C3E1*	1'-5	1'-11-3/4	1'-8-3/8	3-3/4	2'-9-3/8	1'-3-7/8	-	-
WRIGHT-WAY (CHAIN)												
1107011	1	010201	35	2100630	1'-9-5/8	9-3/8	10-1/2	3	1'-0	1'-8-3/8	6	6
WRIGHT-WAY (WIRE ROPE)												
1107021	1	010203	65	2200630	2'-1	1'-0-3/4	1'-1-1/4	3-3/4	1'-6	1'-8-3/8	9	9
WRIGHT (WIRE ROPE)												
1107232	1	010203	65	3220000	2'-10	2'-1-1/8	2'-3-7/8	3-3/4	1'-6	2'-5-7/8	8-3/4	9-1/4
				3220150	2'-10	2'-2-1/8	2'-6-7/8	3-3/4	1'-6	2'-7-7/8	7-3/4	10-1/4
				3243950	2'-10	2'-3-1/8	2'-3-7/8	3-3/4	1'-6	2'-5-7/8	8-3/4	9-1/4
				3244100	2'-10	2'-4-1/8	2'-6-7/8	3-3/4	1'-6	2'-7-7/8	7-3/4	10-1/4
1107291	2	010203	45	3106012*;3106112*	1'-4-1/2	1'-9-7/8	1'-3-3/8	3-3/4	2'-5-3/4	1'-3-7/8	-	-
1107517	2	010203	45	3232302*	1'-9-1/4	1'-5	1'-10-1/2	**	2'-1-7/8	1'-3-7/8	-	-
YALE KEL (CHAIN)												
1104011	1	010201	35	KEL1-10L15S1	1'-6-1/2	1'-0-5/8	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
				KEL1-10L30S1	1'-6-1/2	1'-3-7/8	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
				KEL1-10L42S1	1'-6-1/2	1'-7-1/4	1'-0-1/2	3	1'-0	1'-8-3/8	6	6
YALE KEW (WIRE ROPE)												
1104021	1	010203	65	KEW1-19LG15S2 KEW1-19LG30S2	2'-3-7/8	1'-10-7/8	1'-5	3-3/4	1'-6	1'-8-3/8	9-1/2	8-1/2

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2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

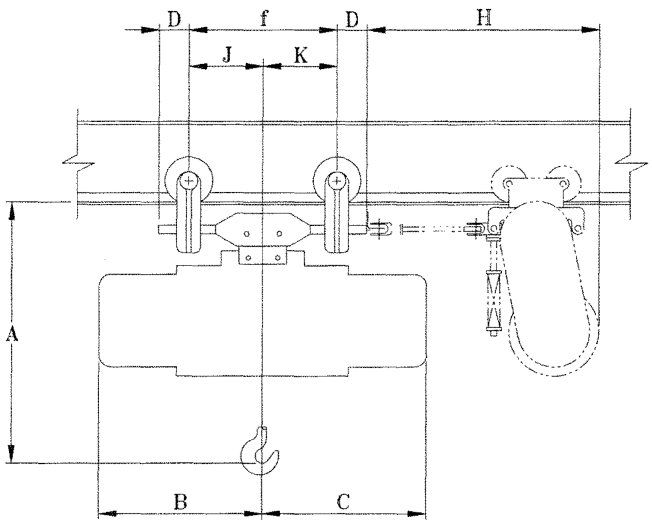
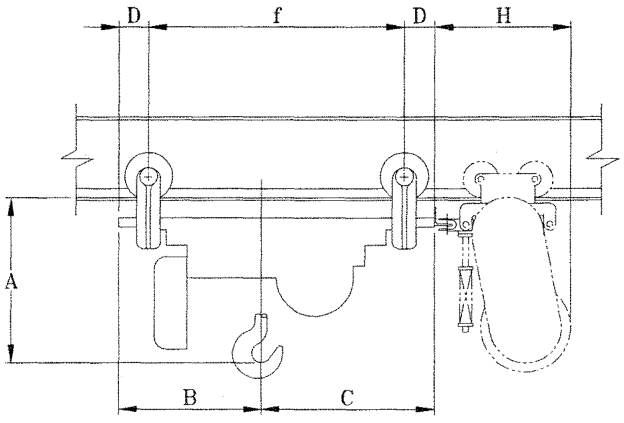


FIGURE NO. 2



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Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	f	H	J	K
LIFT-TECH `BUDGIT' (CHAIN)												
1105003	1	010205	80	P356-3R;S356-3R	2'-0-1/2	1'-0-3/4	10-3/8	3-3/4	1'-6	1'-3-7/8	9	9
CM LODESTAR (CHAIN)												
1102241	1	010205	80	R*	2'-4-5/8	1'-0-3/4	9-1/2	3-3/4	1'-6	1'-3-7/8	9	9
				RR*	2'-5-1/8	1'-0-3/4	9-1/2	3-3/4	1'-6	1'-3-7/8	9	9
COFFING MODEL EC (CHAIN)												
1109002	1	010205	85	EC-4006*;EC-4008*	2'-0-1/4	1'-0-3/4	1'-0-1/8	3-3/4	1'-6	1'-3-7/8	9	9
COFFING MODEL WR (WIRE ROPE)												
1109012	1	010205	80	WR-4014-3;WR-4021-3	2'-7-5/8	1'-5-7/8	1'-7-3/4	3-3/4	1'-6	1'-10-7/8	9	9
P & H `BETA' (WIRE ROPE)												
1101707	1	010205	80	CB2C-K1;CD2C-K1	2'-6-7/8	1'-3-7/8	1'-4-3/4	3-3/4	1'-6	2'-0	8	10
1101708	2	010205	60	FB2C-R1*;FD2C-R1*	1'-0	1'-4-3/4	1'-10-1/4	3-3/4	2'-7-1/2	1'-3-7/8	-	-
LIFT-TECH SERIES 800 & 900 (WIRE ROPE)												
1105225	1	010205	80	110101-15L;110101-20L	2'-5-1/8	11-3/8	10-1/4	3-3/4	1'-6	1'-3-7/8	9-5/8	8-3/8
WRIGHT-WAY (CHAIN)												
1107012	1	010205	75	2100710	2'-2-1/2	1'-0-3/4	10-1/2	3-3/4	1'-6	1'-3-7/8	9	9
YALE KEL (CHAIN)												
1104012	1	010205	80	KEL2-10L7-1/2S2	1'-11-1/8	1'-0-3/4	1'-0-1/2	3-3/4	1'-6	1'-3-7/8	9	9
				KEL2-10L15S2	1'-11-1/8	1'-3-7/8	1'-0-1/2	3-3/4	1'-6	1'-3-7/8	9	9
				KEL2-10L21S2	1'-11-1/8	1'-7-1/4	1'-0-1/2	3-3/4	1'-6	1'-3-7/8	9	9

2 TON CARRIERS CONTINUED ON CA21

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2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

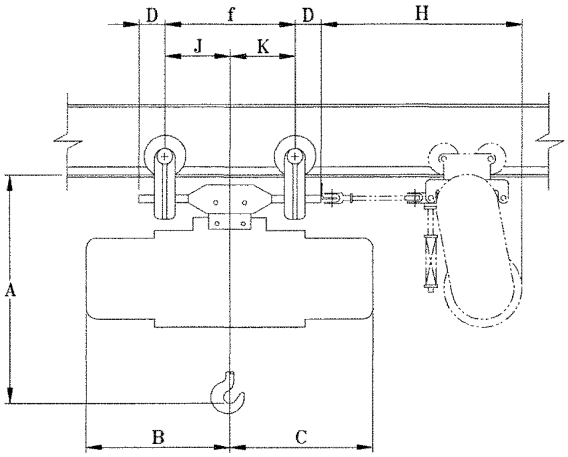


FIGURE NO. 2

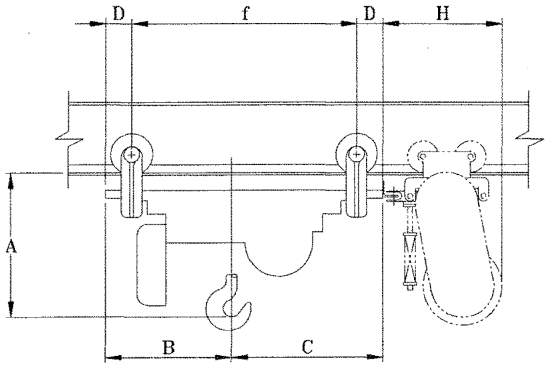


FIGURE NO. 3

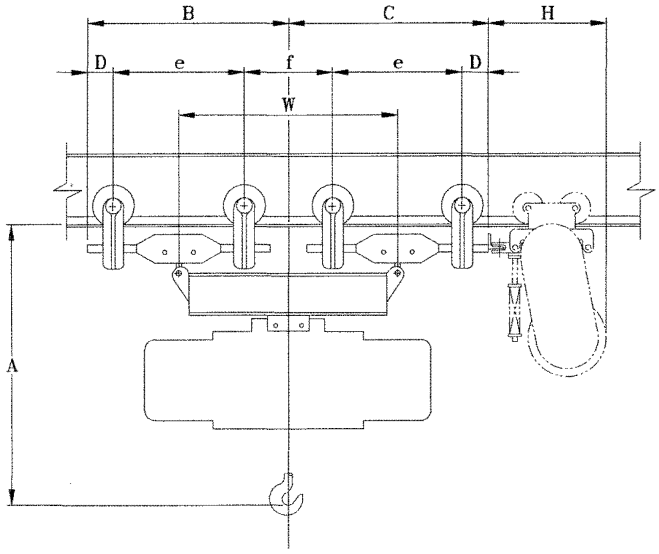
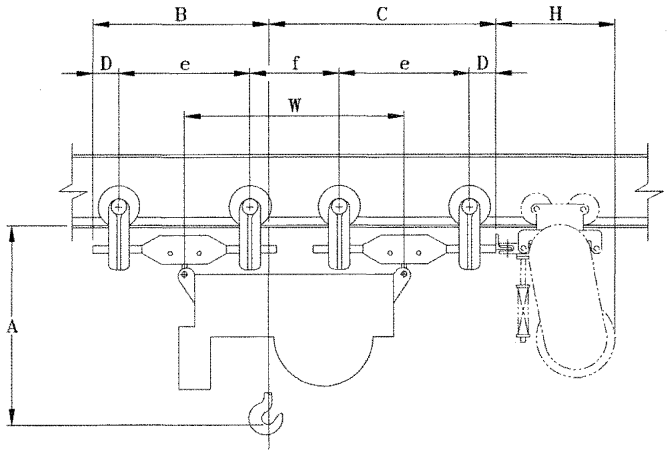


FIGURE NO. 4



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2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J	K	W
CM LODESTAR HEAVYWEIGHT (CHAIN)														
1102341	1	010205	95	7002;7006	3'-1-1/8	11-1/4	1'-4-3/8	3-3/4	-	1'-6	1'-8-3/8	7-1/2	10-1/2	-
1102401	3	010203	200	7002;7006	3'-8-1/2	2'-2-1/4	2'-5-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CM METEOR (WIRE ROPE)														
1102340	1	010207	105	5836;5826	2'-8-1/4	11-7/8	1'-5-3/4	3-3/4	-	1'-6	1'-8-3/8	6-3/4	11-1/4	-
1102402	3	010203	200	5836;5826	3'-3-1/4	2'-1-1/2	2'-6	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CHESTER WORM DRIVE (WIRE ROPE)														
1109110	2	010207	60	WWD-141;WWD-147	2'-3-7/8	1'-2-3/8	2'-6-5/8	3-3/4	-	3'-1-1/2	1'-3-7/8	-	-	-
				WWD-142;WWD-148	2'-3-7/8	1'-3-1/4	3'-0-1/4	3-3/4	-	3'-8	1'-3-7/8	-	-	-
1109200	4	010203	135	WWD-141;WWD-147	2'-9-1/4	1'-6-3/8	2'-10-5/8	3-3/4	1'-6	9-1/2	1'-3-7/8	-	-	2'-3-1/2
				WWD-142;WWD-148	2'-9-1/4	1'-7-1/4	3'-4-1/4	3-3/4	1'-6	1'-4	1'-3-7/8	-	-	2'-10
ELECTROLIFT (WIRE ROPE)														
1108124	2	010205	60	42* ; 37*	2'-1-3/4	1'-9-1/2	2'-9-1/2	3-3/4	-	3'-11-1/2	1'-3-7/8	-	-	-
				64*	2'-7-1/2	2'-2-1/2	2'-7-1/4	3-3/4	-	4'-2-1/4	1'-3-7/8	-	-	-
1108203	4	010203	135	42* ; 37*	2'-5-7/8	1'-6-7/8	3'-1-7/8	3-3/4	1'-6	2'-7-1/4	1'-3-7/8	-	-	4'-1-1/4
				64*	2'-8-7/8	1'-9-3/4	2'-11	3-3/4	1'-6	2'-7-1/4	1'-3-7/8	-	-	4'-1-1/4
P & H HEVI-LIFT - STANDARD HEADROOM (WIRE ROPE)														
1101326	1	010205	80	12BD11A	2'-11-3/8	1'-5-3/8	1'-8-3/8	3-3/4	-	1'-6	1'-11-7/8	9	9	-
1101324	1	010207	95	22BD11A	3'-0-1/8	1'-7-5/8	1'-10-5/8	3-3/4	-	1'-6	2'-1-7/8	9	9	-
1101409	3	010203	185	12BD11A;22BD11A	3'-7-1/4	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
P & H HEVI-LIFT LOW HEADROOM (WIRE ROPE)														
1101525	2	010205	60	22HD11A*;32HD11A*	1'-5-1/4	1'-9-7/8	1'-4-5/8	3-3/4	-	2'-5-1/2	1'-3-7/8	-	-	-
R & M TYPE A (WIRE ROPE)														
1106806	1	010205	90	S1-2-12A7	2'-0-1/2	1'-5-7/8	8-5/8	3-3/4	-	1'-6	1'-3-7/8	10-3/8	7-5/8	-
				S1-2-12A15										
1106807	1	010205	90	S1-2-18A7	2'-0-1/2	1'-9-1/4	9-1/4	3-3/4	-	1'-6	1'-3-7/8	9-3/4	8-1/4	-
				S1-2-18A15										
1106808	3	010203	195	S1-2-12A7	2'-8-3/8	2'-5-1/8	2'-2-3/8	3-3/4	1'-0	1'-6	1'-3-7/8	-	-	2'-6
				S1-2-12A15										
1106809	3	010203	195	S1-2-18A7	2'-8-3/8	2'-4-1/2	2'-3	3-3/4	1'-0	1'-6	1'-3-7/8	-	-	2'-6
				S1-2-18A15										
1106810	3	010203	195	S2-2-19A14	2'-9-5/8	2'-3-1/2	2'-4	3-3/4	1'-0	1'-6	1'-3-7/8	-	-	2'-6
				S2-2-19A21										
				S2-2-19A31										

2 TON CARRIERS CONTINUED ON CA23

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2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

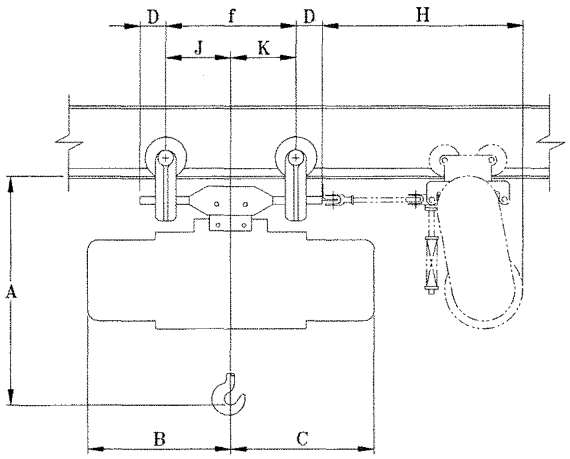


FIGURE NO. 2

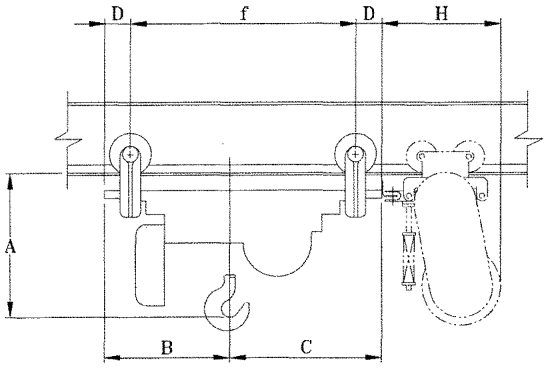


FIGURE NO. 3

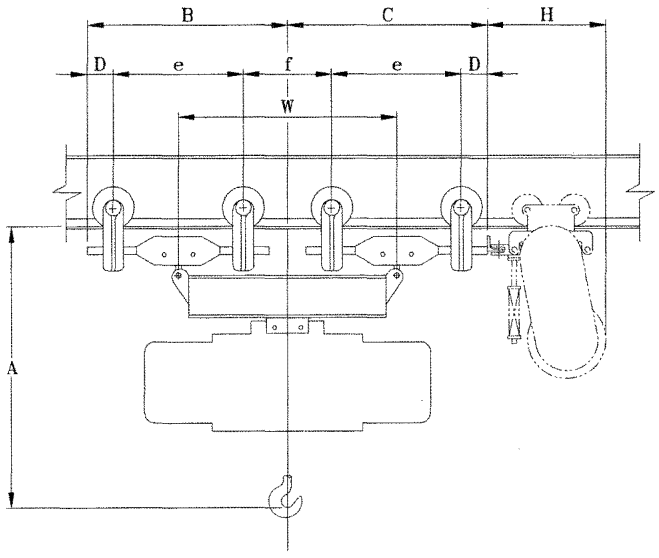
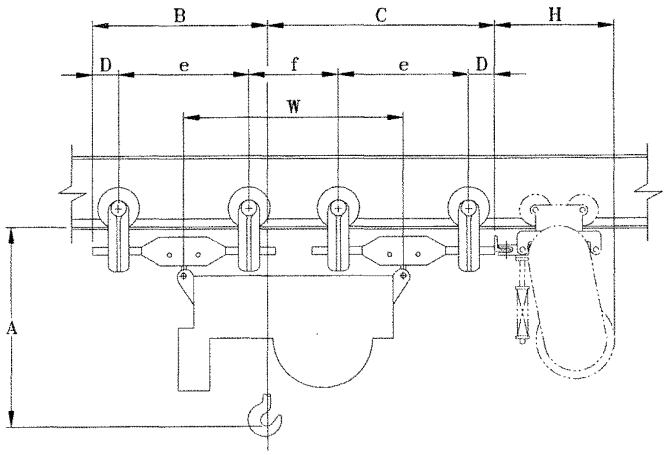


FIGURE NO. 4



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Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J	K	W
LIFT-TECH SERIES 700 (WIRE ROPE)														
1105323	1	010207	100	316266-17L 316266-24L	3'-3	1'-11	2'-4-3/4	3-3/4	-	1'-6	2'-9	9-1/2	8-7/8	-
1105403	3	010203	190	316266-17L 316266-24L	3'-10-1/8	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-5-5/8	-	-	2'-6
SHEPARD NILES - STANDARD HEADROOM (WIRE ROPE)														
1103327	1	010205	80	DA1E1H1	2'-9-3/8	1'-9-1/2	1'-9	3-3/4	-	1'-6	2'-0-7/8	8-3/4	9-1/4	-
1103328	1	010207	90	DA1E2H1	2'-9-3/8	2'-0	1'-11-1/2	3-3/4	-	1'-6	2'-0-7/8	9	9	-
1103329	1	010205	80	DC1E2H1	2'-11-3/8	2'-0	1'-11-1/2	3-3/4	-	1'-6	2'-2-7/8	9	9	-
1103407	3	010203	190	DA1E1H1	3'-5-3/4	2'-3-1/2	2'-4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				DA1E2H1	3'-5-3/4	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				DC1E2H1	3'-7-1/4	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
SHEPARD NILES - LOW HEADROOM (WIRE ROPE)														
1103523	2	010205	60	DE1E2HI*	1'-5	1'-10-1/2	1'-7-7/8	3-3/4	-	2'-7-5/8	1'-3-7/8	-	-	-
				DE1E3H1*	1'-5	1'-11-3/4	1'-8-3/8	3-3/4	-	2'-7-5/8	1'-3-7/8	-	-	-
1103603	4	010203	135	DE1E2H1*;DE1E3H1*	1'-8-3/8	2'-5-3/4	2'-6-3/4	3-3/4	1'-6	1'-2	1'-3-7/8	-	-	2'-6
WRIGHT - STANDARD HEADROOM (WIRE ROPE)														
1107292	1	010205	85	3106310	2'-7-7/8	1'-4-7/8	1'-6-7/8	3-3/4	-	1'-6	1'-9-7/8	8-7/8	9-1/8	-
1107315	1	010205	85	3225100;3226000	2'-10-1/8	2'-1-1/8	2'-3-7/8	3-3/4	-	1'-6	2'-6-7/8	8-3/4	9-1/4	-
1107403	3	010203	190	301631O	3'-3-7/8	2'-3-5/8	2'-3-7/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				32251000;3226000	3'-6	2'-3-1/2	2'-4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
WRIGHT - LOW HEADROOM (WIRE ROPE)														
1107536	2	010205	60	3235702*;3236302*	1'-9-1/4	1'-6-1/2	1'-9-5/8	**	-	2'-2-1/2	1'-3-7/8	-	-	-
YALE CABLE KING - STANDARD HEADROOM (WIRE ROPE)														
1104701	1	010207	95	BEW2-27LG14S2	3'-1-1/2	1'-10-1/2	2'-0-1/2	3-3/4	-	1'-6	2'-3-3/4	9-1/2	8-1/2	-
				BEW2-27LG22S2	3'-1-1/2	1'-10-1/2	1'-9-1/2	3-3/4	-	1'-6	2'-0-1/4	9-1/2	8-1/2	-
1104702	1	010207	95	CEW2-31LG30S2	3'-2-1/2	2'-1-1/2	1'-10-1/2	3-3/4	-	1'-6	2'-1-1/4	9-1/2	8-1/2	-
				CEW2-31LG47S2	3'-2-1/2	2'-1-1/2	2'-2-1/2	3-3/4	-	1'-6	2'-5-5/8	9-1/2	8-1/2	-
1104703	3	010203	185	BEW2-27LG14S2	3'-8-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				BEW2-27LG22S2	3'-8-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1104704	3	010203	185	CEW2-31LG30S2	3'-9-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				CEW2-31LG47S2	3'-9-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
YALE CABLE KING - LOW HEADROOM (WIRE ROPE)														
1104705	2	010207	60	BEW2-21LG14D2* (22D2*)	1'-7	1'-7	2'-4-1/8	3-3/4	-	3'-1-5/8	1'-8-3/8	-	-	-
1104706	4	010203	135	BEW2-21LG14D2* (22D2*)	2'-0	2'-0	2'-7-1/8	3-3/4	1'-6	11-5/8	1'-3-7/8	-	-	2'-5-5/8

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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

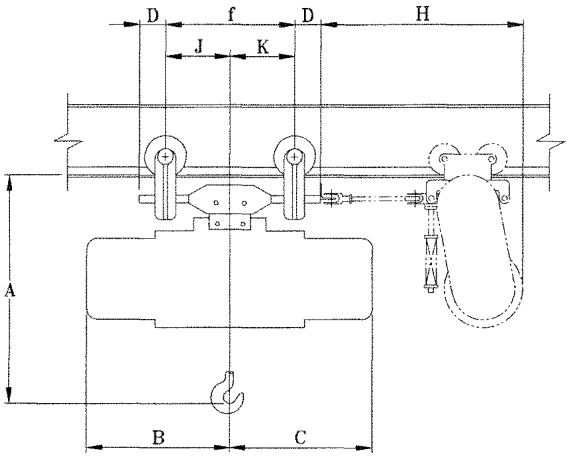


FIGURE NO. 2

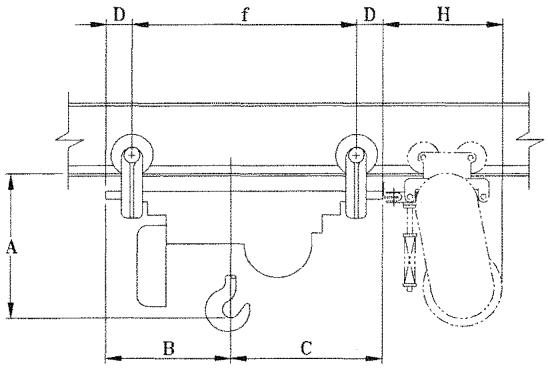


FIGURE NO. 3

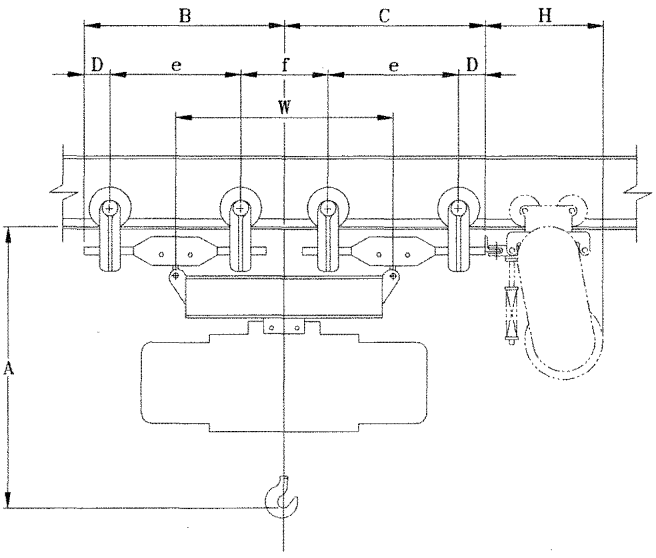
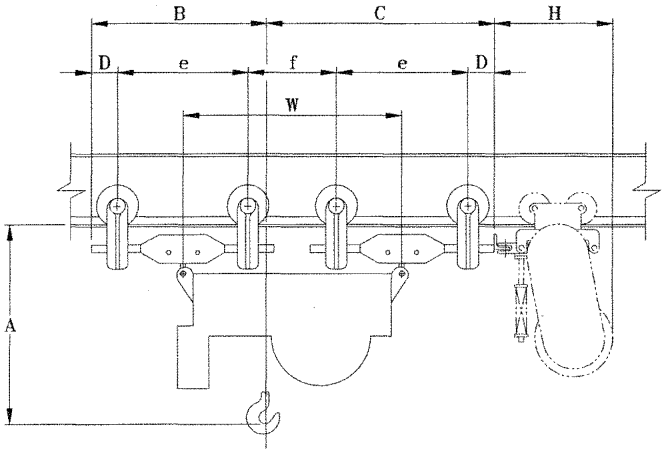


FIGURE NO. 4



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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J .	K	W
CM LODESTAR HEAVYWEIGHT (CHAIN)														
1102351	1	010207	105	7010;7014	3'-1-1/2	11-1/4	1'-4-3/8	3-3/4	-	1'-6	1'-8-3/8	7-1/2	10-1/2	-
1102411	3	010203	200	7010;7014	3'-8-1/2	2'-2-1/4	2'-5-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CM METEOR (WIRE ROPE)														
1102350	1	010209	180	5827	2'-10-5/8	1'-0-1/2	1'-5-3/4	4-1/4	-	1'-9	1'-8-3/8	8-1/4	1'-0-3/4	-
1102412	3	010205	225	5827	3'-3-1/4	2'-1-1/2	2'-6	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CHESTER WORM DRIVE (WIRE ROPE)														
1109120	2	010209	90	WWD-161;WWD-164	2'-6-1/8	1'-3-1/8	2'-7-3/8	4-1/4	-	3'-2	1'-3-7/8	-	-	-
				WWD-162;WWD-165	2'-6-1/8	1'-4	3'-1	4-1/4	-	3'-8-1/2	1'-3-7/8	-	-	-
1109210	4	010205	160	WWD-161;WWD-164	2'-9-1/4	1'-6-3/8	2'-10-5/8	3-3/4	1'-6	9-1/2	1'-3-7/7	-	-	2'-3-1/2
				WWD-162;WWD-165	2'-9-1/4	1'-7-1/4	3'-4-1/4	3-3/4	1'-6	1'-4	1'-3-7/8	-	-	2'-10
DETROIT HOIST MODEL M (WIRE ROPE)														
1106600	2	010207	60	M6L *	2'-3-7/8	1'-1-3/4	1'-0-1/2	3-3/4	-	1'-5-1/2	1'-3-7/8	-	-	-
				M6LL*	2'-3-7/8	1'-4	1'-4	3-3/4	-	2'-0-1/2	1'-3-7/8	-	-	-
				M6XL*	2'-3-7/8	1'-6-1/4	1'-5-3/4	3-3/4	-	2'-4	1'-3-7/8	-	-	-
1106700	4	010203	135	M6L*;M6LL*;M6XL	2'-9	2'-2-1/4	2'-2-1/4	3-3/4	1'-6	9	1'-3-7/8	-	-	2'-3
ELECTROLIFT (WIRE ROPE)														
1108134	2	010209	90	52*	2'-4-5/8	1'-9	2'-10-1/4	4-1/4	-	3'-10-3/4	1'-3-7/8	-	-	-
				54*	2'-4-5/8	1'-8-3/4	2'-10-1/2	4-1/4	-	3'-10-3/4	1'-3-7/8	-	-	-
				50*;58*	2'-4-5/8	1'-9-1/4	3'-2	4-1/4	-	4'-2-3/4	1'-3-7/8	-	-	-
				61*	2'-10-5/8	2'-3	2'-8	4-1/4	-	4'-2-1/2	1'-3-7/8	-	-	-
1108213	4	010205	160	52*	2'-6-3/8	1'-6-7/8	3'-1-7/8	3-3/4	1'-6	2'-7-1/4	1'-3-7/8	-	-	4'-1-1/4
				54*	2'-6-3/8	1'-6-5/8	3'-2-1/8	3-3/4	1'-6	2'-7-1/4	1'-3-7/8	-	-	4'-1-1/4
				50*;58*	2'-6-3/8	1'-7-1/8	3'-5-5/8	3-3/4	1'-6	2'-11-1/4	1'-3-7/8	-	-	4'-5-1/4
				61*	2'-9-7/8	1'-9-3/4	2'-11	3-3/4	1'-6	2'-7-1/4	1'-3-7/8	-	-	4'-1-1/4
P & H `BETA' (WIRE ROPE)														
1101710	3	010205	225	HA2C-N1;HC2C-N1	3'-0-7/8	2'-1-3/4	2'-5-7/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1101711	2	010209	90	GB2C-T1	1'-4-3/4	1'-5-1/4	1'-10-3/4	4-1/4	-	2'-7-1/2	1'-3-7/8	-	-	-
P & H HEVI-LIFT - STANDARD HEADROOM (WIRE ROPE)														
1101330	1	010209	170	22CF21A	3'-1	1'-8-3/4	1'-9-5/8	4-1/4	-	1'-9	1'-11-7/8	11-1/2	9-1/2	-
1101334	1	010209	170	13BF11A	3'-7-1/4	1'-7	1'-9-3/8	4-1/4	-	1'-9	1'-10-7/8	10-1/2	10-1/2	-
1101335	1	010209	170	23BF11A	3'-7-1/4	1'-10-1/2	2'-0-7/8	4-1/4	-	1'-9	2'-1-7/8	10-1/2	10-1/2	-
1101416	3	010205	215	22CF21A	3'-5-3/4	2'-4-3/4	2'-2-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6

3 TON CARRIERS CONTINUED ON CA27

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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

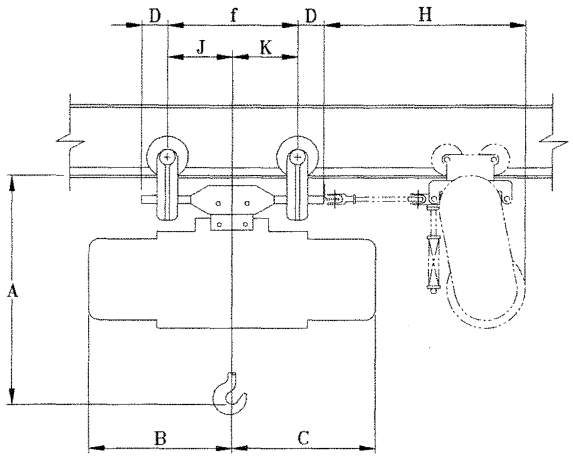


FIGURE NO. 2

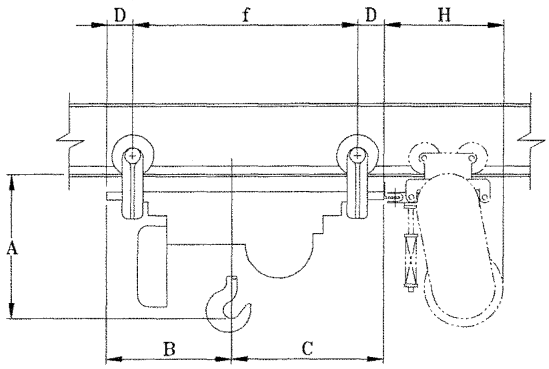


FIGURE NO. 3

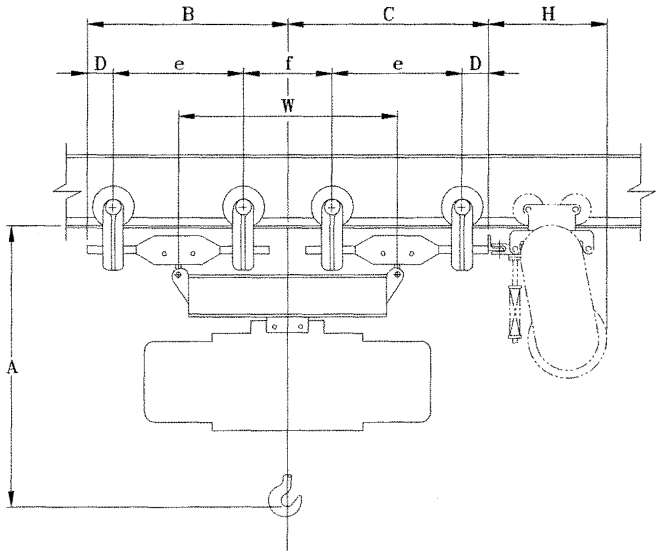
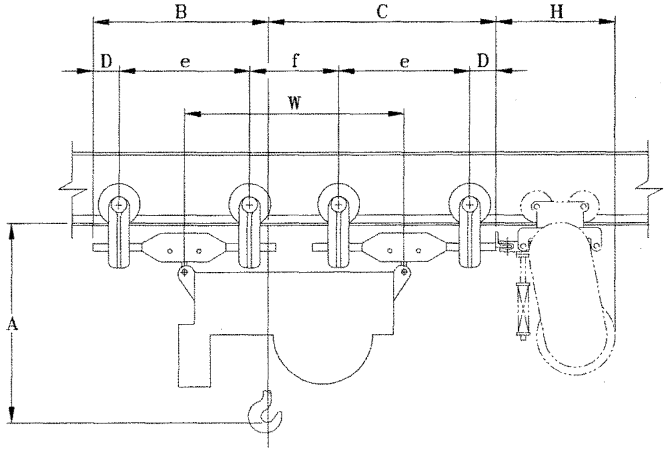


FIGURE NO. 4



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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J	K	W
P & H HEVI-LIFT - LOW HEADROOM (WIRE ROPE)														
1101533	2	010207	60	23HF11A*;33HF11A*	1'-9-3/8	2'-0-1/2	1'-5	3-3/4	-	2'-8-1/2	1'-3-7/8	-	-	-
				32JF11A*;42JF11A*	1'-8-1/4	1'-6-1/2	1'-9	3-3/4	-	2'-8	1'-3-7/8	-	-	-
R & M TYPE A (WIRE ROPE)														
1106811	1	010207	105	S2-3-19A14;S2-3-19A21	2'-2-1/2	1'-10-1/4	1'-8-1/4	3-3/4	-	1'-6	1'-10-1/4	8-3/4	9-1/4	-
1106812	1	010207	105	S2-3-25A14;S2-3-25A21	2'-3-1/2	2'-3-1/4	1'-8-3/4	3-3/4	-	1'-6	1'-10-1/4	8-1/4	9-3/4	-
1106813	3	010203	200	S2-3-19A14;S2-3-19A21	2'-9-5/8	2'-3-1/8	2'-4-1/2	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1106814	3	010203	200	S2-3-25A14;S2-3-25A21	2'-10-5/8	2'-3	2'-4-5/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
LIFT-TECH SERIES 700 (WIRE ROPE)														
1105336	1	010209	175	316267-40L	3'-7-1/2	1'-9-1/4	2'-6-1/2	4-1/4	-	1'-9	2'-6-7/8	9-1/4	11-3/4	-
				316267-49L	3'-5-1/2	1'-11	2'-4-3/4	4-1/4	-	1'-9	2'-6-7/8	11	10	-
1105415	3	010205	220	316267-40L	4'-0-1/4	2'-3-1/8	2'-4-3/8	3-3/4	1'-6	1'-0	1'-5-5/8	-	-	2'-6
				316267-49L	3'-10-1/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-5-5/8	-	-	2'-6
SHEPARD NILES - STANDARD HEADROOM (WIRE ROPE)														
1103333	1	010207	100	GC1G2J1	3'-6-1/2	2'-6-3/4	2'-5-1/2	3-3/4	-	1'-6	2'-8-7/8	9	9	-
				KC2G2K1	3'-6-1/2	2'-8-1/2	2'-5-1/2	3-3/4	-	1'-6	2'-8-7/8	9	9	-
1103334	1	010209	175	GA1G1J1	4'-1-7/8	2'-5-1/4	1'-11	4-1/4	-	1'-9	2'-2-7/8	1'-1	8	-
				KA2G1K1	4'-1-7/8	2'-7	1'-11	4-1/4	-	1'-9	2'-2-7/8	1'-1	8	-
1103413	3	010203	195	GC1G2J1	4'-1-5/8	2'-6-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
				KC2G2K1	4'-1-5/8	2'-8-1/2	2'-3-3/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
1103414	3	010205	225	GA1G1J1	4'-6-5/8	2'-6-1/4	2'-1-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				KA2G1K1	4'-6-5/8	2'-7	2'-1-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
SHEPARD NILES - LOW HEADROOM (WIRE ROPE)														
1103533	2	010207	60	GE1G2J1*	1'-11-5/8	2'-10-3/4	1'-10-1/4	3-3/4	-	3'-4	1'-3-7/8	-	-	-
1103613	4	010203	135	GE1G3J1*	2'-1-7/8	2'-10-3/4	2'-6-1/4	3-3/4	1'-6	1'-9	1'-3-7/8	-	-	3'-3
WRIGHT - STANDARD HEADROOM (WIRE ROPE)														
1107324	1	010209	175	3227950;3228850	3'-0-1/8	2'-2-1/8	2'-6-7/8	4-1/4	-	1'-9	2'-6-7/8	9-1/4	11-3/4	-
1107325	1	010209	175	3330750;3330900	3'-10-1/4	1'-11-7/8	2'-4-5/8	4-1/4	-	1'-9	2'-5-7/8	10	11	-
1107413	3	010205	220	3227950;3228850	3'-4-7/8	2'-2-1/2	2'-5	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
				3330750;3330900	4'-3	2'-3-1/4	2'-4-1/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
WRIGHT - LOW HEADROOM (WIRE ROPE)														
1107542	2	010207	60	3237502*	2'-0	1'-5-3/4	1'-10-1/4	**	-	2'-2-3/8	1'-3-7/8	-	-	-
1107543	2	010207	60	3337252*	2'-2	1'-5-5/8	1'-10-3/4	**	-	2'-2-3/4	1'-3-7/8	-	-	-

3 TON CARRIERS CONTINUED ON CA29

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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

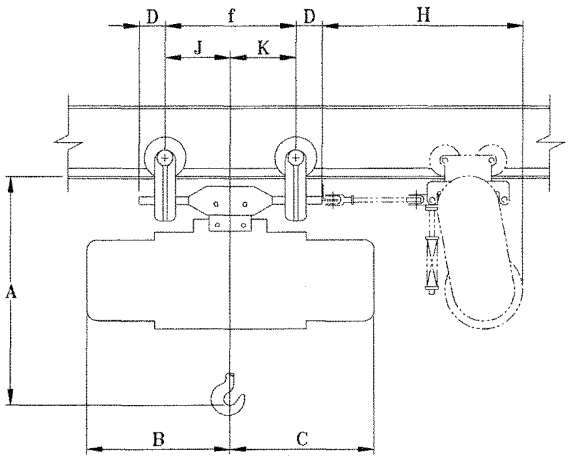


FIGURE NO. 2

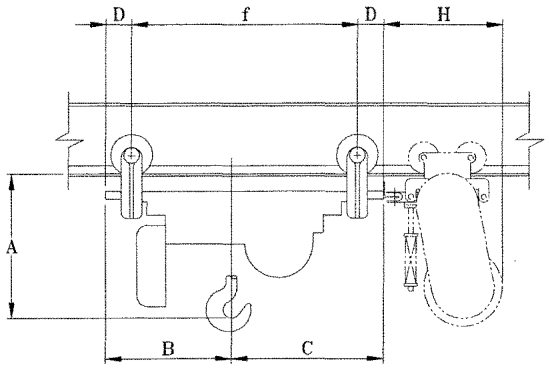


FIGURE NO. 3

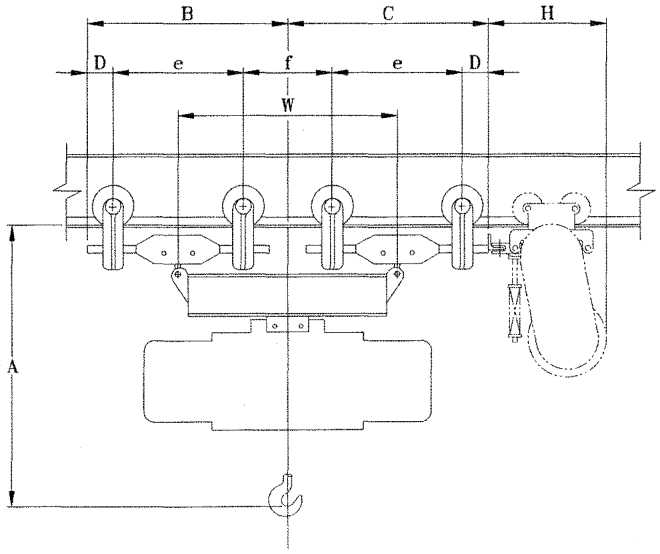
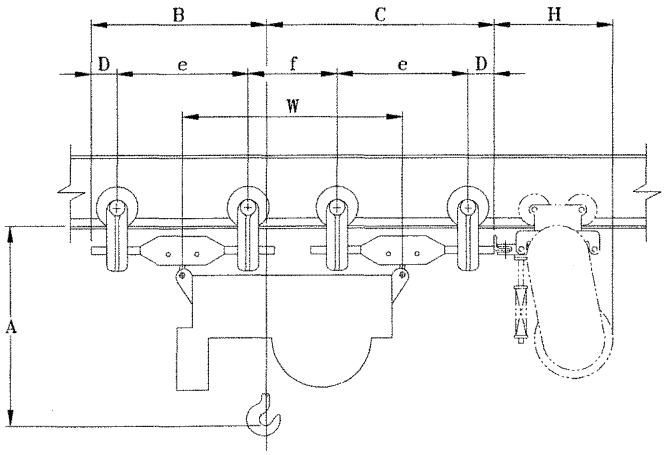


FIGURE NO. 4



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3 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J	K	W
YALE KEL (CHAIN)														
1104013	1	010207	95	KEL3-10L10S3	2'-3-7/8	1'-3-7/8	1'-0-1/2	3-3/4	-	1'-6	1'-3-7/8	9	9	-
				KEL3-10L14S3	2'-3-7/8	1'-7-1/4	1'-0-1/2	3-3/4	-	1'-6	1'-3-7/8	9	9	-
1104014	3	010203	185	KEL3-10L10S3	2'-11	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				KEL3-10L14S3										
YALE CABLE KING - STANDARD HEADROOM (WIRE ROPE)														
1104707	1	010209	175	BEW3-22LG11S4	3'-3-7/8	2'-3-1/2	2'-1-1/2	4-1/4	-	1'-9	2'-2-1/4	11	10	-
				BEW3-32LG11S4	3'-3-7/8	2'-11	2'-2	4-1/4	-	1'-9	2'-2-1/4	10-1/2	10-1/2	-
1104708	1	010209	175	BEW3-22LG16S2	3'-8-7/8	2'-1-1/2	2'-2	4-1/4	-	1'-9	2'-2-3/4	11	10	-
				CEWS-22LG30S2	3'-9-7/8	2'-1-1/2	2'-2-1/2	4-1/4	-	1'-9	2'-3-1/4	11	10	-
1104709	3	010205	220	BEW3-22LG11S4	3'-8-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				BEW3-32LG11S4	3'-8-5/8	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1104710	3	010205	220	BEW3-22LG16S2	4'-1-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				CEW3-22LG30S2	4'-2-5/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
YALE CABLE KING - LOW HEADROOM (WIRE ROPE)														
1104711	2	010209	90	BEW3X17LG16D2* (24D2*)	2'-0	1'-7-1/2	2'-4-5/8	4-1/4	-	3'-1-5/8	1'-8-3/8	-	-	-
1104712	4	010205	160	BEW3X17LG16D2* (24D2*)	2'-0	2'-0	2'-7-1/8	3-3/4	1'-6	11-5/8	1'-3-7/8	-	-	2'-5-5/8

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5 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

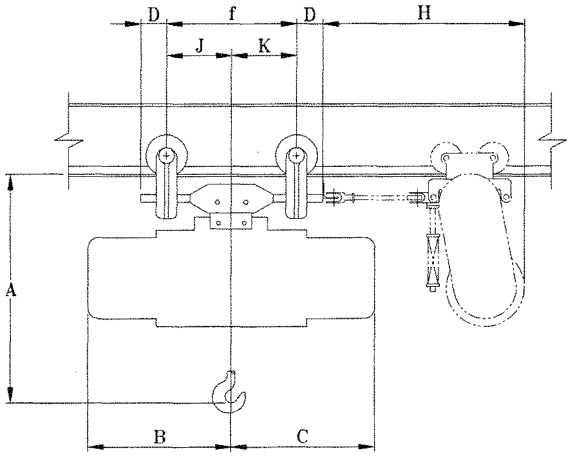


FIGURE NO. 2

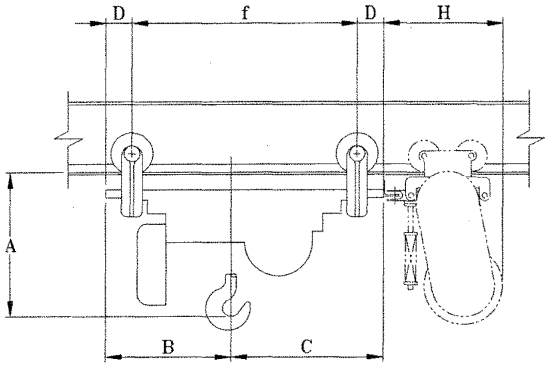


FIGURE NO. 3

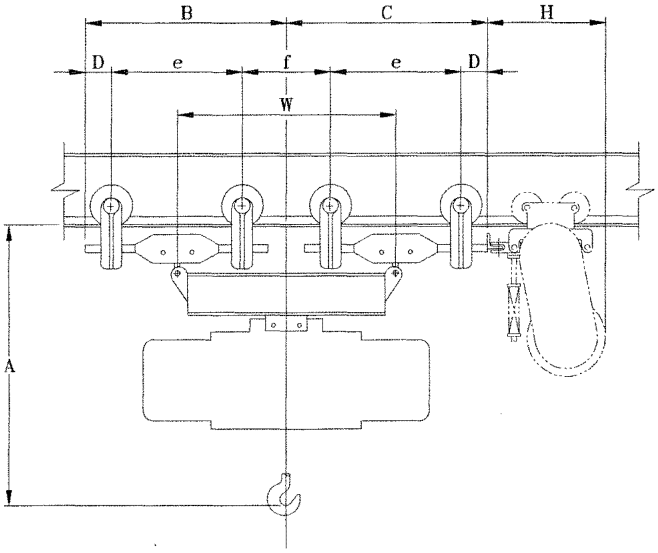
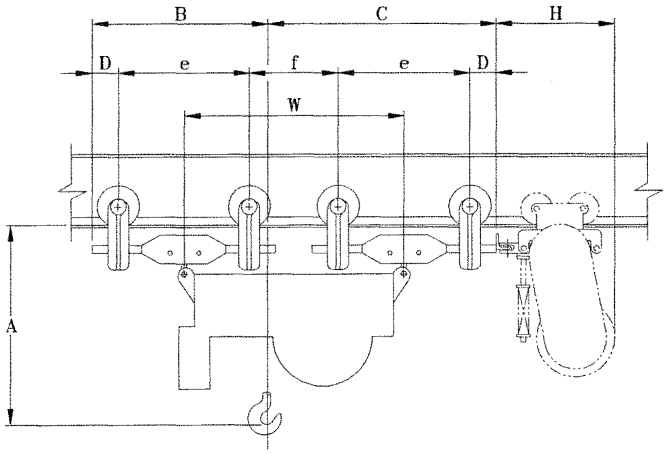


FIGURE NO. 4



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5 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J .	K	W
CM LODESTAR HEAVYWEIGHT (CHAIN)														
1102361	1	010209	190	7030	4'-9-1/4	1'-3-3/8	1'-2-1/4	4-1/4	-	1'-9	1'-3-7/8	11-1/8	9-7/8	-
				7018	3'-7-3/4	1'-3-3/8	1'-2-1/4	4-1/4	-	1'-9	1'-3-7/8	11-1/8	9-7/8	-
1102421	3	010205	235	7030	5'-2	2'-4-3/8	2'-3-1/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				7018	4'-0-1/2	2'-4-3/8	2'-3-1/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CM METEOR (WIRE ROPE)														
1102362	1	010209	190	5830	3'-5-1/8	1'-0-3/4	1'-5-1/2	4-1/4	-	1'-9	1'-8-3/8	8-1/2	1'-0-1/2	-
1102420	3	010207	265	5830	3'-10-3/8	2'-1-3/4	2'-5-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
CHESTER WORM DRIVE (WIRE ROPE)														
1109130	2	010209	90	WWD-1106;WWD-1109	3'-0-1/8	2'-2-1/2	2'-10	4-1/4	-	4'-4	1'-3-7/8	-	-	-
1109131	2	010209	90	WWD-1107;WWD-1110	3'-0-1/8	2'-7	3'-2-1/2	4-1/4	-	5'-1	1'-3-7/8	-	-	-
1109220	4	010207	190	WWD-1106;WWD-1109	3'-3-3/4	2'-5-3/4	3'-1-1/4	3-3/4	1'-6	1'-11-1/2	1'-3-7/8	-	-	3'-5-1/2
1109221	4	010207	190	WWD-1107;WWD-1110	3'-3-3/4	2'-10-1/4	3'-5-3/4	3-3/4	1'-6	2'-8-1/2	1'-3-7/8	-	-	4'-2-1/2
DETROIT HOIST MODEL M (WIRE ROPE)														
1106610	2	010209	90	M10LL *	2'-7-5/8	1'-11-1/2	1'-11-1/2	4-1/4	-	3'-2-1/2	1'-3-7/8	-	-	-
				M10XL *	2'-7-5/8	2'-2	2'-2	4-1/4	-	3'-7-1/2	1'-3-7/8	-	-	-
				M10XLL*	2'-7-5/8	2'-6	2'-6	4-1/4	-	4'-3-1/2	1'-3-7/8	-	-	-
1106710	4	010205	160	M10LL*;M10XL*	3'-0-1/2	2'-2-1/4	2'-2-1/4	3-3/4	1'-6	9	1'-3-7/8	-	-	2'-3
				M10XLL*	3'-0-1/2	2'-4-1/4	2'-4-1/4	3-3/4	1'-6	9	1'-3-7/8	-	-	2'-3
ELECTROLIFT (WIRE ROPE)														
1108235	4	010209	365	701*	3'-11-1/4	2'-4-3/4	3'-5-1/4	4-1/4	1'-9	3'-4-1/4	1'-3-7/8	- .	-	5'-1-1/2
				702*	3'-11-1/4	2'-6-1/4	3'-7-3/4	4-1/4	1'-9	3'-8-1/2	1'-3-7/8	-	-	5'-5-1/2
P & H HEVI-LIFT - STANDARD HEADROOM (WIRE ROPE)														
1101430	3	010207	245	23CJ11A;23CJ21A	3'-11-3/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1101434	3	010207	245	14BJ11A;24BJ11A	4'-7-1/8	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
P & H HEVI-LIFT - LOW HEADROOM (WIRE ROPE)														
1101540	2	010209	90	24HJ11A*;34HJ11A*	2'-1-3/4	2'-4-1/2	1'-8-7/8	4-1/4	-	3'-4-3/8	1'-3-7/8	-	-	-
				33JJ11A*;43JJ11A*	2'-0-1/2	1'-11-1/2	2'-2	4-1/4	-	3'-5	1'-3-7/8	-	-	-
1101634	4	010207	190	24HJ11A*;34HJ11A*	2'-4-1/2	2'-8-3/4	2'-2	3-3/4	1'-6	1'-3-1/4	1'-3-7/8	-	-	2'-9-1/4

5 TON CARRIERS CONTINUED ON CA33

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5 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 1

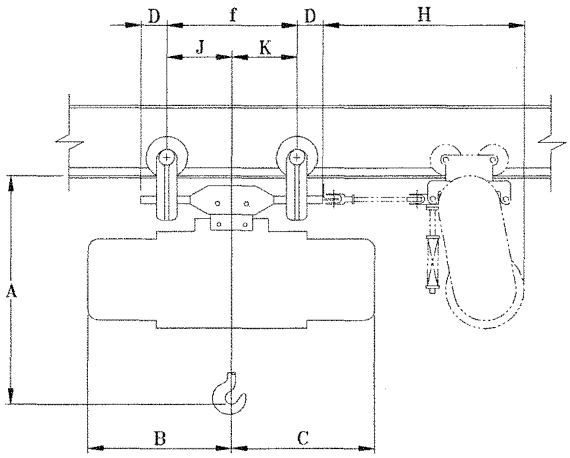


FIGURE NO. 2

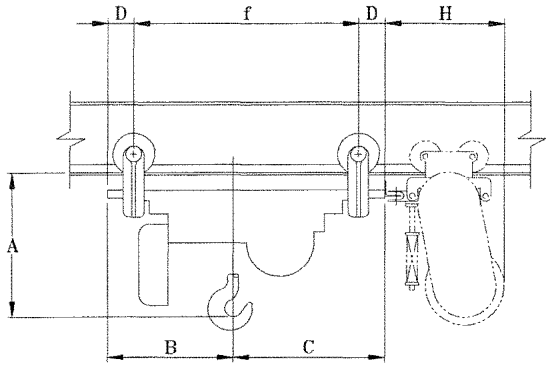


FIGURE NO. 3

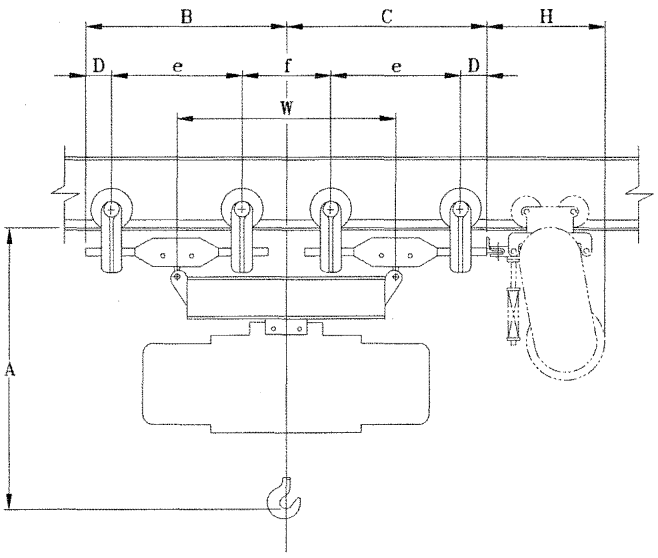
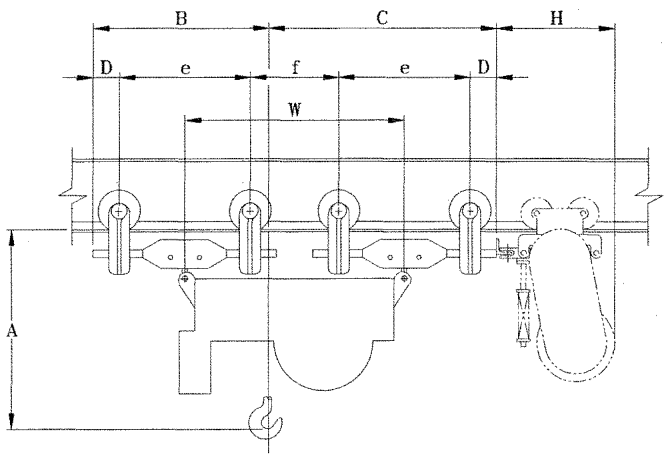


FIGURE NO. 4



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5 TON SINGLE GIRDER HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	J	K	W
R & M TYPE A (WIRE ROPE)														
1106815	3	010205	230	X2-5-18A9;X2-5-18A14	2'-5-3/8	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1106816	3	010205	230	S3-5-18A15; 18A22; 18A30	3'-2-7/8	2'-3-7/8	2'-3-5/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1106817	3	010205	230	S3-5-25A15; 25A22; 25A30	3'-2-7/8	2'-3-3/8	2'-4-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
LIFT-TECH SERIES 700 & 800 (WIRE ROPE)														
1105432	3	010207	255	31269-8L	4'-1	2'-4-7/8	2'-2-5/8	3-3/4	1'-6	1'-0	1'-5-5/8	-	-	2'-6
				316269-24L	4'-1	2'-3-1/8	2'-4-3/8	3-3/4	1'-6	1'-0	1'-5-5/8	-	-	2'-6
1105433	3	010207	255	115736-2L	3'-7-1/8	2'-4-7/8	2'-2-5/8	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
SHEPARD NILES - STANDARD HEADROOM (WIRE ROPE)														
1103350	1	010209	185	GC1L2K1	3'-9-1/4	2'-6-3/4	2'-5-1/2	4-1/4	-	1'-9	2'-6-7/8	10-1/2	10-1/2	-
				KC1L2L1	3'-9-1/4	2'-8-1/2	2'-5-1/2	4-1/4	-	1'-9	2'-6-7/8	10-1/2	10-1/2	-
1103435	3	010205	230	GC1L2K1	4'-2	2'-6-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
				KC1L2L1	4'-2	2'-8-1/2	2'-3-3/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
1103436	3	010207	255	GA1L1K1	4'-7-1/2	2'-6-1/4	2'-1-1/4	3-3/4	1'-6	1'-0	1'-3-7/9	-	-	2'-6
1103437	3	010207	255	GA1L2K1	4'-7-1/2	2'-7-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
SHEPARD NILES - LOW HEADROOM (WIRE ROPE)														
1103540	2	010209	90	GE1L2K1*;GE1L3K1*	2'-1-1/8	2'-10-3/4	1'-10-3/4	4-1/4	-	3'-4	1'-3-7/8	-	-	-
1103633	4	010205	160	GE1L2K1*;GE1L3K1*	2'-1-7/8	2'-10-3/4	2'-6-1/4	3-3/4	1'-6	1'-9	1'-3-7/8	-	-	3'-3
WRIGHT - STANDARD HEADROOM (WIRE ROPE)														
1107435	3	010207	250	3333200	3'-9-1/2	2'-3-3/8	2'-4-1/8	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
				3434050;3434200	4'-6-1/8	2'-3-1/4	2'-4-1/4	3-3/4	1'-6	1'-0	1'-8-3/8	-	-	2'-6
WRIGHT - LOW HEADROOM (WIRE ROPE)														
1107638	4	010207	190	3340252*	2'-6-1/4	2'-0-1/4	2'-3-3/4	3-3/4	1'-6	8-1/2	1'-3-7/8	-	-	2'-2-1/2
				3443952*	2'-8-1/2	2'-1-3/4	2'-2-1/4	3-3/4	1'-6	8-1/2	1'-3-7/8	-	-	2'-2-1/2
YALE CABLE KING - STANDARD HEADROOM (WIRE ROPE)														
1104713	3	010207	250	BEW5X19LG12S4; (15S4)	3'-9-3/8	2'-4-1/4	2'-3-1/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
				BEW5X26LG12S4; (15S4)	3'-9-5/8	2'-3-3/4	2'-3-3/4	3-3/4	1'-6	1'-0	1'-3-7/8	-	-	2'-6
1104714	3	010207	250	CEW5X19LG28S2	4'-6-3/8	2'-5-1/4	2'-2-1/4	3-3/4	1'-6	1'-0	1'-7-1/4	-	-	2'-6
YALE CABLE KING - LOW HEADROOM (WIRE ROPE)														
1104715	4	010207	190	CEW5X16LG19D2*; (28D2*)	2'-6	2'-0	2'-10-1/2	3-3/4	1'-6	1'-2	1'-3-7/8	-	-	2'-8
1104716	4	010207	190	BEW5X20LG12D4*; (15D4*)	2'-11	2'-0	2'-7-1/8	3-3/4	1'-6	11-5/8	1'-3-7/8	-	-	2'-5-5/8

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7 1/2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 3

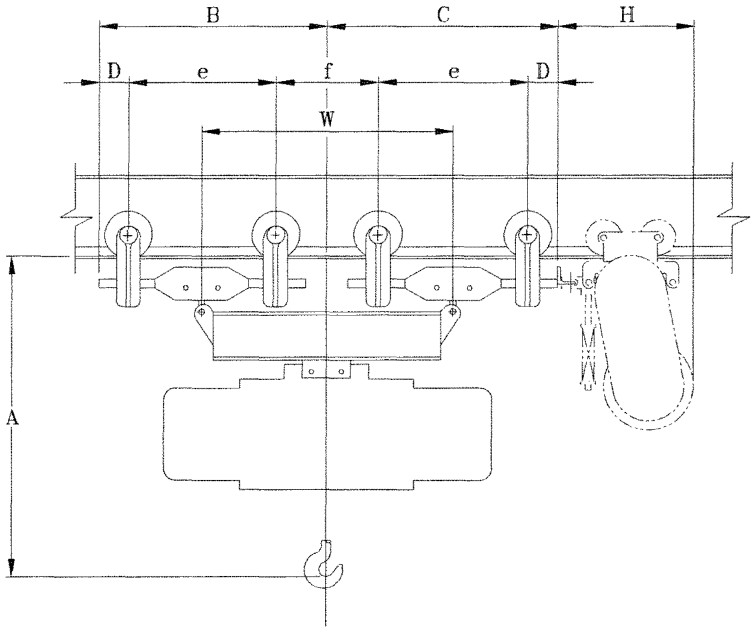
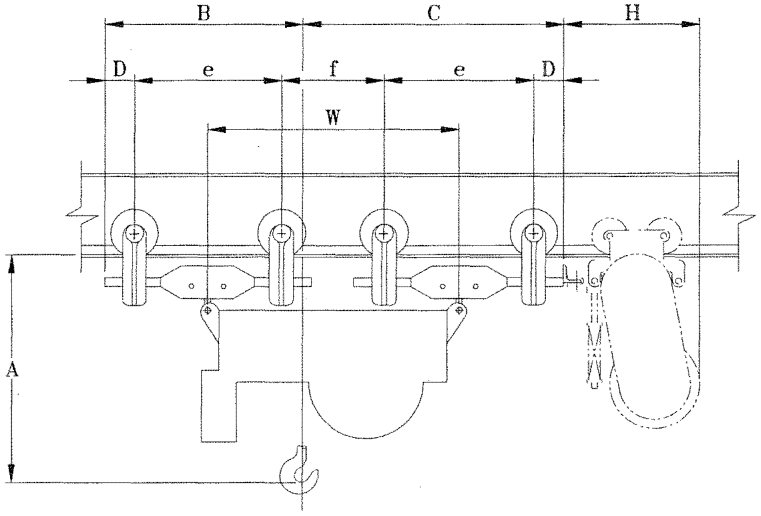


FIGURE NO. 4



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7 1/2 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	W
CHESTER WORM DRIVE (WIRE ROPE)												
1109230	4	010209	365	WWD-1150	3'-6-1/4	2'-7-3/4	3'-3-1/4	4-1/4	1'-9	1'-8-1/2	1'-3-7/8	3'-5-1/2
				WWD-1151	3'-6-1/4	3'-0-1/4	3'-7-3/4	4-1/4	1'-9	2'-5-1/2	1'-3-7/8	4'-2-1/2
				WWD-1152	3'-6-1/4	3'-4-1/4	3'-11-3/4	4-1/4	1'-9	3'-1-1/2	1'-3-7/8	4'-10-1/2
DETROIT HOIST MODEL M (WIRE ROPE)												
1106720	4	010209	365	M15XL *	3'-9-3/4	2'-11-3/4	2'-10-3/4	4-1/4	1'-9	1'-8	1'-3-7/8	3'-5
				M15XLL*	3'-9-3/4	2'-7-1/8	3'-3-3/8	4-1/4	1'-9	1'-8	1'-3-7/8	3'-5
P & H HEVI-LIFT - STANDARD HEADROOM (WIRE ROPE)												
1101450	3	010209	485	24CL21A	4'-10-3/4	2'-9-1/4	2'-8-1/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
				15BL14A	5'-6-1/4	2'-8-3/4	2'-8-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
P & H HEVI-LIFT - LOW HEADROOM (WIRE ROPE)												
1101643	4	010209	365	25HL14A*;35HL14A*	3'-0-7/8	3'-4-1/2	2'-7-1/4	4-1/4	1'-9	1'-9-1/4	1'-3-7/8	3'-6-1/4
1101644	4	010209	385	34HL11A*;44HL11A*	3'-5-1/4	2'-7-3/4	3'-4-1/4	4-1/4	1'-9	1'-9-1/2	1'-3-7/8	3'-6-1/2
R & M TYPE A (WIREROPE)												
1106818	3	010209	365	S3-7-1/2-18A10 18A15; 18A20	3'-9-1/4	2'-6-3/4	2'-10-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
LIFT-TECH SERIES 700 - (WIREROPE)												
1105451	3	010209	485	326794-1L	4'-6-3/8	2'-8-`/8	2'-9-3/8	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
SHEPARD NILES - STANDARD HEADROOM (WIRE ROPE)												
1103452	3	010209	495	GB1H2K1;KB1H2K1 KB2H2L1	5'-1-3/4	2'-8-3/4	2'-8-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
SHEPARD NILES - LOW HEADROOM (WIRE ROPE)												
1103652	4	010209	365	GF1H3K1*;GF1H4K1* KF1H3K1*;KF1H4K1*	3'-4	4'-2-1/2	2'-6-3/4	4-1/4	1'-9	1'-10	1'-3-7/8	3'-7
WRIGHT - STANDARD HEADROOM (WIRE ROPE)												
1107451	3	010209	480	3436300	4'-9-1/4	2'-8-1/4	2'-9-1/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
1107452	3	010209	485	3501750;3501900	5'-4-7/8	2'-8-3/8	2'-9-1/8	4-1/4	1'-9	1'-3	1'-8-3/8	3'-0
WRIGHT - LOW HEADROOM (WIRE ROPE)												
1107642	4	010209	365	3446952*	3'-2-3/4	2'-3-1/2	2'-9-1/2	4-1/4	1'-9	10-1/2	1'-3-7/8	2'-7-1/2
				3506152*	3'-4-5/8	2'-4-5/8	2'-8-1/2	4-1/4	1'-9	10-5/8	1'-3-7/8	2'-7-5/8
YALE CABLE KING - STANDARD HEADROOM (WIRE ROPE)												
1104717	3	010209	485	CEW7-1/2X18LG8S4 (14S4)	4'-3-1/4	2'-7-3/4	2'-9-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
YALE CABLE KING - LOW HEADROOM (WIRE ROPE)												
1104720	4	010209	365	CEW7-1/2X19LG8D4* (14D4*)	3'-2	2'-4-3/4	3'-0-7/8	4-1/4	1'-9	1'-3-1/8	1'-3-7/8	3'-0-1/8

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10 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

FIGURE NO. 3

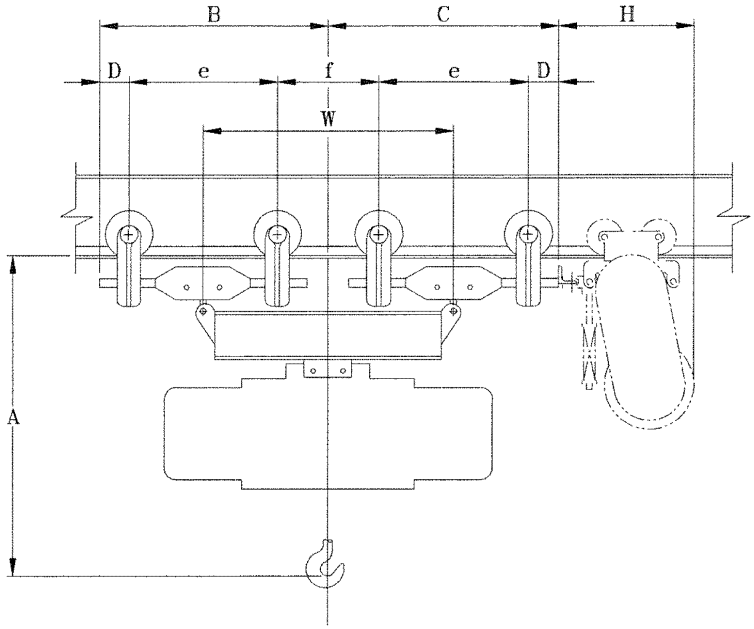
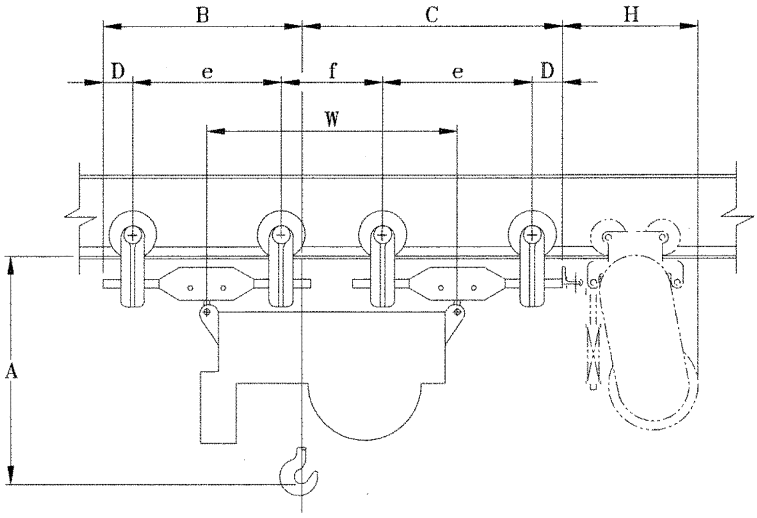


FIGURE NO. 4



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10 TON SINGLE GIRDER ELECTRIC HOIST CARRIERS

Carrier Number	Fig. No.	Carrier Head	Weight (lbs.)	Hoist Model Number	A	B	C	D	e	f	H	W
CHESTER WORM DRIVE (WIRE ROPE)												
1109240	4	010209	365	WWD-1200;WWD-1203	3'-7-1/4	3'-3-1/4	3'-10-3/4	4-1/4	1'-9	2'-11-1/2	1'-3-7/8	4'-8-1/2
				WWD-1201;WWD-1204	3'-7-1/4	3'-10-3/4	4'-6-3/4	4-1/4	1'-9	4'-3	1'-3-7/8	6'-0
DETROIT HOIST DYNEX (WIRE ROPE)												
1106730	4	010209	365	DY20L*	3'-7-3/4	2'-8-3/4	2'-8-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
P & H HEVI-LIFT - STANDARD HEADROOM (WIRE ROPE)												
1101460	3	010209	495	24CN11A	4'-10	2'-9-1/4	2'-8-1/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
1101461	3	010209	495	25CN24A	5'-2	2'-9-3/8	2'-8-1/8	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
P & H HEVI-LIFT LOW HEADROOM (WIRE ROPE)												
1101650	3	010211	560	34KN11A*;44KN11A;*54KN11A*	3'-4	2'-7-1/4	3'-4-3/4	4-1/4	1'-9	1'-9-1/2	1'-3-7/8	3'-6-1/2
R & M TYPE A (WIRE ROPE)												
1106819	3	010209	510	X3-10-18A7; 18A11; 18A14	4'-5	2'-6	2'-10-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
LIFT-TECH SERIES 700 (WIRE ROPE)												
1105461	3	010209	545	327372-1L	4'-8-5/8	2'-8-3/4	2'-8-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
1105460	3	010211	725	316308-11L	5'-6-3/8	2'-10-3/8	2'-7-1/8	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
SHEPARD NILES - STANDARD HEADROOM (WIRE ROPE)												
1103462	3	010209	495	GB1L2K1;KB1L2L1	5'-1-3/4	2'-8-3/4	2'-8-3/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
SHEPARD NILES - LOW HEADROOM (WIRE ROPE)												
1103660	4	010211	530	GF1L3K1*;GF1L4K1*KF1L3L1* KF1L4L1*	3'-5	4'-2-1/2	2'-6-3/4	4-1/4	1'-9	1'-10	1'-3-7/8	3'-7
WRIGHT - STANDARD HEADROOM (WIRE ROPE)												
1107462	3	010209	480	3437650;3437800;3437950	4'-9-1/4	2'-8-1/4	2'-9-1/4	4-1/4	1'-9	1'-3	1'-3-7/8	3'-0
WRIGHT - LOW HEADROOM (WIRE ROPE)												
1107652	4	010209	365	3507352*	3'-4-5/8	2'-4-5/8	2'-8-1/2	4-1/4	1'-9	10-5/8	1'-3-7/8	2'-7-5/8
YALE CABLE KING - STANDARD HEADROOM (WIRE ROPE)												
1104721	3	010209	545	CEW10X16LG14S4	5'-0	2'-7-1/4	2'-10-1/4	4-1/4	1'-9	1'-3	1'-6-7/8	3'-0
1104722	3	010211	725	CEW10X16LG8S4	5'-1	2'-7-1/4	2'-10-1/4	4-1/4	1'-9	1'-3	1'-6-7/8	3'-0
YALE CABLE KING - LOW HEADROOM (WIRE ROPE)												
1104723	4	010211	530	CEW10X20LG8D4*; (14D4*)	3'-8-1/2	2'-4-3/4	3'-0-7/8	4-1/4	1'-9	1'-3-1/8	1'-3-7/8	3'-0-1/8

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SINGLE GIRDER TWIN HOOK ELECTRIC HOIST CARRIERS

FIGURE NO. 1

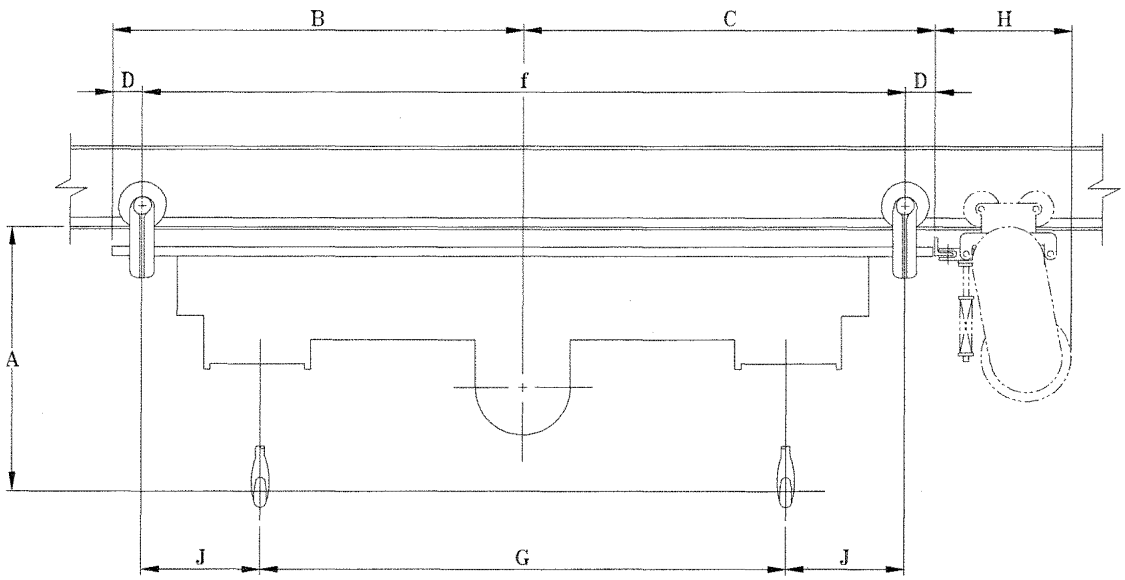
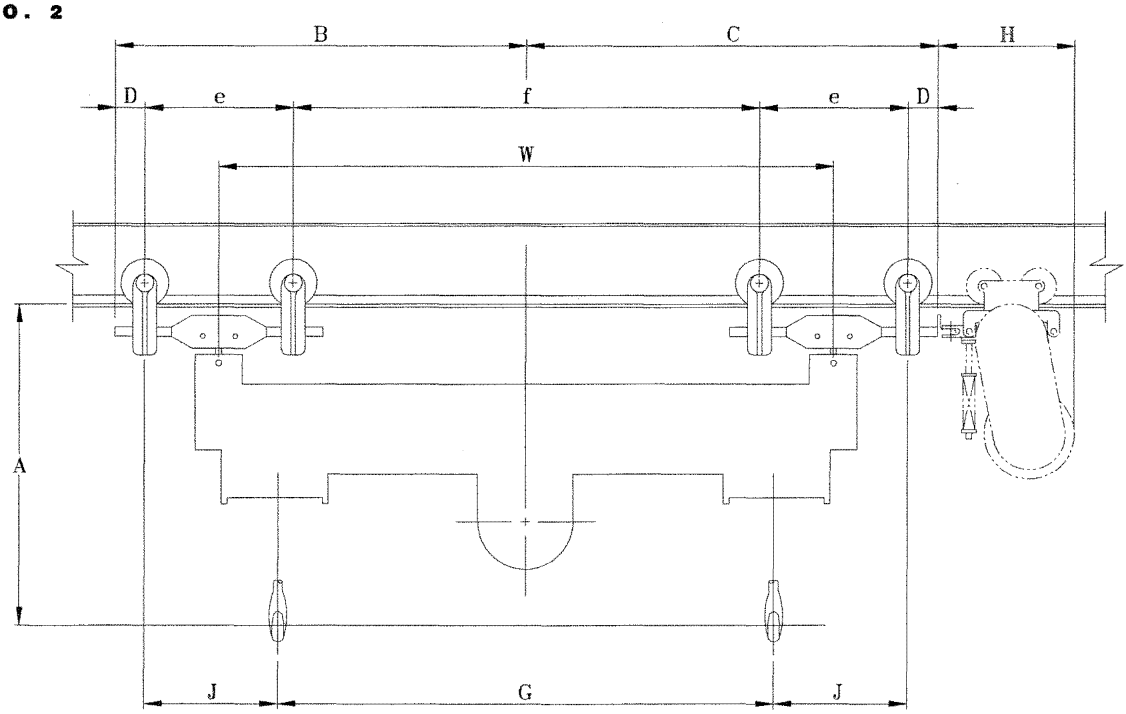


FIGURE NO. 2



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SINGLE GIRDER TWIN HOOK ELECTRIC HOIST CARRIERS

Rated Load (Tons)	Carrier Number	Fig. No.	Carrier Head	WGT. (lbs.)	Hoist Model Number	A	B or C	D	e	f	G	H	J	W
CHESTER WORM DRIVE (WIRE ROPE)														
1	1109300	1	010203	45	WWD-320;WWD-326	1'-10	2'-2-3/4	3-3/4	-	3'-10	2'-0-3/4	1'-3-7/8	10-5/8	-
					WWD-321;WWD-327	1'-10	2'-9-1/4	3-3/4	-	4'-11	2'-10-1/2	1'-3-7/8	1'-0-1/4	-
2	1109310	1	010205	60	WWD-340;WWD-343	2'-2	2'-3-3/4	3-3/4	-	4'-0	2'-2-3/4	1'-3-7/8	10-5/8	-
					WWD-341;WWD-344	2'-2	2'-10-1/4	3-3/4	-	5'-1	3'-0-1/2	1'-3-7/8	1'-0-1/4	-
	1109400	2	010203	135	WWD-340;WWD-343	2'-7-1/4	2'-7-3/4	3-3/4	1'-6	1'-8	2'-2-3/4	1'-3-7/8	1'-2-5/8	3'-2
					WWD-341;WWD-344	2'-7-1/4	3'-2-1/4	3-3/4	1'-6	2'-9	3'-0-1/2	1'-3-7/8	1'-4-1/4	4'-3
3	1109320	1	010207	60	WWD-360	2'-3-7/8	2'-3-3/4	3-3/4	-	4'-0	2'-2-3/4	1'-3-7/8	10-5/8	-
					WWD-361	2'-3-7/8	2'-10-1/4	3-3/4	-	5'-1	3'-0-1/2	1'-3-7/8	1'-0-1/4	-
	1109410	2	010203	135	WWD-360	2'-9-1/4	2'-7-3/4	3-3/4	1'-6	1'-8	2'-2-3/4	1'-3-7/8	1'-2-5/8	3'-2
					WWD-361	2'-9-1/4	3'-2-1/4	3-3/4	1'-6	2'-9	3'-0-1/2	1'-3-7/8	1'-4-1/4	4'-3
5	1109330	1	010209	90	WWD-3100;WWD-3103	2'-7-1/8	2'-7-1/2	4-1/4	-	4'-6-1/2	2'-10	1'-3-7/8	10-1/4	-
					WWD-3101;WWD-3104	2'-7-1/8	3'-4-1/2	4-1/4	-	6'-0-1/2	4'-1-3/4	1'-3-7/8	11-3/8	-
					WWD-3106	2'-11-1/8	2'-10	4-1/4	-	4'-11-1/2	3'-0	1'-3-7/8	11-3/4	-
	1109420	2	010205	160	WWD-3100;WWD-3103	2'-10-1/4	2'-10-3/4	3-3/4	1'-6	2'-2	2'-10	1'-3-7/8	1'-2	3'-8
					WWD-3101;WWD-3104	2'-10-1/4	3'-7-3/4	3-3/4	1'-6	3'-8	4'-1-3/8	1'-3-7/8	1'-3-1/8	5'-2
					WWD-3106	3'-2-1/4	3'-1-1/4	3-3/4	1'-6	2'-7	3'-0	1'-3-7/8	1'-3-1/2	4'-1
7-1/2	1109430	2	010209	365	WWD-3150	3'-8-1/4	3'-3-1/4	4-1/4	1'-9	2'-4	3'-0	1'-3-7/8	1'-5	4'-1
					WWD-3151	3'-8-1/4	3'-11-3/4	4-1/4	1'-9	3'-9	4'-0-1/2	1'-3-7/8	1'-7-1/4	5'-6
10	1109440	2	010209	365	WWD-3200;WWD-3203	3'-9-1/4	3'-3-1/4	4-1/4	1'-9	2'-4	3'-3	1'-3-7/8	1'-3-1/2	4'-1
					WWD-3201;WWD-3204	3'-9-1/4	3'-11-3/4	4-1/4	1'-9	3'-9	4'-5-3/4	1'-3-7/8	1'-4-5/8	5'-6
*ELECTROLIFT														
1/2	1108302	1	010203	45	852;162	1'-10-1/2	1'-11-3/4	3-3/4	-	3'-4	2'-2-1/2	1'-3-7/8	6-3/4	-
					853;192	1'-10-1/2	2'-5-3/4	3-3/4	-	4'-4	2'-11	1'-3-7/8	8-1/2	-
1	1108312	1	010203	45	168;163	1'-11-1/2	1'-11-3/4	3-3/4	-	3'-4	2'-2-1/2	1'-3-7/8	6-3/4	-
					198;193	1'-11-1/2	2'-5-3/4	3-3/4	-	4'-4	2'-11	1'-3-7/8	8-1/2	-
2	1108322	1	010205	60	165;860	2'-4	2'-2-3/4	3-3/4	-	3'-10	2'-8-1/2	1'-3-7/8	6-3/4	-
					195;861	2'-4	2'-8-3/4	3-3/4	-	4'-10	3'-5	1'-3-7/8	8-1/2	-
	1108402	2	010203	135	165;860	2'-6-3/8	2'-10-3/4	3-3/4	1'-6	2'-2	2'-8-1/2	1'-3-7/8	1'-2-3/4	3'-8
					195;861	2'-6-3/8	3'-4-3/4	3-3/4	1'-6	3'-2	3'-5	1'-3-7/8	1'-4-1/2	4'-8
3	1108332	1	010207	60	169;166	2'-3-7/8	2'-10-3/4	3-3/4	-	5'-2	4'-0-1/2	1'-3-7/8	6-3/4	-
					199;196	2'-3-7/8	2'-10-3/4	3-3/4	-	5'-2	3'-9	1'-3-7/8	8-1/2	-
	1108412	2	010203	135	169;166	2'-6-3/8	3'-6-3/4	3-3/4	1'-6	3'-6	4'-0-1/2	1'-3-7/8	1'-2-3/4	5'-0
					199;196	2'-6-3/8	3'-6-3/4	3-3/4	1'-6	3'-6	3'-9	1'-3-7/8	1'-4-1/2	5'-0
5	1108340	1	010209	90	151;153	3'-3-1/8	3'-1-1/2	4-1/4	-	5'-6-1/2	4'-1-1/4	1'-3-7/8	8-5/8	-
					152;154	3'-3-1/8	3'-10-1/2	4-1/4	-	7'-0-1/2	5'-2-3/4	1'-3-7/8	10-7/8	-
	1108432	2	010207	190	151;153	3'-3-7/8	3'-8-3/4	3-3/4	1'-6	3'-10	4'-1-1/4	1'-3-7/8	1'-4-3/8	5'-4
					152;154	3'-3-7/8	4'-5-3/4	3-3/4	1'-6	5'-4	5'-2-3/4	1'-3-7/8	1'-6-5/8	6'-10
7-1/2	1108440	2	010209	365	871	3'-9-3/4	3'-10-3/4	4-1/4	1'-9	3'-7	4'-3-1/2	1'-3-7/8	1'-4-3/4	5'-4
					872	3'-9-3/4	4'-7-3/4	4-1/4	1'-9	5'-1	5'-7-1/2	1'-3-7/8	1'-5-3/4	6'-10
10	1108450	2	010209	365	874	3'-9-3/4	3'-10-3/4	4-1/4	1'-9	3'-7	4'-3-1/2	1'-3-7/8	1'-4-3/4	5'-4
					875	3'-9-3/4	4'-7-3/4	4-1/4	1'-9	5'-1	5'-7-1/2	1'-3-7/8	1'-5-3/4	6'-10

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DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Double girder electric hoist carriers operate on the double girder cranes listed in the Crane Section or on double track systems. They are cataloged by (1) rated load and (2) hoist manufacturer.

HOIST SPECIFICATIONS

Double girder carriers are cataloged for 2, 3, 5, 7-1/2, 10 and 15 ton rated load hoists and for hoists with the more common lifts and speeds. Carriers for hoists with other rated loads, longer lifts and faster speeds are available; consult factory for carrier data on hoists not listed. Information on hoist lifts and speeds is not included in the data but is readily available from the hoist manufacturers' catalogs.

Service classifications for electric wire rope hoists are defined in ANSI/ASME HST-4M Performance Standards for Overhead Electric Wire Rope Hoists. Hoists should be selected for each application from the data in this standard.

When the hoist cable is single reeved, indicated in the data as 2PS, 4PS or 6PS, the hoist hook follows the cable as it is wound on the drum resulting in the hook not giving a true vertical lift. While the hook travel is not objectionable in many applications, these hoists should not be used where a true vertical lift is specified. Single reeved hoists are located on the hoist framing to put the hook at the center of the crane girders when the hook is at the mid-point of its travel.

CARRIER SPECIFICATIONS

Double girder carriers may be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation, elevation and rated load; however, they are generally motor driven. The dimensions listed in the data apply to motor driven carriers; consult factory for data on hand propelled or hand racked carriers.

Service classifications for carriers are defined in ANSI MH 27.1 Specifications for Underhung Cranes and Monorail Systems. Carriers will generally meet the service classification of the hoist used on the carrier and also the requirements of the comparable ANSI MH 27.1 service classification. For Class D carriers with speeds greater than 200 FPM and all Class E severe duty carriers, consult factory for recommendations.

Dimension 'A' for carriers listed in the data is the headroom required for the hoist. It is measured from the top of the crane girder at the crane end truck to the upper limit of the hoist hook and provides clearance for the hoist to pass under the crane end trucks. This results in better hook approaches to the ends of the crane girders and also allows the carrier to transfer to another crane or spur tracks on transfer crane applications. In some instances, dimension 'A' can be reduced by raising the hoist; however, because the hoist will not clear the end trucks, hook approaches are usually reduced and the carrier cannot be used for transfer applications. Consult factory for recommendations when it is necessary to reduce dimension 'A'.

Dimension 'A' remains constant for most carriers regardless of the crane girder depth. To maintain a constant dimension and to simplify the carrier design, three types of crane girders are used: Type 1 fabricated from Nos. 34037 or 34041 track with a 12-1/2 in. depth at the crane end trucks; Type 2 fabricated from Nos. 34046 through 34076 track with a 16 in. depth at the crane end trucks; and Type 3 fabricated from Nos. 34077 through 34079 track with a 22-1/2 in. depth at the crane end trucks.

Dimension 'A' increases for some carriers operating on cranes with 16-wheel end trucks. This is necessary because the hoist must be lowered to clear the end truck carrier heads. Changes to dimension 'A' for carriers operating on cranes with 16-wheel end trucks are noted in the data.

Dimension 'H' in the data is the distance from the top of the crane girder at the end truck to the bottom of the hoist framing. The dimension can vary with the type of girder. It is shown in the data for carriers operating on Type 2 girders. Changes to dimension 'H' for other types of girders are listed on Page CA-54.

Carrier end truck load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness. The 2 and 3 ton rated load carriers have bronze washers in the carrier head connections to provide free swivel of the carrier heads. All other carriers have self-aligning bushings in the carrier head connections to provide equal wheel loading and free swivel of the heads. The 15 ton rated load carriers have self-aligning bushings in the connections of the carrier load bars to the main load bars to provide equal head loading.

The hoist framing is fabricated from steel channels and angles. Spacers are used under the hoist or at the carrier end trucks as required to obtain maximum hook lift by providing minimum clearance between the hoist and crane end trucks.

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DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Lugs are available to limit the drop of the carrier end truck to 1 in. or less in the event of wheel or axle failure. Lugs are optional equipment.

CARRIER DRIVES AND CONTROLS

All double girder carriers except those for 15 ton rated load hoists are driven by No. 24011 double girder carrier drives. Carriers or 15 ton rated load hoists are driven by individual No. 24016 carrier drives in each end truck. Standard nominal speeds for these drives are 100, 125, 150, 175 and 200 FPM. Slower speeds are available.

When horsepower requirements exceed the allowable horsepower for the No. 24011 carrier drive , individual No. 24017 carrier drives are used in each end truck.

No. 2408 tractor drives are used to drive carriers for 15 ton rated load hoists when horsepower requirement exceed the allowable horsepower for the No. 24016 carrier drive . They are also used for carrier speeds in excess of 200 FPM.

Complete data on double girder carrier drives, motor control and horsepower requirements are contained in the Tractor Drive Section.

Wiring and control panels for double girder carriers are designed to meet the requirements of Article 610, National Electric Code. Carrier control panels are furnished with fuse protection for carrier motor branch circuit, NEMA 12 enclosure and thermal overload relays in 3 phases as standard.

Double girder carriers are controlled by (1) a pendant push button station, (2) an operator's cab cantilevered from the hoist framing or (3) remotely by a transmitter using radio or infrared control. The push button station may be suspended from the carrier or from a swivel arm on the carrier if the load being handled is bulky. Carriers with cabs are generally controlled from master switches in the cab. Under some conditions, it is desirable to use a cab without controls on floor operated carriers; this arrangement allows the push button station to be raised into the cab and provides both floor and cab control of the carrier.

Most double girder carriers operate on cranes and may be controlled from a push button station or cab on the crane provided it is not a transfer crane. For radio control or other special applications, consult factory for recommendations.

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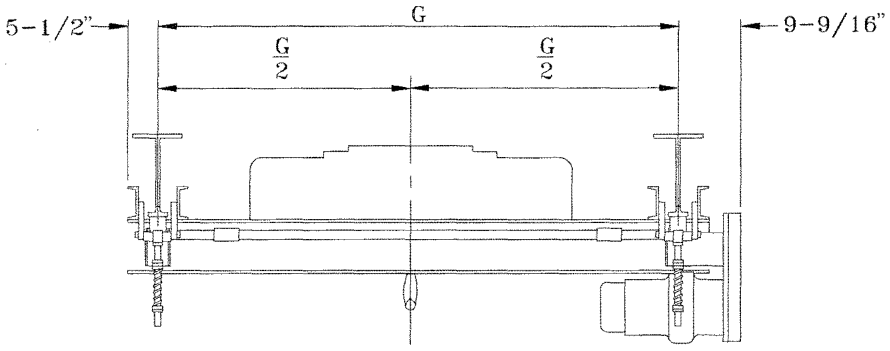
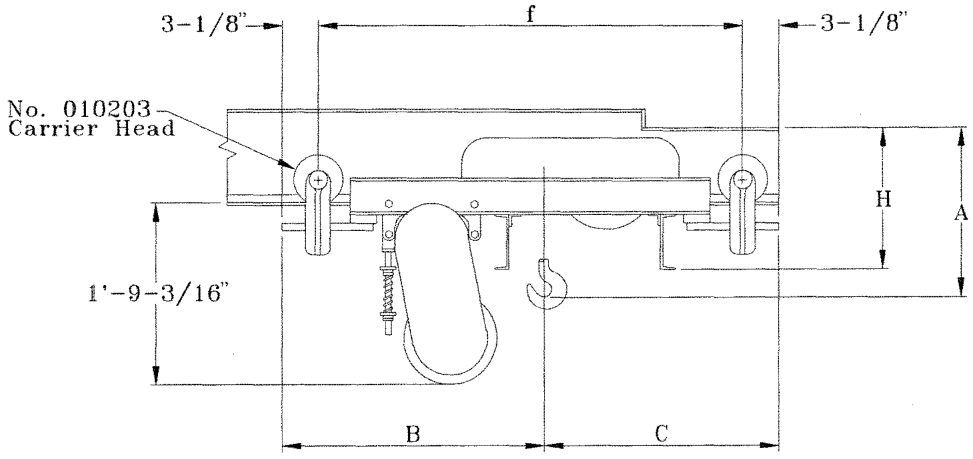
2 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





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2 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A	B	C	f	G	H*
P & H HEVILIFT									
2201002	880	22MD11L	2PD	1'-4-1/4	3'-2	2'-7-1/4	5'-3	7'-0	2'-0-1/2 (1)
		22MD21L	2PD	1'-4-1/2	3'-2	2'-7-1/4	5'-3	7'-0	2'-0-1/2 (1)
2201003	895	32MD11L	2PD	1'-4-1/4	3'-2	2'-7-1/4	5'-3	7'-6	2'-0-1/2 (1)
		32MD21L	2PD	1'-4-1/2	3'-2	2'-7-1/4	5'-3	7'-6	2'-0-1/2 (1)
2201102	940	12BD11G;12BD21G	2PS	2'-7	2'-11-1/4	2'-4	4'-9	6'-6	2'-1-1/2 (6)
22-1103	955	22BD11G;22BD21G	2PS	2'-7	2'-11-1/2	2'-4	4'-9	7'-0	2'-1-1/2 (6)
R & M TYPE Z									
2206102	985	S2-2-19Z14;S2-2-19Z21 S2-2-19Z31	4PS	1'-9-1/2	2'-11-1/2	2'-9-3/4	5'-3	6'-6	2'-1 (27)
2206103	1030	S2-2-25Z14;S2-2-25Z21 S2-2-25Z31	4PS	1'-10-1/2	2'-11-1/2	2'-9-3/4	5'-3	8'-0	2'-1 (27)
2206106	1005	D2-2-25Z21;D2-2-25Z31	2PD	2'-4	3'-0-1/8	2'-9-1/8	5'-3	7'-6	2'-2-1/4 (28)
2206107	1030	D2-2-41Z21;D2-2-41Z31	2PD	2'-4	3'-0-1/8	2'-9-1/8	5'-3	8'-0	2'-2-1/4 (28)
SHEPARD NILES									
2203003	920	DM1E2G1	2PD	1'-6-1/2	2'-9-1/4	2'-6	4'-9	7'-6	2'-0-1/2 (2)
2203004	945	DM1E3G1	2PD	1'-6-1/2	2'-9-1/4	2'-6	4'-9	8'-6	2'-0-1/2 (2)
2203005	960	GM1E2H1;GM2E2J1;KM4E2K1	2PD	2'-1	2'-9-1/8	2'-6-1/8	4'-9	8'-0	2'-2 (5)
2203006	985	GM1E3H1;GM2E3J1;KM4E3K1	2PD	2'-1	2'-9-1/8	2'-6-1/8	4'-9	9'-0	2'-2 (5)
2203104	955	DK1E2G1	2PD	2'-6-1/2	3'-0	2'-6-1/4	5'-0	7'-6	2'-0-1/2 (2)
2203105	970	DK1E3G1	2PD	2'-6-1/2	3'-0	2'-6-1/4	5'-0	8'-0	2'-0-1/2 (2)
WRIGHT									
2207000	910	3245940;3246060	2PD	1'-9-3/8	2'-10	2'-8-1/4	5'-0	8'-0	2'-0-1/2 (1)
2207001	920	3245970;3246090	2PD	1'-9-3/8	2'-10	2'-8-1/4	5'-0	8'-6	2'-0-1/2 (1)
2207002	935	3246000;3246120	2PD	1'-9-3/8	2'-10	2'-8-1/4	5'-0	9'-0	2'-0-1/2 (1)
YALE									
2204203	985	CEW2-24DM30D2	2PD	1'-6-3/8	3'-4-3/8	2'-4-7/8	5'-3	7'-6	1'-11-3/8 (1)
2204204	1025	CEW2-37DM30D2	2PD	1'-6-3/8	3'-4-3/8	2'-4-7/8	5'-3	8'-0	1'-11-3/8 (1)
2204205	1055	CEW2-48DM30D2	2PD	1'-6-3/8	3'-4-3/8	2'-4-7/8	5'-3	8'-6	1'-11-3/8 (1)
2204302	1045	BEW2-27BM14S2;BEW2-27BM22S2	2PS	2'-8-1/4	3'-3-1/2	2'-2-3/4	5'-0	7'-0	2'-1-1/2 (4)
2204303	1045	BEW2-45BM14S2;BEW2-45BM22S2	2PS	2'-8-1/4	3'-3-1/2	2'-2-3/4	5'-0	7'-6	2'-1-1/2 (4)

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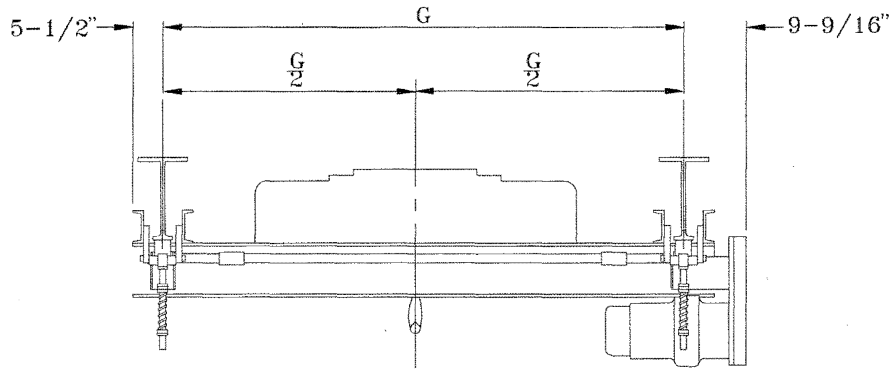
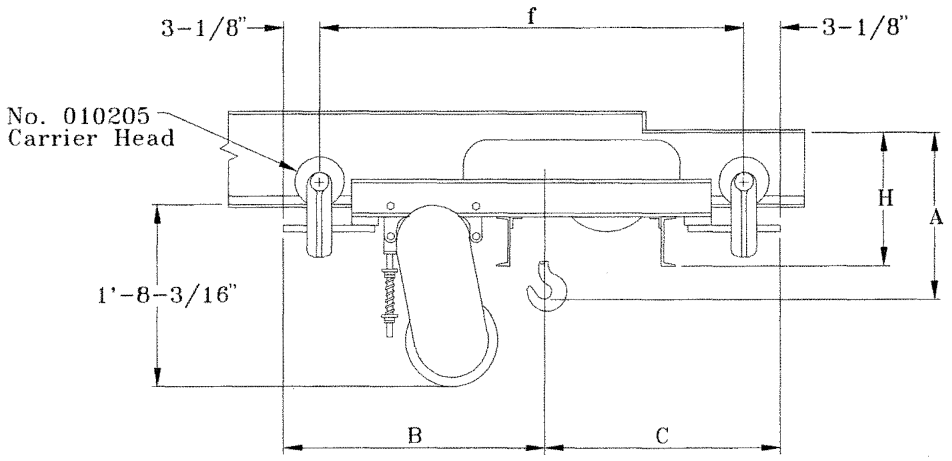
3 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





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3 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A	B	C	f	G	H*
LIFT-TECH									
2205010	925	312322-17	2PS	3'-0-1/2	3'-3-1/2	2'-8-3/4	5'-6	6'-6	2'-0-1/2 (1)
2205011	995	312322-33;312322-40	4PS	3'-4-1/8	3'-3-1/2	2'-8-3/4	5'-6	8'-0	2'-0-1/2 (1)
2205012	990	312322-49;312322-56	2PS	3'-0-1/2	3'-3-1/2	2'-8-3/4	5'-6	7'-6	2'-0-1/2 (1)
2205110	1015	316267-1B;316267-8B	4PS	2'-11-7/8	3'-0	2'-6-1/4	5'-0	6'-6	2'-5 (3)
2205111	1060	316267-33B;316267-40B	4PS	2'-11-7/8	3'-0	2'-6-1/4	5'-0	8'-0	2'-5 (3)
2205112	1015	316267-17B;316267-24B	2PS	2'-9-3/4	3'-0	2'-6-1/4	5'-0	6'-6	2'-5 (3)
P & H HEVI-LIFT									
2201012	915	23MF11L;23MF21L	2PD	1'-8-1/8	3'-2-3/8	2'-9-7/8	5'-6	7'-0	2'-0-1/2 (1)
2201013	945	33MF11L;33MF21L	2PD	1'-8-1/8	3'-2-3/8	2'-9-7/8	5'-6	8'-0	2'-0-1/2 (1)
2201014	935	32MF11L	2PD	1'-7-5/8	3'-4	2'-8-3/8	5'-6	7'-6	2'-0-1/2 (1)
2201015	950	42MF11L	2PD	1'-7-5/8	3'-4	2'-8-3/8	5'-6	8'-0	2'-0-1/2 (1)
2201112	990	22CF21G;22CF31G	4PS	2'-5-1/2	2'-11-1/4	2'-4	4'-9	7'-0	2'-2 (5)
2201113	1015	32CF21G;32CF31G	4PS	2'-5-1/2	2'-11-1/4	2'-4	4'-9	8'-0	2'-2 (5)
R & M TYPE Z									
2206112	1010	S2-3-19Z14;S2-3-19Z21	4PS	1'-9-1/2	2'-11-1/2	2'-9-3/4	5'-3	6'-6	2'-1 (27)
2206113	1055	S2-3-25Z14;S2-3-25Z21	4PS	1'-10-1/2	2'-11-1/2	2'-9-3/4	5'-3	7'-0	2'-1 (27)
2206116	1080	D2-3-19Z15;D2-3-19Z21	4PD	2'-4	3'-0-1/8	2'-9-1/8	5'-3	8'-0	2'-1-1/4 (29)
2206117	1080	D2-3-26Z15;D2-3-26Z21	4PD	2'-4	3'-0-1/8	2'-9-1/8	5'-3	9'-0	2'-1-1/4 (29)
SHEPARD NILES									
2203015	990	GM1G2J1;KM2G2K1;KM3G2L1	2PD	2'-1	2'-9-1/8	2'-6-1/8	4'-9	8'-0	2'-2 (5)
2203016	1010	GM1G3J1;KM2G3K1;KM3G3L1	2PD	2'-1	2'-9-1/8	2'-6-1/8	4'-9	9'-0	2'-2 (5)
2203113	1035	GK1G2J1;KK2G2K1;KK3G2L1	2PD	2'-11-1/2	3'-1-3/8	2'-7-7/8	5'-3	8'-0	2'-1-1/2 (6)
2203114	1065	GK1G3J1;KK2G3K1;KK3G3L1	2PD	2'-11-1/2	3'-1-3/8	2'-7-7/8	5'-3	9'-0	2'-1-1/2 (6)
WRIGHT									
2207010	950	3246180;3246300	2PD	2'-0	2'-10	2'-8-1/4	5'-0	8'-6	2'-0-1/2 (1)
2207011	965	3246210;3246330	2PD	2'-0	2'-10	2'-8-1/4	5'-0	9'-0	2'-0-1/2 (1)
2207012	960	3345440;3345470	2PD	2'-1	2'-10-3/4	2'-10-1/2	5'-3	8'-6	2'-0-1/2 (1)
2207013	970	3345500;3345530	2PD	2'-1	2'-10-3/4	2'-10-1/2	5'-3	9'-0	2'-0-1/2 (1)
YALE									
2204214	1205	BEW3X26DM16D2;BEW3X26DM24D2	2PD	2'-0-5/8	3'-4-3/8	2'-4-7/8	5'-3	8'-6	1'-10-1/2 (1)
2204215	1230	CEW3-30DM30D2	2PD	1'-9-5/8	3'-4-3/8	2'-4-7/8	5'-3	9'-0	1'-10-3/8 (1)
2204216	1240	BEW3X34DM16D2;BEW3X34DM24D2	2PD	2'-0-5/8	3'-4-3/8	2'-4-7/8	5'-3	9'-0	1'-10-3/8 (1)
2204217	1270	CEW3-39DM30D2	2PD	1'-9-5/8	3'-4-3/8	2'-4-7/8	5'-3	9'-6	1'-10-3/8 (1)
2204314	1090	BEW3-22BM11S4	4PS	2'-8-1/4	3'-3-1/2	2'-2-3/4	5'-0	7'-6	2'-1-5/8 (4)
2204315	1110	BEW3-22BM16S2;BEW3-22BM24S2	2PS	3'-1-1/4	3'-3-1/2	2'-2-3/4	5'-0	7'-6	2'-4 (4)

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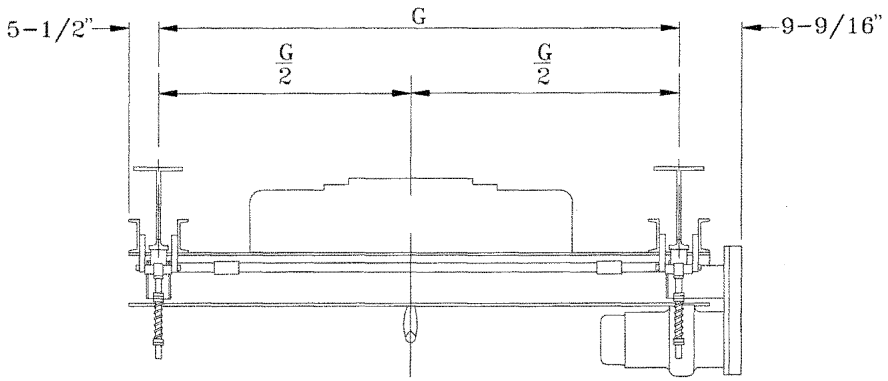
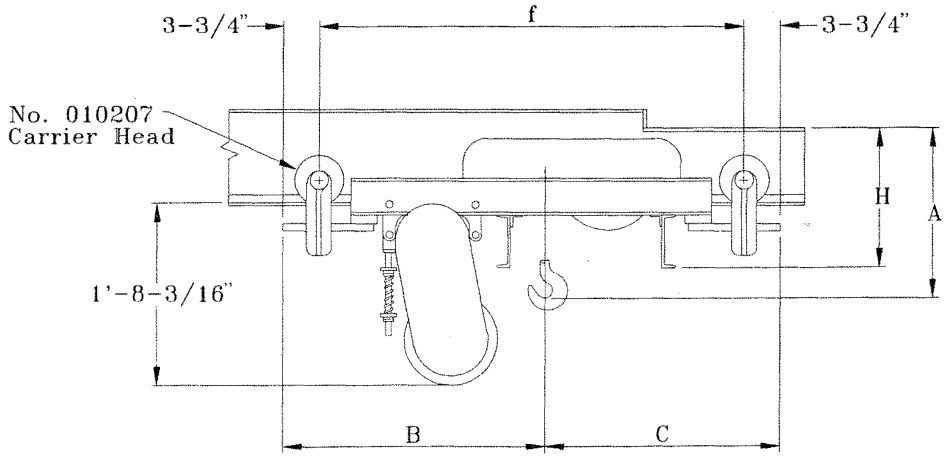
5 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





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5 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A*	B	C	f	G	H**
LIFT-TECH									
2205030	960	312324-1;312324-8	4PS	3'-4-5/8	3'-4-1/4	2'-9-1/4	5'-6	6'-6	2'-1-1/2 (1)
2205031	1045	312324-17;312324-24	4PS	3'-4-1/8	3'-4-1/4	2'-9-1/4	5'-6	8'-0	2'-1-1/2 (1)
2205032	1220	311968-10	4PS	3'-2-5/8	3'-4-1/4	2'-9-1/4	5'-6	10'-0	2'-2-1/2 (1)
2205130	1060	316269-1B;316269-8B	4PS	2'-11-7/8	3'-0-5/8	2'-6-7/8	5'-0	6'-6	2'-6 (14)
2205131	1105	316269-17B;316269-24B	4PS	2'-11-7/8	3'-0-5/8	2'-6-7/8	5'-0	8'-0	2'-6 (14)
P & H HEVI-LIFT									
2201032	1025	24MJ11L	2PD	1'-10-5/8	3'-4-3/4	3'-2-3/4	6'-0	7'-6	2'-2-1/2 (1)
2201033	1060	34MJ11L	2PD	1'-10-5/8	3'-4-3/4	3'-2-3/4	6'-0	8'-6	2'-2-1/2 (1)
2201034	1045	33MJ11L	2PD	1'-10-3/8	3'-5-1/2	2'-11	5'-9	8'-0	2'-2-1/2 (1)
2201035	1085	43ML11L	2PD	1'-10-3/8	3'-5-1/2	2'-11	5'-9	9'-0	2'-2-1/2 (1)
2201132	1070	23CJ11G;23CJ21G	4PS	2'-10	3'-1-3/8	2'-6-1/8	5'-0	7'-6	2'-5 (12)
2201133	1100	33CJ11G;33CJ21G	4PS	2'-10	3'-1-3/8	2'-6-1/8	5'-0	8'-6	2'-5 (12)
R & M TYPE Z									
2206132	1185	S3-5-18Z15;S3-5-18Z22	4PS	2'-2-1/2	3'-0-1/8	2'-10-3/8	5'-3	6'-6	2'-3-1/2 (30)
2206133	1185	S3-5-25Z15;S3-5-25Z22	4PS	2'-2-1/2	3'-0-1/8	2'-10-3/8	5'-3	6'-6	2'-3-1/2 (30)
2206136	1215	D3-5-24Z22;D3-5-24Z30	2PD	2'-3-1/2	3'-0-3/4	3'-3-3/4	5'-6	8'-0	2'-3-1/4 (31)
2206137	1215	D3-5-32Z22;D3-5-32Z30	2PD	2'-3-1/2	3'-0-3/4	3'-3-3/4	5'-6	8'-0	2'-3-1/4 (31)
SHEPARD NILES									
2203037	1065	GM1L2K1;KM1L2L1	2PD	2'-1	2'-9-3/4	2'-6-3/4	4'-9	8'-0	2'-4 (17)
2203038	1100	GM1L3K1;KM1L3L1	2PD	2'-1	2'-9-3/4	2'-6-3/4	4'-9	9'-0	2'-4 (17)
2203039	1125	GN1F3J1;KN2F3K1;KN3F3L1	4PD	2'-9	3'-2-3/4	2'-10-3/4	5'-6	9'-0	2'-4 (17)
2203040	1160	GN1F4J1;KN2F4K1;KN3F4L1	4PD	2'-9	3'-2-3/4	2'-10-3/4	5'-6	10'-0	2'-4 (17)
2203132	1080	GK1L2K1;KK1L2L1	2PD	2'-11-1/2	3'-2	2'-8-1/2	5'-3	8'-0	2'-2-1/2 (19)
2203133	1115	GK1L3K1;KK1L3L1	2PD	2'-11-1/2	3'-2	2'-8-1/2	5'-3	9'-0	2'-2-1/2 (19)
WRIGHT									
2207030	1005	3352010;3352160	4PS	2'-7-3/4	3'-4-1/2	2'-6	5'-3	8'-0	2'-1-1/2 (1)
2207031	1060	3352040;3352190	4PS	2'-7-3/4	3'-4-1/2	2'-6	5'-3	9'-0	2'-1-1/2 (1)
2207032	1060	3352310;3352430	2PD	2'-8	3'-3-1/4	2'-7-1/4	5'-3	9'-0	2'-1-1/2 (1)
2207033	1095	3352340;3352460	2PD	2'-8	3'-3-1/4	2'-7-1/4	5'-3	9'-6	2'-1-1/2 (1)
YALE									
2204233	1195	CEW5X16DM19D2;CEW5X16DM28D2	2PD	2'-0	3'-5	2'-5-1/2	5'-3	8'-6	1'-10-1/2 (1)
2204234	1245	BEW5X20DM12D4;BEW5X20DM15D4	4PD	2'-5-1/2	3'-5	2'-5-1/2	5'-3	9'-0	1'-10-1/2 (1)
2204235	1335	BEW5X25DM12D4;BEW5X25DM15D4	4PD	2'-5-1/2	3'-5	2'-5-1/2	5'-3	9'-6	1'-11-1/2 (1)
2204332	1205	BEW5X19BM12S4;BEW5X19BM15S4	4PS	2'-9-1/4	3'-4-1/2	2'-9	5'-6	7'-6	2'-5 (4)
2204333	1425	BEW5X26BM12S4;BEW5X26BM15S4	4PS	2'-9-1/4	3'-4-1/2	2'-9	5'-6	9'-0	2'-6-1/8 (4)

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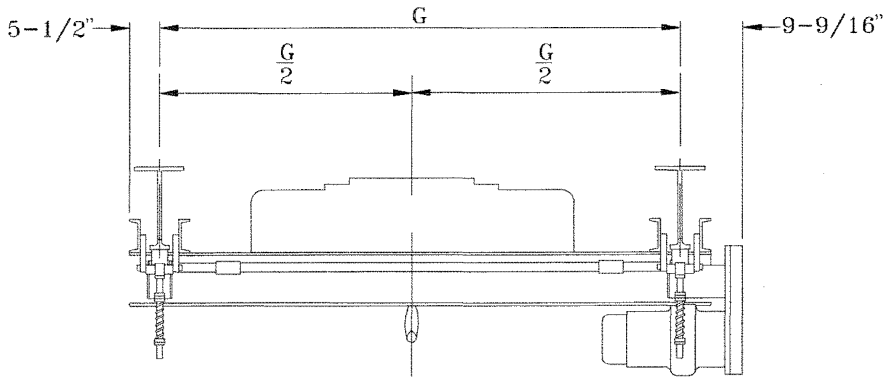
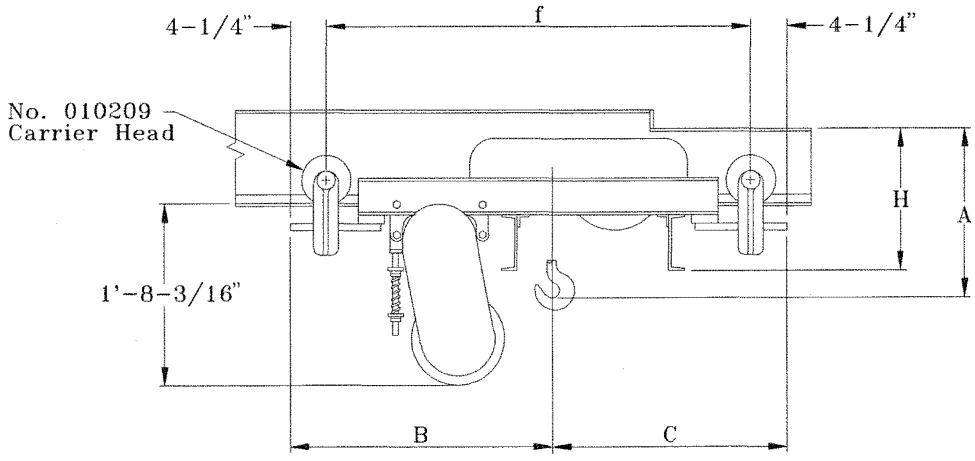
7-1/2 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





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7-1/2 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A*	B	C	f	G	H**
LIFT-TECH									
2205050	1465	326983-1	6PS	3'-4-1/8	3'-7-3/4	3'-0-3/4	6'-0	8'-0	2'-2-1/2 (11)
2205051	1760	326983-20	6PS	3'-4-1/8	3'-7-3/4	3'-0-3/4	6'-0	10'-0	2'-2-1/2 (11)
2205150	1415	326794-1B	6PS	3'-0-3/8	3'-4-1/8	2'-10-3/8	5'-6	8'-0	2'-7-1/2 (15)
2205151	1615	326794-20B	6PS	2'-9-7/8	3'-4-1/8	2'-10-3/8	5'-6	10'-6	2'-5 (16)
P & H HEVI-LIFT									
2201052	1490	34PL21L;34PL31L	4PD	2'-10-1/4	3'-7-3/4	3'-3-3/4	6'-3	8'-6	2'-4-1/2 (11)
2201053	1540	44PL21L;44PL31L	4PD	2'-10-1/4	3'-7-3/4	3'-3-3/4	6'-3	9'-0	2'-4-1/2 (11)
2201054	1535	34ML11L	2PD	2'-8-7/8	3'-8-1/4	3'-3-1/4	6'-3	8'-6	2'-4-1/2 (11)
2201055	1560	44ML11L	2PD	2'-8-7/8	3'-8-1/4	3'-3-1/4	6'-3	9'-0	2'-4-1/2 (11)
2201056	1580	54ML11L	2PD	2'-8-7/8	3'-8-1/4	3'-3-1/4	6'-3	9'-6	2'-4-1/2 (11)
2201150	1405	24CL21G;24CL31G	4PS	3'-4-3/4	3'-2-3/4	2'-8-3/4	5'-3	8'-0	2'-9-1/2 (13)
2201151	1450	34CL21G;34CL31G	4PS	3'-4-3/4	3'-2-3/4	2'-8-3/4	5'-3	9'-0	2'-9-1/2 (13)
R & M TYPE Z									
2206152	1570	S3-7-1/2-18Z10;S3-7-1/2-18Z15 S3-7-1/2-18Z20	4PS	2'-5-1/4	2'-10-1/4	4'-1-1/4	6'-3	6'-6	2'-4-3/4 (32)
2206153	1630	S3-7-1/2-27Z10;S3-7-1/2-27Z15 S3-7-1/2-27Z20	4PS	2'-5-1/4	2'-10-1/4	4'-1-1/4	6'-3	7'-6	2'-4-3/4 (32)
2206156	1695	D3-7-1/2-15Z10;D3-7-1/2-15Z15 D3-7-1/2-15Z20	4PD	3'-0-1/4	3'-1-3/4	3'-10-1/4	6'-3	8'-0	2'-9 (13)
2206157	1675	D3-7-1/2-22Z10;D3-7-1/2-22Z15 D3-7-1/2-22Z20	4PD	3'-0-1/4	3'-1-1/4	3'-10-1/4	6'-3	9'-0	2'-9 (13)
SHEPARD NILES									
2203057	1420	GN1H3K1;KN1H3K1;KN2H3L1	4PD	2'-9	3'-6-1/4	2'-11-1/4	5'-9	9'-0	2'-6 (18)
2203058	1465	GN1H4K1;KN1H4K1;KN2H4L1	4PD	2'-9	3'-6-1/4	2'-11-1/4	5'-9	10'-0	2'-6 (18)
2203059	1490	GN1H5K1;KN1H5K1;KN2H5L1	4PD	2'-9	3'-6-1/4	2'-11-1/4	5'-9	10'-6	2'-6 (18)
2203150	1425	GL1H3K1;KL1H3K1;KL2H3L1	4PD	3'-9	3'-4	2'-10-1/2	5'-6	9'-0	2'-3-1/2 (20)
2203151	1470	GL1H4K1;KL1H4K1;KL2H4L1	4PD	3'-9	3'-4	2'-10-1/2	5'-6	10'-0	2'-3-1/2 (20)
WRIGHT									
2207050	1325	3463360;3463510	4PS	3'-3-1/4	3'-9-5/8	2'-10-7/8	6'-0	8'-0	2'-2-1/2 (11)
2207051	1385	3463390;3463540	4PS	3'-3-1/4	3'-9-5/8	2'-10-7/8	6'-0	9'-0	2'-2-1/2 (11)
2207052	1430	3463660;3463750	2PD	2'-11	3'-8-1/4	3'-0-1/4	6'-0	9'-6	2'-2-1/2 (11)
2207053	1475	3463690;3463780	2PD	2'-11	3'-8-1/4	3'-0-1/4	6'-0	10'-0	2'-2-1/2 (11)
YALE									
2204254	1660	CEW7-1/2X19DM8D4;CEW7-1/2X19DM14D4	4PD	2'-6-5/8	3'-8-1/4	3'-3-1/4	6'-3	9'-0	2'-1-1/4 (33)
2204255	1705	CEW7-1/2X25DM8D2;CEW7-1/2X25DM14D4	4PD	2'-6-5/8	3'-8-1/4	3'-3-1/4	6'-3	10'-0	2'-1-1/4 (33)
2204256	1685	DEW7-1/2X28DM33D2	2PD	2'-6-7/8	3'-8-1/4	3'-3-1/4	6'-3	9'-6	2'-8 (33)
2204257	1695	CEW7-1/2X32DM8D4	4PD	2'-6-5/8	3'-8-1/4	3'-3-1/4	6'-3	10'-6	2'-1-1/4 (33)

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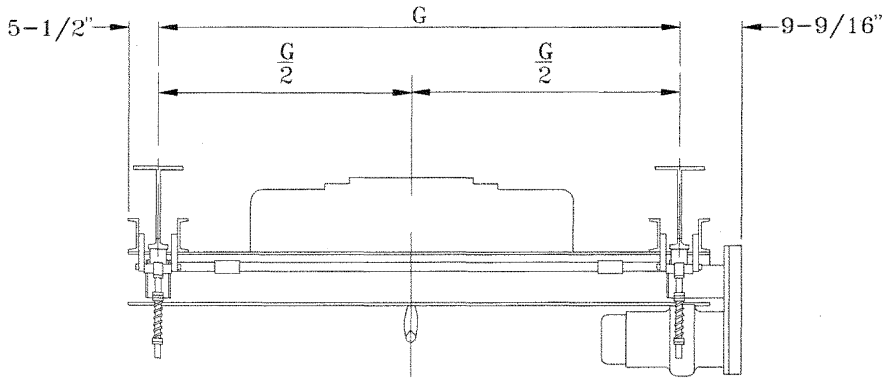
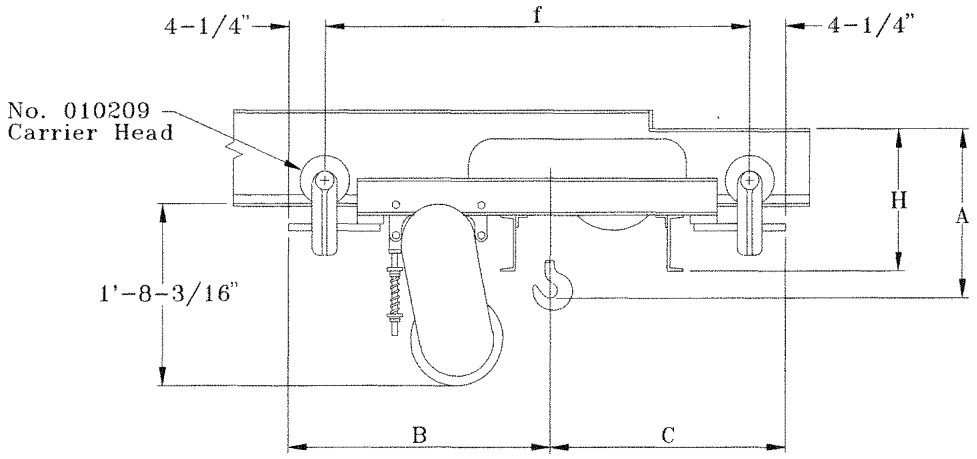
10 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





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Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A*	B	C	f	G	H **
LIFT-TECH									
2205080	1420	327374-1	6PS	3'-5-7/8	3'-7-3/4	3'-6-3/4	6'-6	8'-0	2'-4-1/2 (23)
2205081	1585	327374-20	6PS	3'-5-7/8	3'-7-3/4	3'-6-3/4	6'-6	10'-0	2'-4-1/2 (23)
2205082	2050	327374-40	6PS	3'-5-7/8	3'-7-3/4	3'-6-3/4	6'-6	13'-6	2'-7-1/2 (23)
P & H HEVI-LIFT									
2201080	1525	34PN11L;34PN21L	4PD	3'-7-1/4	3'-7-3/4	3'-6-3/4	6'-6	8'-6	2'-4-1/2 (22)
2201081	1565	44PN11L;44PN21L	4PD	3'-7-1/4	3'-7-3/4	3'-6-3/4	6'-6	9'-0	2'-4-1/2 (22)
2201082	1635	34NN11L	3PD	3'-1	3'-7-3/4	3'-6-3/4	6'-6	8'-6	2'-4-1/2 (22)
2201083	1665	44NN11L	3PD	3'-1	3'-7-3/4	3'-6-3/4	6'-6	9'-0	2'-4-1/2 (11)
2201084	1790	54NN11L	3PD	3'-1	3'-7-3/4	3'-6-3/4	6'-6	9'-6	2'-7-1/2 (11)
R & M TYPE Z									
2206162	1765	S6-10-17Z11;S6-10-17Z15 S6-10-17Z22	4PS	2'-10-1/4	4'-2-1/4	3'-6-1/4	7'-0	7'-6	2'-10-1/4 (13)
2206163	1775	D3-10-15Z11;D3-10-15Z15	4PD	3'-0-1/4	4'-2-3/4	2'-8-3/4	7'-0	8'-0	2'-10-1/4 (13)
2206164	1815	D6-10-22Z11;D6-10-22Z15	4PD	3'-0-1/4	4'-2-3/4	2'-8-3/4	7'-0	9'-0	3'-0-1/4 (13)
2206165	1800	D6-10-17Z11;D6-10-17Z15 D6-10-17Z22	4PD	3'-1-3/4	4'-2-3/4	3'-5-3/4	7'-0	9'-0	2'-11 (13)
SHEPARD NILES									
2203080	1600	GN1L3K1;KN1L3L1	4PD	3'-2	3'-6-1/4	3'-2-1/4	6'-0	9'-0	2'-11 (24)
2203081	1655	GN1L4K1;KN1L4L1	4PD	3'-2	3'-6-1/4	3'-2-1/4	6'-0	10'-0	2'-11 (24)
2203082	1800	GN1L5K1;KN1L5L1	4PD	3'-2	3'-6-1/4	3'-2-1/4	6'-0	10'-6	2'-11 (24)
WRIGHT									
2207080	1470	3463840;3463990;3464140	4PS	3'-8-1/4	3'-9-5/8	3'-7-7/8	6'-9	8'-6	2'-7 (25)
2207081	1495	3463870;3464020;3464170	4PS	3'-8-1/4	3'-9-5/8	3'-7-7/8	6'-9	9'-0	2'-7 (25)
2207082	1635	3463900;3464050;3464200	4PS	3'-8-1/4	3'-9-5/8	3'-7-7/8	6'-9	10'-0	2'-7 (25)
2207083	1625	3460870;3460900	4PD	3'-3-1/2	3'-9-1/4	3'-8-1/4	6'-9	9'-0	2'-6 (26)
2207084	1785	3457120;3457150	4PD	3'-3-1/2	3'-9-1/4	3'-8-1/4	6'-9	10'-0	2'-6 (26)
YALE									
2204280	1975	CEW10X20DM8D4;CEW10X20DM14D4	4PD	3'-0-5/8	3'-8-1/4	3'-3-1/4	6'-3	10'-6	2'-3-1/4 (22)
2204281	1870	CEW10-23DM19D4	4PD	3'-1-1/2	3'-9-3/4	3'-10-3/4	7'-0	9'-6	2'-3-1/4 (22)
2204282	2110	CEW10X25DM8D4;CEW10X25DM14D4	4PD	3'-0-5/8	3'-8-1/4	3'-3-1/4	6'-3	11'-0	2'-3-1/4 (22)
2204283	1990	EEW10-30DM19D4	4PD	3'-1-1/2	3'-9-3/4	3'-10-3/4	7'-0	10'-0	2'-3-1/4 (22)

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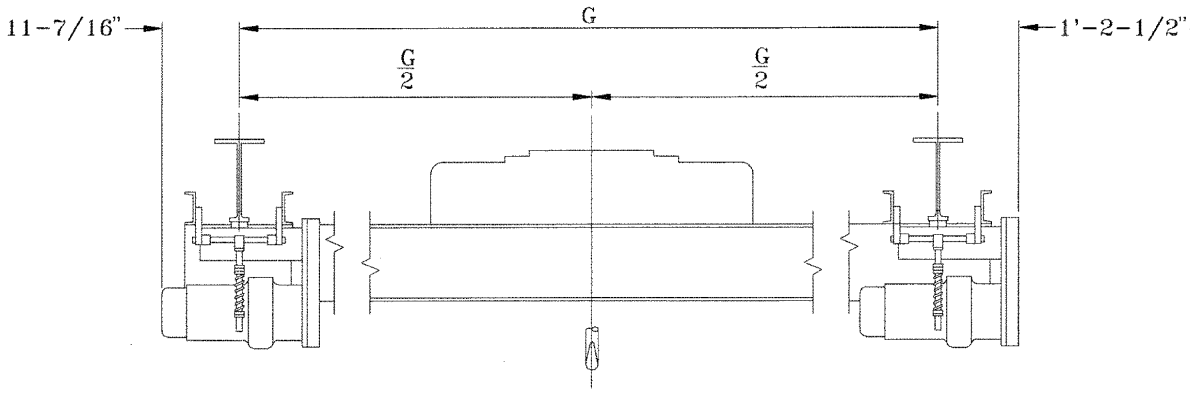
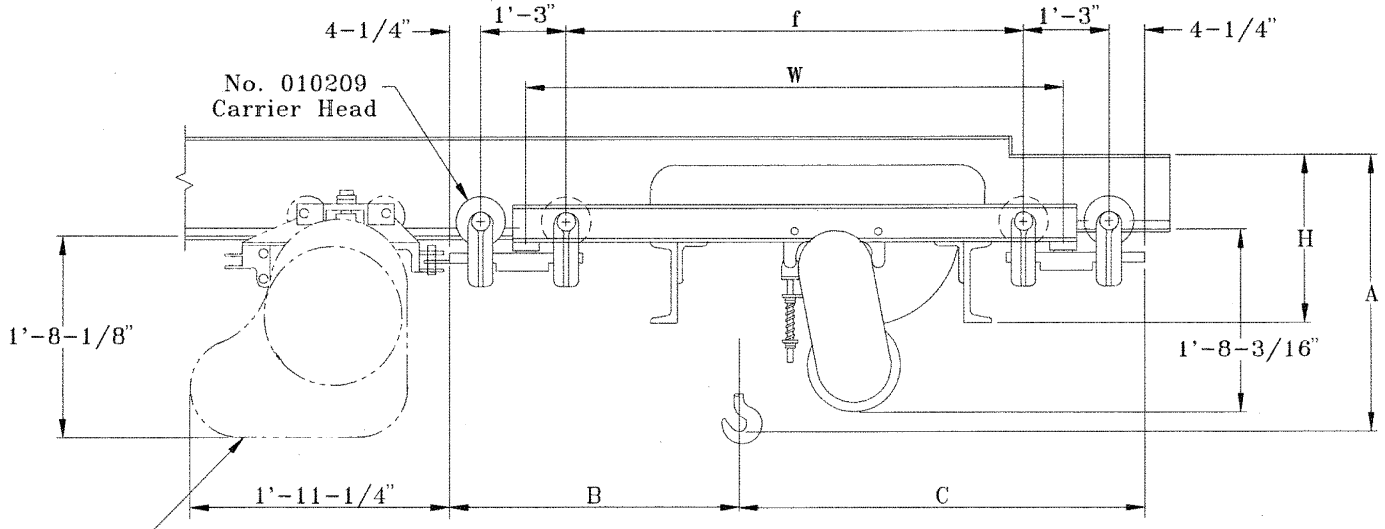
15 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS





No. 2408 Tractors Are Used When Horsepower Requirements Exceed Allowable Horsepower For No. 24016 Drive Or For Carrier Speeds In Excess Of 200 FPM.

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15 TON DOUBLE GIRDER ELECTRIC HOIST CARRIERS

Catalog Number	Weight (lbs.)	Hoist Catalog Number	Reeving	A*	B	C	f	G	H **	W
LIFT-TECH										
2205070	2680	312363-1	6PS	4'-11-7/8	3'-9-1/2	3'-11	4'-6	9'-0	2'-11 (8)	5'-9
2205071	2810	312363-11	6PS	4'-11-7/8	3'-9-1/2	3'-11	4'-6	11'-0	2'-11 (8)	5'-9
2205072	3470	312306-1	6PS	4'-11-7/8	3'-9-1/2	3'-11	4'-6	13'-6	2'-11 (8)	5'-9
P & H HEVI-LIFT										
2201074	3160	35PR14L;35PR24L	4PD	4'-2	3'-6-3/4	4'-4-3/4	4'-9	10'-0	3'-0 (7)	6'-0
2201075	3210	45PR14L;45PR24L	4PD	4'-2	3'-6-3/4	4'-4-3/4	4'-9	10'-6	3'-0 (7)	6'-0
2201076	3310	55PR14L;55PR24L	4PD	4'-2	3'-6-3/4	4'-4-3/4	4'-9	11'-6	3'-0 (7)	6'-0
2201077	3450	65PR14L;65PR24L	4PD	4'-2	3'-6-3/4	4'-4-3/4	4'-9	12'-6	3'-0 (7)	6'-0
R & M TYPE Z										
2206172	2910	X6-15-16Z7;X6-15-16Z10 X6-15-16Z15	6PS	4'-7-3/4	3'-11-3/4	3'-11-3/4	4'-9	8'-6	4'-1-3/4 (9)	6'-0
2206173	2980	X6-15-25Z7;X6-15-25Z10 X6-15-25Z15	6PS	4'-7-3/4	3'-11-3/4	3-11-3/4	4'-9	9'-6	4'-1-3/4 (9)	6'-0
2206174	3205	X6-15-32Z7;X6-15-32Z10 X6-15-32Z15	6PS	4'-7-3/4	3'-11-3/4	3'-11-3/4	4'-9	10'-6	4'-1-3/4 (9)	6'-0
2207177	3280	D8-15-33Z11;D8-15-33Z15 D8-15-33Z20	4PD	4'-0-3/4	4'-3-7/8	4'-1-5/8	5'-3	13'-0	3'-9-3/4 (9)	6'-6
SHEPARD NILES										
2203077	3320	MN1N3M1;MN2N3N1	4PD	3'-11-1/2	3'-5-7/8	4'-2-5/8	4'-6	12'-0	3'-5-1/2 (9)	5'-9
2203078	3420	MN1N4M1;MN2N4N1	4PD	3'-11-1/2	3'-5-7/8	4'-2-5/8	4'-6	13'-0	3'-5-1/2 (9)	5'-9
2203079	3290	MN1N5M1;MN2N5N1	4PD	3'-11-1/2	3'-5-7/8	4'-2-5/8	4'-6	14'-0	3'-8-1/2 (9)	5'-9
WRIGHT										
2207070	2760	3522820	4PS	4'-4-1/2	3'-7-1/4	3'-7-1/4	4'-0	10'-0	3'-0-1/2 (10)	5'-3
2207071	2860	3522850	4PS	4'-4-1/2	3'-7-1/4	3'-7-1/4	4'-0	11'-6	3'-0-1/2 (10)	5'-3
2207072	3430	3522880	4PS	4'-4-1/2	3'-7-1/4	3'-7-1/4	4'-0	13'-0	3'-0-1/2 (1O)	5'-3
YALE										
2204273	2760	DEW15X17DM11D4;DEW15X17DM16D4	4PD	3'-7-3/8	3'-10-3/4	4'-6-3/4	5'-3	10'-6	3'-1-1/8 (9)	6'-6
2204274	3200	DEW15X22DM11D4;DEW15X22DM16D4	4PD	3'-7-3/8	3'-10-3/4	4'-6-3/4	5'-3	11'-0	3'-1-1/8 (9)	6'-6

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DIMENSION 'H'

Dimension 'H' in the data is the distance from the top of the crane girder at the end truck to the bottom of the hoist framing for cranes with Type 2 girders. The numbered changes in dimension 'H' noted below correspond to the numerals noted in the data.

1. 'H' is based on Type 2 girders; deduct 3-1/2 in. for Type 1 girders; add 6-1/2 in. for Type 3 girders.
2. 'H' is based on Type 2 girders; deduct 2 in. for Type 1 girders; add 6-1/2 in. for Type 3 girders.
3. 'H' is based on Types 1 and 2 girders; add 2 in. for Type 3 girders.
4. 'H' is based on Types 1 and 2 girders; add 3-1/2 in. for Type 3 girders.
5. 'H' is based on Types 1 and 2 girders; add 5 in. for Type 3 girders.
6. 'H' is based on Types 1 and 2 girders; add 5-1/2 in. for Type 3 girders.
7. 'H' is based on Type 2 girders; add 2-1/2 in. for Type 3 girders.
8. 'H' is based on Type 2 girders; add 3-1/2 in. for Type 3 girders.
9. 'H' is based on Types 2 and 3 girders; add 1 in. when operating on cranes with No. 180114 end trucks.
10. 'H' is based on Type 2 girders; add 2 in. for Type 3 girder.
11. 'H' is based on Type 2 girders; add 6-1/2 in. for Type 3 girders.
12. 'H' is based on Types 1 and 2 girders; add 3 in. for Type 3 girders. Add an additional 2 in. for Type 3 girders for cranes with No. 180112 end trucks; 4 in. for No. 180113 end trucks.
13. Add 5 in. to the 'H' dimension for cranes with No. 180112 end trucks; add 7 in. for cranes with no. 180113 end trucks.
14. 'H' is based on Types 1 and 2 girders; add 2 in. for Type 3 girders. Add an additional 3 in. for Type 3 girders for cranes with No. 180112 end trucks; 5 in. for No. 180113 end trucks.
15. 'H' is based on Type 2 girders; add 1-1/2 in. for Type 3 girders. Add an additional 3-1/2 in. for Type 3 girders for cranes with No. 180112 end trucks; 5-1/2 in. for No. 180113 end trucks.
16. 'H' is based on Type 2 girders; add 4 in. for Type 3 girders. Add an additional 1 in. for Type 3 girders for cranes with No. 180112 end trucks; 3 in. for No. 180113 end trucks.
17. 'H' is based on Types 1 and 2 girders; add 5 in. for Type 3 girders. Add an additional 2 in. for Type 3 girders for cranes with No. 180113 end trucks.
18. 'H' is based on Types 1 and 2 girders; add 5 in. for Type 3 girders. Add an additional 2 in. for Type 3 girders for cranes with no. 180113 end trucks.
19. 'H' is based on Types 1 and 2 girders; add 5-1/2 in. for Type 3 girders. Add an additional 1-1/2 in. for Type 3 girders for cranes with No. 180113 end trucks.
20. 'H' is based on Type 2 girders; add 5-1/2 in. for Type 3 girders. Add an additional 1-1/2 in. for Type 3 girders for cranes with No. 180113 end trucks.
21. 'H' is based on Types 1 and 2 girders. Add 2-1/2 in. for Type 3 girders. Add an additional 2-1/2 in. for cranes with No. 180113 end trucks.
22. 'H' is based on Type 2 girders. Add 2 in. for cranes with Type 2 girders and No. 180113 end trucks. Add 6-1/2 in. for Type 3 girders.
23. 'H' is based on Type 2 girders. Add 1 in. for cranes with Type 2 girders and No. 180113 end trucks. Add 6-1/2 in. for Type 3 girders.
24. 'H' is based on Type 2 girders. Add 2 in. for cranes with Type 2 girders and No. 180113 end trucks. Add 2 in. for Type 3 girders.
25. 'H' is based on Type 2 girders. Add 2 in. for cranes with Type 2 girders and No. 180113 end trucks. Add 4 in. for Type 3 girders.
26. 'H' is based on Type 2 girders. Add 2 in. for cranes with Type 2 girders and No. 180113 end trucks. Add 5 in. for Type 3 girders.
27. 'H' is based on Type 2 girders. Deduct 1 in. for Type 1 girders. Add 3 in. for Type 3 girders.
28. 'H' is based on Types 1 and 2 girders. Add 4-3/4 in. for Type 3 girders.
29. 'H' is based on Types 1 and 2 girders. Add 5-3/4 in. for Type 3 girders.
30. 'H' is based on Types 1 and 2 girders. Add 4-1/2 in. for Type 3 girders. Add an additional 1-1/2 in. for cranes with No. 180112 end trucks and 3-1/4 in. for No. 180113 end trucks.
31. 'H' is based on Types 1 and 2 girders. Add 4-3/4 in. for Type 3 girders. Add an additional 1-1/2 in. for cranes with No. 180113 end trucks.
32. 'H' is based on Type 2 girders. Add 4-1/4 in. for Type 3 girders. Add an additional 2 in. for cranes with no. 180113 end trucks.
33. 'H' is based on Type 2 girders. Add 1-5/8 in. for Type 3 girders. Add an additional 4-1/2 in. for cranes with No. 180112 end trucks and 6-1/4 in. for No. 180113 end trucks.

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GENERAL INFORMATION

Trambeam cranes are available for rated loads to 30 tons. They provide complete plant coverage and are used to move almost every conceivable type of material in practically every industry. Trambeam cranes increase productivity by utilizing overhead space and have the flexibility to meet facilities change and expansion.

All Trambeam cranes are essentially the same in construction and vary only in rated load and span. They consist of a bridge girder fitted to end trucks which operate on the lower flange of the runways. The runways consist of at least two and as many additional tracks as may be required to provide the desired area coverage.

Cranes may use single or double girder construction depending on rated load, span and lift required. They may be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation and rated load. When motor driven, or when electric hoists operate on the crane, they are equipped with conductors and current collectors as described in the Electrification Section.

Trambeam cranes are manufactured with as many standard components as possible to provide quality equipment at a reasonable cost. Where standard components are not suitable for a particular application, special combinations are used to provide the best suited equipment for the application

SINGLE GIRDER CRANES

Single girder cranes are available in two series - light duty and standard. The components for each series have been carefully selected to provide many years of dependable, trouble-free service.

Light duty cranes are always hand propelled and provide maximum economy for light loads and short spans. Specifications for these cranes are given on Pages CR-3 through CR-5.

Standard single girder cranes may be hand propelled, hand racked or motor driven and are available for rated loads to 10 tons. Two-runway cranes are available with spans to 100 feet. Multiple runway cranes are also available. Specifications, dimensional data and selection procedure are given on Pages CR-6 through CR-29.

Low headroom single girder cranes are available for buildings with low truss elevations or other obstructions which may restrict the hoist lift. Low headroom cranes provide maximum lift under these conditions; but some flexibility is sacrificed. Specifications and dimensional data on low headroom connections are given on Pages CR-37 and CR-38.

DOUBLE GIRDER CRANES

Double girder cranes are generally used on systems having long spans and where heavier loads are handled. They require minimum headroom and are often used in handling lighter loads where maximum lift is required. Double girder cranes are available for rated loads to 30 tons. Two runways cranes are available with spans to 100 feet. Multiple runway cranes are also available. Specifications, dimensional data and selection procedure are given on Pages CR-40 through CR-61.

TRANSFER CRANES

Transfer cranes are used to transfer loads from area to area, either directly from crane to crane or by fixed transfer sections or spur tracks. Most Trambeam cranes can be furnished as transfer cranes by the addition of interlock mechanisms to the ends of the bridge girders. Specifications and dimensional data are given on Pages CR-30 through CR-36 for single girder transfer cranes and on Pages CR-62 through CR-67 for double girder transfer cranes.

GANTRY CRANES

Trambeam gantry cranes are generally used where a particular work area is of an unusual nature or where an operation is repetitive. Single or double leg construction may be used. Girder construction may be single or double girder depending on the span, rated load and lift required. The gantry leg end truck has double flanged wheels which operate on a rail installed in the floor. Specifications and dimensional data are given on Pages CR-68 through CR-71.

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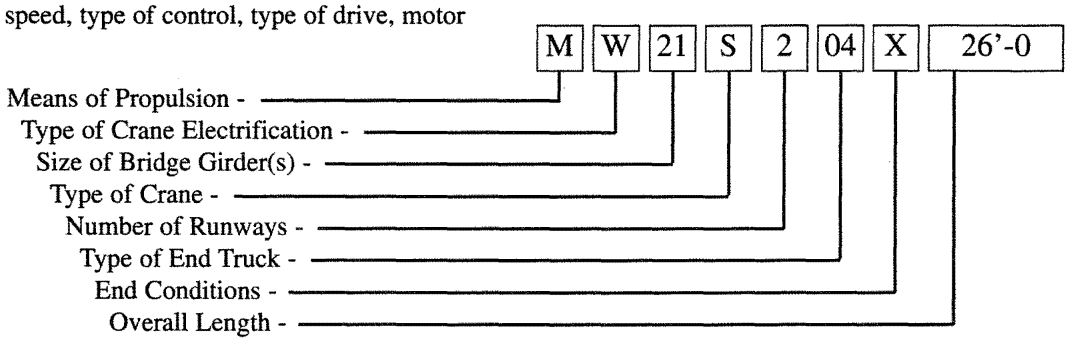
CODE FOR NUMBERING CRANES

Trambeam cranes are identified by a code numbering system indicating the major components of that particular crane. An explanation is given in the diagram below. In addition to the crane number, the span and overhangs of the bridge girder(s), rated load, speed, type of control, type of drive, motor horsepower and current characteristics must be indicated when specifying or ordering cranes. Special features such as girder coping, low headroom construction, brakes, etc., Must also be specified.



Means of Propulsion:
H - Hand Propelled
L - Light Duty Hand Propelled
M- Motor Driven
R - Hand Racked

Type of Electrification:
W - Insul-8-Bar
T - Tagline
F - Festooned

Size of Bridge Girder(s):
11 - No. 34011 (8 @ 15.9)
16 - No. 34016 (8-1/2 @ 19.4)
21 - No. 34021 (10 @ 22.2)
26 - No. 34026 (11-1/2 @ 26.3)
31 - No. 34031 (13 @ 29.3)
37 - No. 34037 (12-1/2 @ 33.6)
41 - No. 34041 (14 @ 38.5)
46 - No. 34046 (16 @ 42.7)
51 - No. 34051 (18 @ 50.3)
56 - No. 34056 (20 @ 55.0)
61 - No. 34061 (22-1/2 @ 61.4)
66 - No. 34066 (25 @ 67.8)
71 - No. 34071 (27-1/2 @ 82.8)
76 - No. 34076 (30 @ 92.0)
77 - No. 34077 (32 @ 108.6)
78 - No. 34078 (36 @ 122.1)
79 - No. 34079 (40 @ 135.6)

Type of Crane:
S - Single Girder
D - Double Girder

Number of Runways:
2 - Two Runways
3 - Three Runways
4 - Four Runways

TYPE OF END TRUCK;
01 - 170301
02 - 170302; 180102; 180202
03 - 170303
04 - 170304; 180104; 180204
05 - 170305; 180205
06 - 170306; 180106; 180206
07 - 170307
08 - 170308; 170408; 180108; 180208
09 - 170309; 170409; 180209
12 - 170112; 180112; 180212
13 - 170313; 180113; 180213
14 - 170314; 170414; 180214
15 - 170315; 170415
16 - 170416
17 - 170417
18 - 170318; 170418
19 - 170319; 170419
20 - 170320; 170420
21 - 170321; 170421
22 - 170422
23 - 170423

End Conditions:
X - Plain End
L- Interlock
D - Discharge

Overall Length:
Exact Overall Length Stated in Feet and Inches

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LIGHT DUTY SINGLE GIRDER CRANES

Light duty, single girder cranes provide maximum economy for light loads and short spans. Although designed for light duty service, quality components provide many years of dependable trouble-free service. They are available for rated loads to 2 tons and spans to 20 feet. Light duty cranes are always hand propelled. Crane selection is made from the table on Page CR-5.

Nos. 34011, 34016 and 34021 light rail sections are used for girders. Only carriers with 4 inch and 5 inch diameter wheels can operate on these cranes. No. 340136 end stops are provided on each end of the girder.

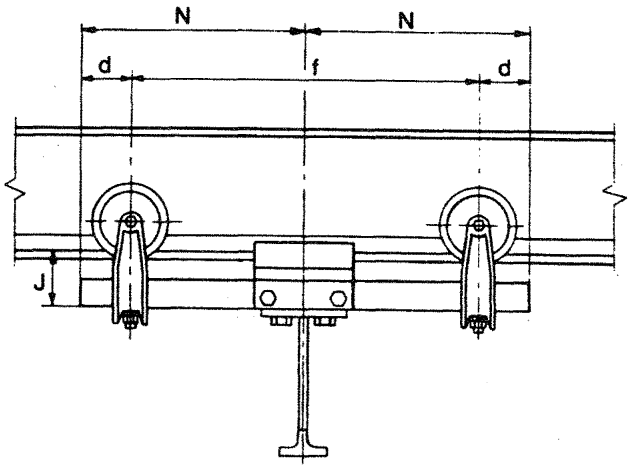
Light duty cranes may be electrified with Insul-8-Bar's 90 amp conductors. Cranes with Insul-8-Bar electrification include No. 560374 collectors on one end truck. All light duty cranes may be equipped with tagline conductors.

Light duty cranes with No. 34021 girders can be furnished with Type L interlocks for transferring loads through fixed transfer sections or to spur tracks. They are not used for crane to crane transfers. No. 34021 girders are used on transfer cranes cataloged with Nos. 34011 or 34016 girders because the depth of these girders does not permit installation of the interlock. These cranes do not require guide rollers or guide roller guides. When 2 or more light duty transfer cranes operate on the same runway, the cranes must have end trucks that maintain the same elevation of the girder treads.

LIGHT DUTY CRANE END TRUCKS

Three end trucks are used on light duty cranes. The drawing illustrates the No. 170302 end truck. The table indicates the item number, rated load, carrier heads, minimum girder overhang, net weight and principal dimensions for each end truck. Complete specifications on carrier heads and wheel assemblies are listed in the Carrier Section.

The load bars are made from steel tubing. Lugs are provided to limit the drop of the end truck to 1 inch or less in the event of a wheel or axle failure. The No.170302 end truck uses (2) 5/8 inch capscrews for girder attachment; Nos.170301 and 170303 end truck uses (4) 5/8 inch capscrews.



End Truck Item Number	Rated Load (Lbs.)	Carrier Head Item No.	Net Weight (Lbs.)	Minimum Girder Overhang		d	f	J	N
				Non-Elect.	Electrified				
170301	5,000	010205	94	4-3/4	8-7/8	3-1/2	2'-0	4-1/2	1'-3-1/2
170302	2,400	010201	43	3-1/2	8-7/8	3-1/2	2'-0	3-7/8	1'-3-1/2
170303	4,000	010203	69	4-3/4	8-7/8	3-1/2	2'-0	4-1/2	1'-3-1/2

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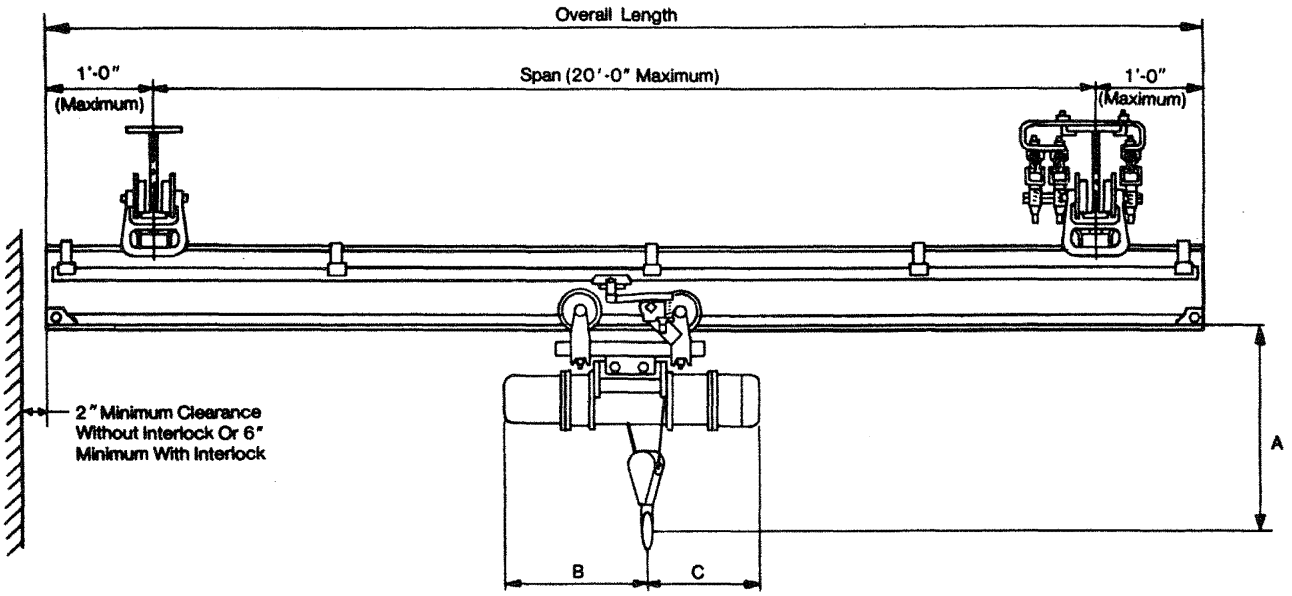
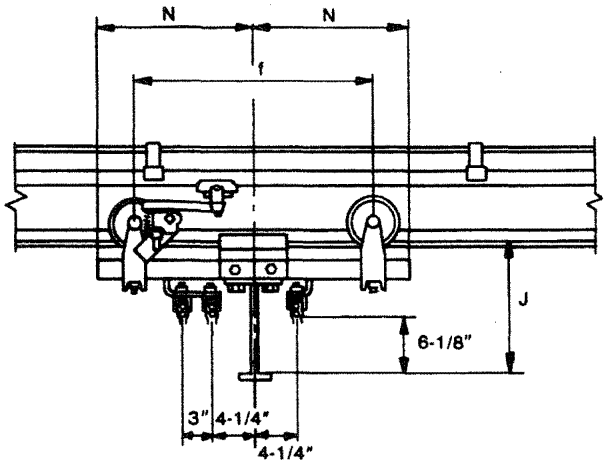
CLEARANCE DRAWING FOR LIGHT DUTY CRANES

The drawing illustrates the clearance for a light duty crane with 3 conductor Insul-8-Bar electrification. Clearances for a non-electrified crane are the same as shown for the electrified crane. Dimensions f, J and N are shown in the table on Page CR-5. To determine dimensions A, B and C, refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See end truck table on Page CR-3 for minimum girder overhangs.





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SELECTION OF LIGHT DUTY CRANES

Light duty cranes are listed by rated load and span. Rated loads are based on a carrier design load which is adequate for most applications. The carrier design load includes hoist and carrier weights, rated load and 15% impact allowance. The design load is indicated in the table.

Crane selection is made by:

Step 1 - Determine actual carrier load (weights of hoist and carrier selected for the crane, rated load and impact allowance, if applicable).

Step 2 - Select crane from table providing actual load is no greater than the design load.

If the actual load exceeds the 2 ton design load, select a standard single girder crane from the table on Page CR-15.

The weights are based on cranes with 3 conductors of Insul-8-Bar. Cranes are listed with an overall length based on a nominal span between runway tracks and 1'-0 maximum girder overhangs.

Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	f	J	N
1/2	1360	LW11S202X10	308	8	10	2'-0	11-1/2	1'-3-1/2
		LW11S202X12	350	10	12	2'-0	11-1/2	1'-3-1/2
		LW11S202X14	391	12	14	2'-0	11-1/2	1'-3-1/2
		LW11S202X16	433	14	16	2'-0	11-1/2	1'-3-1/2
		LW11S202X18	464	16	18	2'-0	11-1/2	1'-3-1/2
		LW11S202X20	515	18	20	2'-0	11-1/2	1'-3-1/2
		LW16S202X22	634	20	22	2'-0	1'-0	1'-3-1/2
1	2540	LW11S203X10	369	8	10	2'-0	1'-0-1/8	1'-3-1/2
		LW11S203X12	411	10	12	2'-0	1'-0-1/8	1'-3-1/2
		LW16S203X14	452	12	14	2'-0	1'-0-1/8	1'-3-1/2
		LW11S203X16	494	14	16	2'-0	1'-0-1/8	1'-3-1/2
		LW16S203X18	598	16	18	2'-0	1'-0-5/8	1'-3-1/2
		LW16S203X20	646	18	20	2'-0	1'-0-5/8	1'-3-1/2
		LW16S203X22	695	20	22	2'-0	1'-0-5/8	1'-3-1/2
1-1/2	3660	LW11S203X10	369	8	10	2'-0	1'-0-1/8	1'-3-1/2
		LW11S203X12	411	10	12	2'-0	1'-0-1/8	1'-3-1/2
		LW11S203X14	452	12	14	2'-0	1'-0-1/8	1'-3-1/2
		LW16S203X16	550	14	16	2'-0	1'-0-5/8	1'-3-1/2
		LW16S203X18	598	16	18	2'-0	1'-0-5/8	1'-3-1/2
		LW16S203X20	646	18	20	2'-0	1'-0-5/8	1'-3-1/2
		LW21S203X22	756	20	22	2'-0	1'-2-1/8	1'-3-1/2
2	5110	LW11S201X10	410	8	10	2'-0	1'-0-1/8	1'-3-1/2
		LW11S201X12	452	10	12	2'-0	1'-0-1/8	1'-3-1/2
		LW16S201X14	542	12	14	2'-0	1'-0-5/8	1'-3-1/2
		LW16S201X16	591	14	16	2'-0	1'-0-5/8	1'-3-1/2
		LW16S201X18	639	16	18	2'-0	1'-0-5/8	1'-3-1/2
		LW21S201X20	743	18	20	2'-0	1'-2-1/8	1'-3-1/2
		LW21S201X22	797	20	22	2'-0	1'-2-1/8	1'-3-1/2

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STANDARD SINGLE GIRDER CRANES

Standard, 2-runway, single girder Trambeam cranes are cataloged for rated loads to 10 tons and for spans to 100 feet. Multiple runway cranes are also available; consult factory for assistance on these applications. Selection of 2-runway cranes is made in accordance with the procedure outlined on Page CR-13.

These cranes may be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation, span, elevation and rated load. When used with electric hoists or when motor driven, they are equipped with an electrification system as described on subsequent pages and in the Electrification Section.

Service classifications for cranes are described in ANSI MH 27.1 Specification for Underhung Cranes and Monorail Systems. Cataloged cranes will generally meet the service classification of the hoist and carrier selected to operate on the crane and the requirements of the comparable ANSI MH 27.1 service classification.

For Class D cranes with speeds greater than 200 FPM and all Class E severe duty cranes, consult factory for recommendations.

Complete specifications for bridge girders, girder connections, end trucks, motor driven cranes and crane electrification are described below and on subsequent pages.

BRIDGE GIRDERS

Trambeam track sections as described in the Track & Fitting Section are used for bridge girders. No. 34016 (8-1/2 @ 19.4) is the minimum size girder used on hand propelled cranes. No. 34021 (10 @ 22.2) is the minimum size girder used on motor driven cranes.

Bridge girders with light rails (Nos. 34016 through 34031) are limited to carriers with 4 inch and 5 inch diameter wheels and a maximum carrier head load of **5,000** pounds. Girders with heavy rails (Nos. 34037 through 34079) are limited to a maximum carrier head load of 7,500 pounds.

Bridge girder deflection is limited to 1/450 of the span for cranes having spans of 46' or less. For spans greater than 46', the ratio is reduced so that actual deflection does not exceed 1-1/4 inch.

Brace angles between the bridge girder top flange and end truck are provided on cranes with spans of 20 feet or greater. One brace angle is furnished at each end truck on cranes with spans between 20 feet and 60 feet. Two brace angles are furnished at each end truck on cranes with spans greater than 60 feet.

GIRDER CONNECTIONS

Girder connections to the end trucks utilize key plates on the girder top flange and milled slots in the end truck load bars. The key plates are aligned by an optical instrument and welded into position. A tolerance fit between the key plate and milled slot provides a rigid connection which does not rely on the fit of the attaching hardware in the mounting holes.

END TRUCKS

A complete line of end trucks is available with rated loads from 4,000 to 30,000 pounds. All trucks are available with standard and extended wheelbases. The extended wheelbase trucks are used primarily on long span cranes to provide a minimum 10:1 ratio of span to wheelbase. The use of extended wheelbase trucks on shorter span cranes may also permit the use of a smaller size runway track which is desirable when hook lift is critical. The smaller runway track will also result in a more economical runway cost.

End truck load bars consist of steel channels, plates and bars which are welded into a rigid assembly. After welding, the load bar is machined to control vertical elevations, squareness of trucks and interchangeability of parts. A milled slot, provided at the center of the load bar for girder attachment, serves as the vertical reference for other load bar machining. This results in a uniform dimension between the treads of the runway and bridge girder which is essential to the successful operation of transfer cranes. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

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STANDARD SINGLE GIRDER CRANES

Cranes with trucks having 5 inch diameter wheels operate on all sizes of track. Cranes with trucks having 6-1/2 inch or 8 inch diameter wheels operate on heavy rail track sections only. Certain extended wheelbase trucks are limited in track size by the height of the load bar channels. These runway restrictions are noted on Pages CR-11 and CR-12 and in the crane tables.

MOTOR DRIVEN CRANES

When there are frequent crane movements or long travel distances, motor driven cranes will increase productivity. A motor driven crane improves employee morale and will usually pay for itself in a short period of time.

Motor driven, 2-runway cranes are identical to hand propelled cranes with the addition of tractor drives at each end truck and a motor control system. Multiple runway cranes are driven by two or more tractor drives depending on its length, speed and service classification.

Three tractor drives (Nos. 2408, 2409 and 24010) are available to meet a wide range of applications. All are satisfactory for class D heavy duty service. Complete data on tractor drives, motor control and horsepower requirements are contained in the Tractor Drive Section.

Nominal speeds for single girder cranes are 55 and 90 FPM when No. 2401l0 drives are used; 100, 125, 150 and 200 FPM when No. 2409 drives are used; and 100, 150, 200, 250 and 300 FPM when No. 2408 drives are used. Other speeds can be furnished.

Wiring and control panels comply with the requirements of OSHA electrical standards and Article 610 of the National Electric Code. Wiring is enclosed in rigid conduit insofar as possible. Crane control panels are furnished with fused motor circuit switch, mainline contactor, motor overcurrent protection, thermal overload relays in 3 phases and NEMA 12 dust-tight enclosures as standard.

CRANE ELECTRIFICATION

Crane electrification consists of a combination of power and control conductors. Power conductors supply current to the hoist, carrier and any motor operated accessories on the hoist and carrier. Control conductors carry the signals from the operating station to the motor controls.

The number of power conductors depends on the characteristics of the power source. Two power conductors are required for direct current applications. Three power conductors are required for 3 phase alternating current; 4 power conductors are sometimes used for 3 phase alternating current with the 4th conductor used for equipment grounding.

The number of control conductors depends on the location of the operating station, the number of motions being controlled, type of speed control for each motion and control circuit and mainline contactor arrangements.

Three control arrangements are available for motor driven cranes. These arrangements cover the majority of applications and are as follows:

TYPE I control has the operating station on the hoist or carrier. With this arrangement, control conductors are required for the crane motion, mainline contactor and any accessories on the crane. The total number of crane conductors for various combinations of power and crane control used on Type I control is listed in the table on Page CR-8.

TYPE II control has the operating station on the crane. With this arrangement, control conductors are required for the hoist and carrier motions and accessory equipment on the hoist and carrier.

The total number of crane conductors for various combinations of power and hoist and carrier control used on Type II control is listed in the table on Page CR-8.

TYPE III control has 2 operating stations. One is located on the crane and operates the crane motion. The other is located on the hoist or carrier and operates the hoist and carrier motions. With this arrangement, control conductors are not required.

The number of conductors listed in the tables on Page CR-8 for Types I and II control is based on (1) a control circuit arrangement which uses 2 transformers and (2) a mainline contactor arrangement which is operated by a maintained contact push button or toggle switch in the operating station.

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STANDARD SINGLE GIRDER CRANES

The control circuit arrangement requires one transformer in the crane control panel and is sized for the mainline contactor, crane control circuit and any crane accessories. A second transformer is supplied with the hoist and is sized for the hoist and carrier control circuits and any accessories on the hoist and carrier. Other control circuit and mainline contactor arrangements may add to the number of control conductors.

Collectors are required for the carrier to pick up current from the power conductors and supply power to the hoist and carrier motors. They are also required for transferring control functions from the operating stations to the control conductors. The number of carrier collectors is generally the same as the number of crane conductors. On transfer crane applications, tandem collector arrangements are usually required to activate the mainline contactor.

Insul-8-Bar's 90 amp steel conductor is the standard electrification for Trambeam cranes. Complete descriptions of conductor bars, insulating covers, collectors and accessories are in the Electrification Section. Conductor arrangements for single girder cranes are illustrated on Page CR-9.

Open conductors are not recommended as they do not meet the requirements of Article 610 of the National Electric Code.

Single girder cranes, except transfer cranes, may be equipped with festooned electrification; transfer cranes are equipped with rigid conductors to provide continuous power to the hoist and carrier motors as the transfer is made. Festooned electrification is described in the electrification Section.

NUMBER OF CRANE CONDUCTORS						
Type I Control			Type II Control			
	3 Phase Alternating Current				3 Phase Alternating Current	
Crane Control	3 Power Conductors	4 Power Conductors	Hoist Control	Carrier Control	3 Power Conductors	4 Power Conductors
Single Speed	7	8	Single Speed	Single Speed	8	9
2-Speed	8	9	2-Speed	Single Speed	9	10
			5-Speed	Single Speed	12	13
			Single Speed	2-Speed	9	10
			2-Speed	2-Speed	10	11
			5-Speed	2-Speed	13	14

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STANDARD SINGLE GIRDER CRANES

CONDUCTOR ARRANGEMENTS

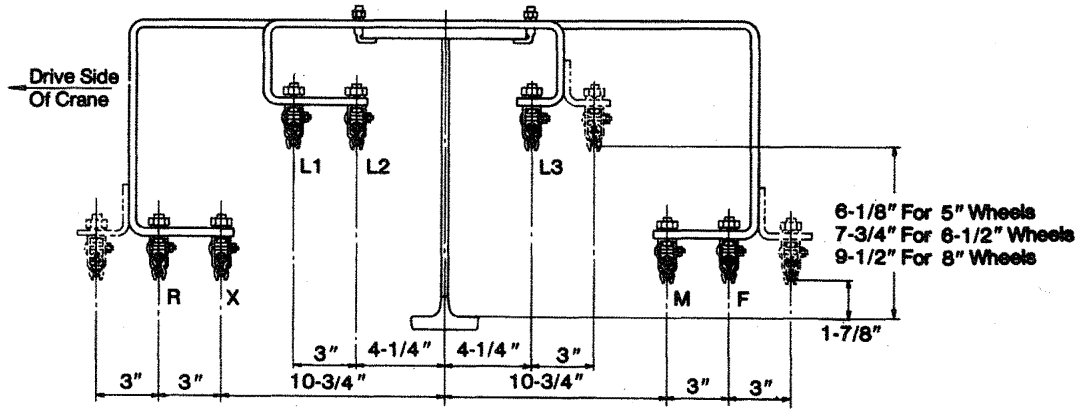
The drawings illustrate the standard arrangement of power and control conductors for motor driven, single girder cranes with Insul-8-Bar electrification. Power conductors (L1, L2 and L3) are 6-1/8 inch above the tread for light rail girders (Nos. 34021 through 34031). Heavy rail girders (Nos. 34037 through 34079) have the power conductors at 6-1/8 inch above the tread for carriers with 4 inch and 5 inch diameter wheels, 7-3/4 inch for carriers with 6-1/2 inch diameter wheels or 9-1/2 inch for carriers with 8 inch diameter wheels.

Control conductors (F, R, X and M) are 1-7/8 inch above the tread when the girder is No. 34056 or less. Cranes with No. 34061 or larger girders have the control conductors at the same elevation as the power conductors.

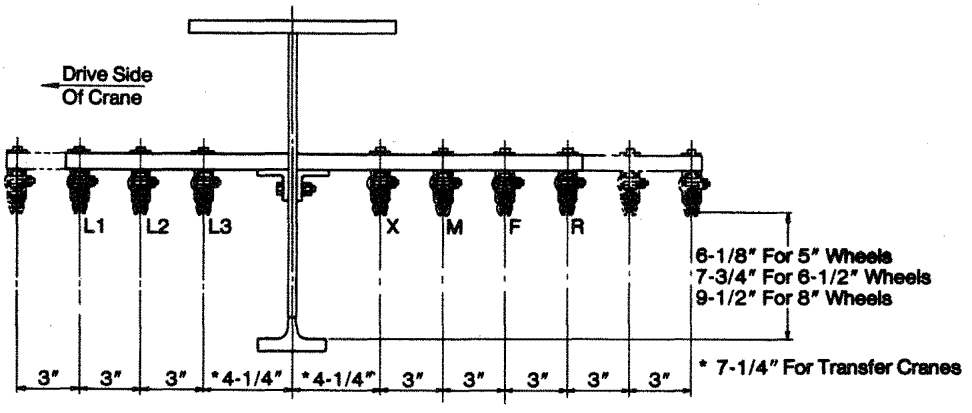
The conductors and supports shown by solid lines indicate the 7 conductor arrangement used with Type I single speed crane control. The dotted lines indicate the location of additional conductors for other control arrangements.

The illustrated arrangements are satisfactory for transfer cranes only when there are no switches in the spur track. When switches are located in the spur track, control conductors must be lowered to clear the switch stops and guards.

TYPICAL FOR NOS. 34021 THROUGH 34056 GIRDERS



TYPICAL FOR NOS. 34061 THROUGH 34079 GIRDERS



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STANDARD SINGLE GIRDER CRANES

BRIDGE GIRDER OVERHANGS

The table lists the minimum, standard and maximum overhangs for single girder cranes. Wherever possible, standard overhangs should be used.

Minimum overhangs for electrified cranes are based on runway electrified with 3 conductor Insul-8-Bar electrification arranged with 2 conductors mounted on the side of the runway away from the overhang.

The maximum overhang should be limited to a length that will not allow the hoist hook to travel beyond the center of the runway when the carrier is against the end stop or the interlock fork. In some cases overhangs greater than the listed maximum can be furnished; consult factory for assistance on these applications.

Minimum overhangs for interlock and discharge ends should be used on transfer cranes to utilize the standard interlock mechanism and to provide for mounting of guide rollers and guides. When overhang is greater than the minimum at the interlock end, the slide rod length may have to be increased to allow the throw out mechanism to clear the end truck load bar.

IMPORTANT: When laying out transfer crane systems or if future installation of an interlock is anticipated, check clearance between extreme of the guide roller or interlock latch and the nearest obstruction.

End Truck Item Number	Minimum						Standard	Maximum	
	Non-Electrified, Hand Propelled Cranes			Electrified, Hand Propelled and Motor Driven Cranes					
	Plain End	Interlock End*	Discharge End**	Plain End	Interlock End*	Discharge End**		Light Rail Girders	Heavy Rail Girders
170304; 170306	5-1/2	9-1/2	1'-2	8-7/8	9-1/2	1'-2	1'-0	1'-6	2'-0
170305; 170307	5-1/2	9-1/2	1'-2	8-7/8	9-1/2	1'-2	1'-0	1'-6	2'-0
170308; 170408	5-1/2	9-1/2	1'-2	8-1/4	9-1/2	1'-2	1'-0	1'-6	2'-0
170309; 170409	5-1/2	9-1/2	1'-2	8-1/4	9-1/2	1'-2	1'-0	1'-6	2'-0
170312	8-3/4	1'-1-1/8	1'-5	8-7/8	1'-1-1/8	1'-5	1'-0	2'-0	2'-6
170313	8-3/4	1'-1-1/8	1'-5	11-3/4	1'-1-1/8	1'-5	1'-0	2'-0	2'-6
170314; 170414	6-1/8	10-1/8	1'-2	8-1/4	10-1/8	1'-2	1'-0	-	2'-6
170315; 170415	6-3/8	10-3/4	1'-2-1/2	8-1/4	10-3/4	1'-2-1/2	1'-0	-	2'-6
170416	7-1/4	10-1/8	1'-2	11-5/8	10-1/8	1'-2	1'-0	-	2'-6
170417	7-1/4	10-3/8	1'-2-1/2	11-3/4	10-3/8	1'-2-1/2	1'-0	-	2'-6
170318; 170418	8-3/4	1'-1-1/8	1'-5	8-3/4	1'-1-1/8	1'-5	1'-0	2'-0	2'-6
170319; 170419	8-5/8	1'-0-5/8	1'-4-1/2	11-3/4	1'-0-5/8	1'-4-1/2	1'-0	2'-0	2'-6
170320; 170420	10	1'-2-3/8	1'-6-1/2	10	1'-2-3/8	1'-6-1/2	1'-0	-	3'-0
170321; 170421	10-1/4	1'-2-5/8	1'-6-1/2	1'-0	1'-2-5/8	1'-6-1/2	1'-0	-	3'-0
170422	1'-0	1'-4-3/8	1'-8-1/2	1'-0	1'-4-3/8	1'-8-1/2	1'-0	-	3'-0
170423	1'-0-1/4	1'-4-5/8	1'-8-1/2	1-0-1/4	1'-4-5/8	1'-8-1/2	1'-1	-	3'-0

*Minumum bridge girder overhang provides space for mounting of No. 4504 guide roller. Guide roller projects 5-1/2" beyond end of the bridge girder. This projection must be taken into account in laying out transfer crane systems.

**Minumum bridge girder overhang provides space for mounting of No. 4501007 guide roller guide.

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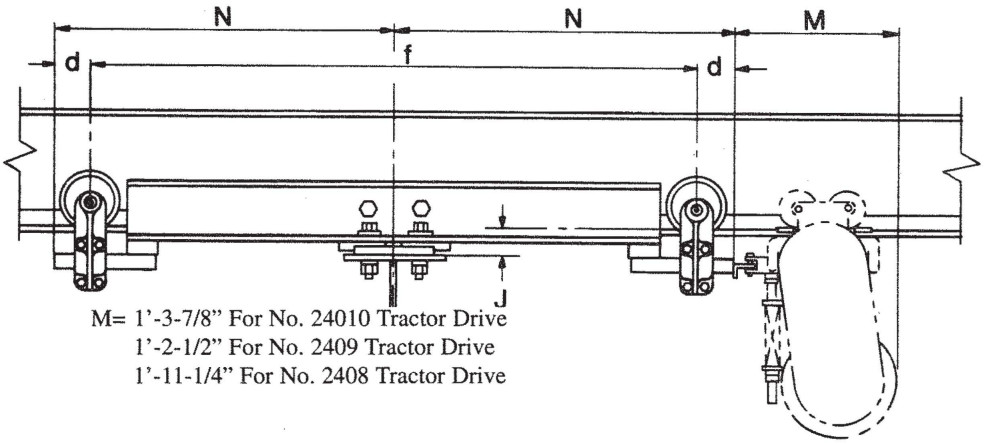
STANDARD SINGLE GIRDER CRANES

4-WHEEL END TRUCKS

The drawing illustrates the No. 170308 end truck and is typical for all 4-wheel end trucks. The table indicates the end truck item number, rated load, carrier head, net weight, minimum size runway track and principal dimensions. See Carrier Section for specifications on carrier heads and wheel assemblies.

Load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness and to provide interchangeability. A milled slot, provided at the center of the load bar for girder attachment, also serves as the vertical reference for other load bar machining. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

The 4,000 and 6,000 pound trucks have bronze washers between the underside of the load bar and carrier head yokes for free swivel of the heads. The 8,000, 13,000 and 15,000 pound trucks have self-aligning bushings in the connection between the carrier heads and the load bar to provide equal wheel loading and free swivel of the heads.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

End Truck Item Number	Rated Load (Pounds)	Carrier Head Item No.	Net Weight (Pounds)	Minimum Runway Size	d	f	J	N
170304	4,000	010203	150	34011	3-1/8	4'-0	1-7/8	2'-3-1/8
170305	4,000	010203	193	34011	3-1/8	6'-0	1-7/8	3'-3-1/8
170306	6,000	010205	164	34011	3-1/8	4'-0	1-7/8	2'-3-1/8
170307	6,000	010205	207	34011	3-1/8	6'-0	1-7/8	3'-3-1/8
170308	8,000	010207	179	34011	3-3/4	4'-0	1-7/8	2'-3-3/4
170408	8,000	010208	191	34011	3-3/4	4'-0	1-7/8	2'-3-3/4
170309	8,000	010207	263	34011	3-3/4	6'-0	1-7/8	3'-3-3/4
170408	8,000	010208	275	34011	3-3/4	6'-0	1-7/8	3'-3-3/4
170314	13,000	010209	304	34037	4-1/4	4'-0	2-1/2	2'-4-1/4
170414	13,000	010210	326	34037	4-1/4	4'-0	2-1/2	2'-4-1/4
170315	13,000	010209	487	34037	4-1/4	7'-0	2-1/2	3'-10-1/4
170415	13,000	010210	509	34037	4-1/4	7'-0	2-1/2	3'-10-1/4
170416	15,000	010211	403	34037	4-1/4	4'-0	2-1/2	2'-4-1/4
170417	15,000	010211	586	34037	4-1/4	7'-0	2-1/2	3'-10-1/4

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STANDARD SINGLE GIRDER CRANES

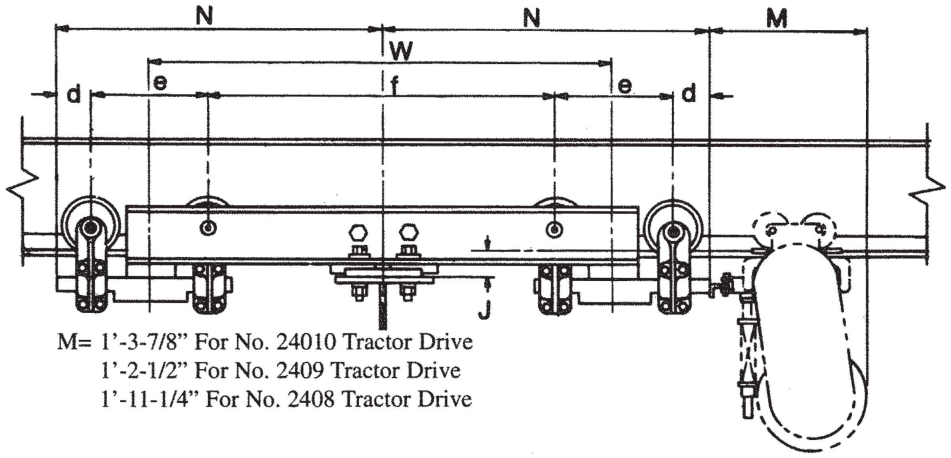
8-WHEEL END TRUCKS

The drawing illustrates the No. 170318 end truck and is typical for all 8-wheel end trucks. The table indicates the end truck item number, rated load, carrier head, net weight, minimum size of runway track and principal dimensions. See Carrier Section for specifications on carrier heads and wheel assemblies.

Load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness and to provide interchangeability. A milled slot, provided at the center of the load bar for girder attachment, also serves as the vertical reference for the load bar machining. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

The 4-wheel carrier load bars are made from steel plate which is machined to control vertical elevations. Self-aligning bushings are used between the carrier load bars and main load bar to provide equal carrier head loading.

The 12,000 pound trucks have bronze washers between the carrier load bar and carrier heads for free swivel of the carrier heads. All other 8-wheel trucks have self-aligning bushings between the carrier heads and carrier load bar to provide equal wheel loading and free swivel of the heads.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

End Truck Item Number	Rated Load (Pounds)	Carrier Head Item No.	Net Weight (Pounds)	Minimum Runway Size	d	e	f	J	N	W
170312	12,000	010205	433	34011	3-1/2	1'-0	3'-8	1-7/8	3'-1-1/2	4'-8
170313	12,000	010205	527	34011	3-1/2	1'-0	7'-0	1-7/8	4'-9-1/2	8'-0
170318	16,000	010207	447	34011	3-3/4	1'-0	3'-8	1-7/8	3'-1-3/4	4'-8
170418	16,000	010208	471	34011	3-3/4	1'-0	3'-8	1-7/8	3'-1-3/4	4'-8
170319	16,000	010207	708	34031	3-3/4	1'-0	7'-0	1-7/8	4'-9-3/4	8'-0
170419	16,000	010208	732	34031	3-3/4	1'-0	7'-0	1-7/8	4'-9-3/4	8'-0
170320	26,000	010209	734	34037	4-1/4	1'-3	4'-6	2-1/2	3'-10-1/4	5'-9
170420	26,000	010210	778	34037	4-1/4	1'-3	4'-6	2-1/2	3'-10-1/4	5'-9
170321	26,000	010209	1,193	34041	4-1/4	1'-3	8'-9	2-1/2	5'-11-3/4	10'-0
170421	26,000	010210	1,237	34041	4-1/4	1'-3	8'-9	2-1/2	5'-11-3/4	10'-0
170422	30,000	010211	1,026	34037	4-1/4	1'-3	4'-6	2-1/2	3'-10-1/4	5'-9
170423	30,000	010211	1,440	34041	4-1/4	1'-3	8'-0	2-1/2	5'-7-1/4	9'-3

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SELECTION OF STANDARD SINGLE GIRDER CRANES

Standard single girder, 2-runway cranes are tabulated on subsequent pages by (1) means of propulsion, (2) number of end truck wheels, (3) rated load and (4) span. The tables provide a simple means for crane selection and indicate the crane code number, net weight, minimum runway size and clearance dimensions. End truck wheelbase dimensions are also provided to assist in determining the runway size.

Hand propelled cranes are listed for rated loads of 1, 2 and 3 tons and spans from 12'-0 to 40'-0. Cranes with greater rated load and span or with bridge girder tread elevations greater than 12'-0 are not recommended for hand propelling. Motor driven cranes are listed for rated loads of 1, 2, 3, 5, 7-1/2 and 10 tons.

Crane rated loads are based on a carrier design load which is adequate for most applications. The carrier design load includes: (1) hoist and carrier weights, (2) rated load and (3) 15% impact allowance. The design load is shown in the tables.

Crane selection is made by:

STEP 1 - Determine actual carrier load (weights of hoist and carrier selected for the crane, rated load and impact allowance, if applicable).

STEP 2 - Select crane from table providing actual load is no greater than the design load.

If the actual load exceeds the design load, it is necessary to calculate the girder and end truck loads and select the components on the basis of the calculated loads

Crane code numbers indicate the means of propulsion, type of electrification, bridge girder size, type of end truck and overall length of bridge girder. Page CR-2 provides a complete explanation of the crane code numbering system.

Net weights of hand propelled cranes are for cranes with 3 conductors of Insul-8-Bar. Net weights of motor driven cranes are for cranes with 7 conductors of Insul-8-Bar and motorization with No. 2409 tractor drives. Cranes with No. 2408 drives are approximately 400 pounds heavier than the weight indicated in the tables. Cranes with No. 24010 drives are approximately 120 pounds less than the weight indicated in the tables.

Cranes are listed with an overall length based on a nominal span between runway tracks and 1'-0 nominal girder overhangs. See Page CR-10 for minimum, maximum and standard overhangs when determining the crane span and overall length.

A clearance drawing is provided on the page facing each crane table. The drawings for motor driven cranes locate the control panel elevation for crane with Nos. 34021 through 34056 girders. The horizontal spacing of the panel varies with the type of control and collector arrangement. Consult factory for this dimension if the possibility exists for interference between the panel and building, lights, etc.

Dimension J is the distance between the running treads of the runway track and bridge girder and is shown in the crane tables for full depth bridge girders. The dimension will decrease and provide closer headroom if the bridge girder is coped or low headroom end truck construction is used. See Pages CR-37 and CR-38 for data on coped bridge girders and low headroom cranes.

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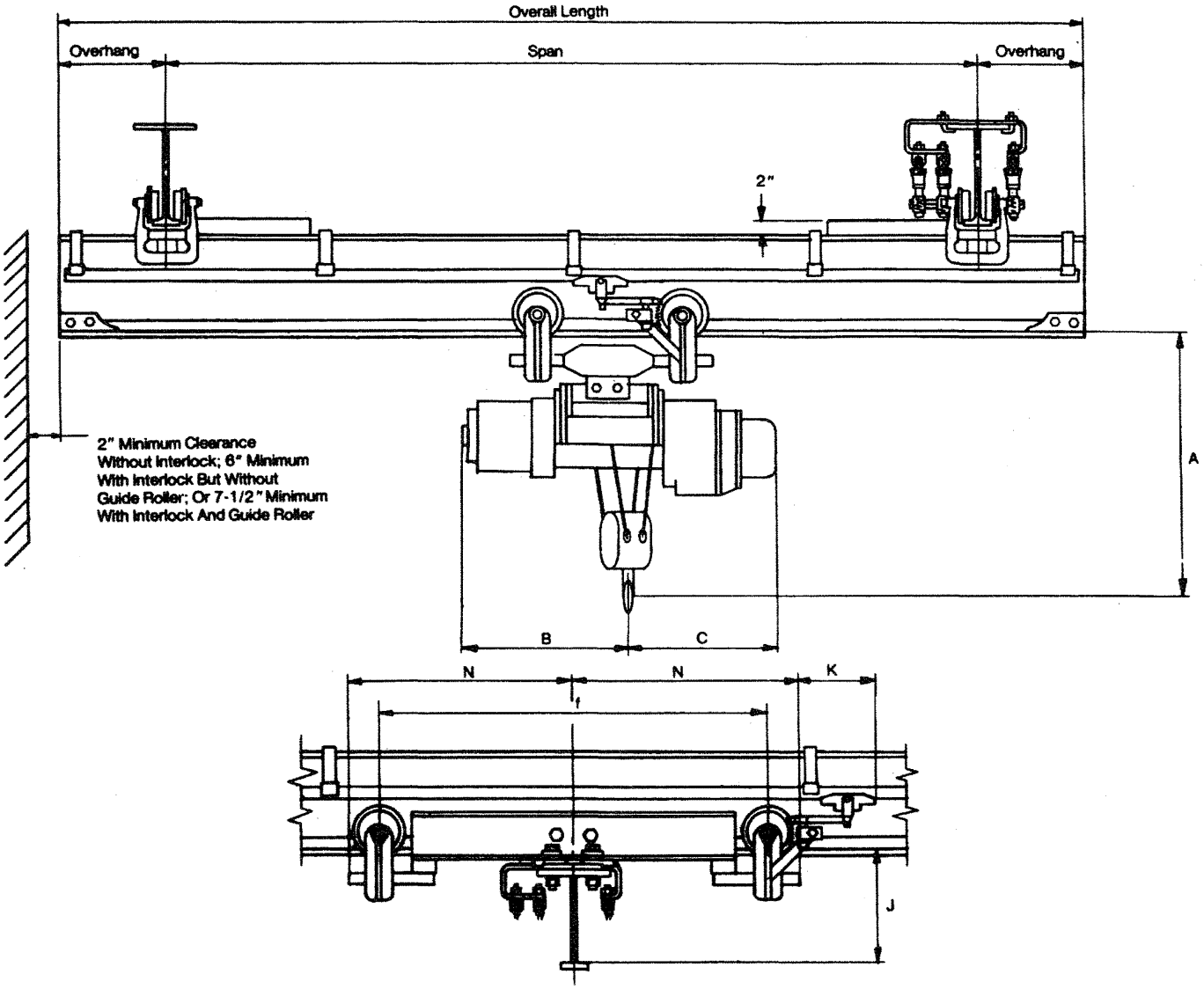
STANDARD SINGLE GIRDER CRANES

CLEARANCE DRAWING FOR HAND PROPELLED CRANES WITH 4-WHEEL END TRUCKS

The drawing illustrates the clearances of a hand propelled crane with 4-wheel end trucks and 3 conductor Insul-8-Bar electrification. Clearances of a non-electrified crane are the same except there is no collector overhang on the end truck. On electrified cranes, the runway end stops at the collector end of the crane should be located a sufficient distance from the end of the runway to prevent the collectors from leaving the conductors. When 2 or more electrified cranes operate on the same runway, cranes should be equipped with extension bumpers to prevent the collectors from hitting.

Dimensions f, J, K and N are shown on the facing page. To determine dimensions A, B and C refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See Page CR-10 for minimum, maximum and standard bridge girder overhangs.



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STANDARD SINGLE GIRDER CRANES

HAND PROPELLED CRANES WITH 4-WHEEL END TRUCKS

HAND PROPELLED CRANES WITH 4-WHEEL END TRUCKS										
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	f	J	K	N
1	2920	HW16S204X14	673	12	14	34011	4'-0	10	9-5/8	2'-3-1/8
		HW16S204X16	722	14	16	34011	4'-0	10	9-5/8	2'-3-1/8
		HW16S204X18	770	16	18	34011	4'-0	10	9-5/8	2'-3-1/8
		HW16S204X20	818	18	20	34011	4'-0	10	9-5/8	2'-3-1/8
		HW16S204X22	901	20	22	34011	4'-0	10	9-5/8	2'-3-1/8
		HW21S204X24	1016	22	24	34011	4'-0	11-1/2	9-5/8	2'-3-1/8
		HW21S204X26	1071	24	26	34011	4'-0	11-1/2	9-5/8	2'-3-1/8
		HW21S204X28	1125	26	28	34011	4'-0	11-1/2	9-5/8	2'-3-1/8
		HW26S204X30	1301	28	30	34011	4'-0	1'-1	9-5/8	2'-3-1/8
		HW26S204X32	1364	30	32	34011	4'-0	1'-1	9-5/8	2'-3-1/8
		HW31S204X34	1528	32	34	34011	4'-0	1'-2-1/2	9-5/8	2'-3-1/8
		HW31S204X36	1596	34	36	34011	4'-0	1'-2-1/2	9-5/8	2'-3-1/8
		HW41S204X38	2006	36	38	34011	4'-0	1'-3-1/4	9-5/8	2'-3-1/8
		HW46S204X40	2252	38	40	34011	4'-0	1'-5-1/4	9-5/8	2'-3-1/8
		HW46S204X42	2347	40	42	34011	4'-0	1'-5-1/4	9-5/8	2'-3-1/8
2	5330	HW16S206X14	701	12	14	34011	4'-0	10	10-1/8	2'-3-1/8
		HW16S206X16	750	14	16	34011	4'-0	10	10-1/8	2'-3-1/8
		HW16S206X18	797	16	18	34011	4'-0	10	10-1/8	2'-3-1/8
		HW21S206X20	902	18	20	34011	4'-0	11-1/2	10-1/8	2'-3-1/8
		HW21S206X22	991	20	22	34011	4'-0	11-1/2	10-1/8	2'-3-1/8
		HW26S206X24	1143	22	24	34011	4'-0	1'-1	10-1/8	2'-3-1/8
		HW26S206X26	1205	24	26	34011	4'-0	1'-1	10-1/8	2'-3-1/8
		HW31S206X28	1351	26	28	34011	4'-0	1'-2-1/2	10-1/8	2'-3-1/8
		HW31S206X30	1413	28	30	34011	4'-0	1'-2-1/2	10-1/8	2'-3-1/8
		HW41S206X32	1776	30	32	34011	4'-0	1'-3-1/4	10-1/8	2'-3-1/8
		HW41S206X34	1862	32	34	34011	4'-0	1'-3-1/4	10-1/8	2'-3-1/8
		HW41S206X36	1948	34	36	34011	4'-0	1'-3-1/4	10-1/8	2'-3-1/8
		HW46S206X38	2186	36	38	34011	4'-0	1'-5-1/4	10-1/8	2'-3-1/8
		HW46S206X40	2280	38	40	34011	4'-0	1'-5-1/4	10-1/8	2'-3-1/8
		HW51S208X42	2724	40	42	34011	4'-0	1'-7-1/4	9-3/8	2'-3-3/4
3	8030	HW16S208X14	737	12	14	34011	4'-0	10	9-3/8	2'-3-3/4
		HW21S208X16	831	14	16	34011	4'-0	11-1/2	9-3/8	2'-3-3/4
		HW21S208X18	884	16	18	34011	4'-0	11-1/2	9-3/8	2'-3-3/4
		HW26S208X20	1020	18	20	34011	4'-0	1'-1	9-3/8	2'-3-3/4
		HW26S208X22	1117	20	22	34011	4'-0	1'-1	9-3/8	2'-3-3/4
		HW31S208X24	1252	22	24	34011	4'-0	1'-2-1/2	9-3/8	2'-3-3/4
		HW31S208X26	1315	24	26	34011	4'-0	1'-2-1/2	9-3/8	2'-3-3/4
		HW41S208X28	1640	26	28	34011	4'-0	1'-3-1/4	9-3/8	2'-3-3/4
		HW41S208X30	1726	28	30	34011	4'-0	1'-3-1/4	9-3/8	2'-3-3/4
		HW46S214X32	2191	30	32	34037	4'-0	1'-5-7/8	8-1/2	2'-4-1/4
		HW46S214X34	2285	32	34	34037	4'-0	1'-5-7/8	8-1/2	2'-4-1/4
		HW51S214X36	2652	34	36	34037	4'-0	1'-7-7/8	8-1/2	2'-4-1/4
		HW51S214X38	2759	36	38	34037	4'-0	1'-7-7/8	8-1/2	2'-4-1/4
		HW56S214X40	3055	38	40	34037	4'-0	1'-9-7/8	8-1/2	2'-4-1/4
		HW56S214X42	3174	40	42	34037	4'-0	1'-9-7/8	8-1/2	2'-4-1/4

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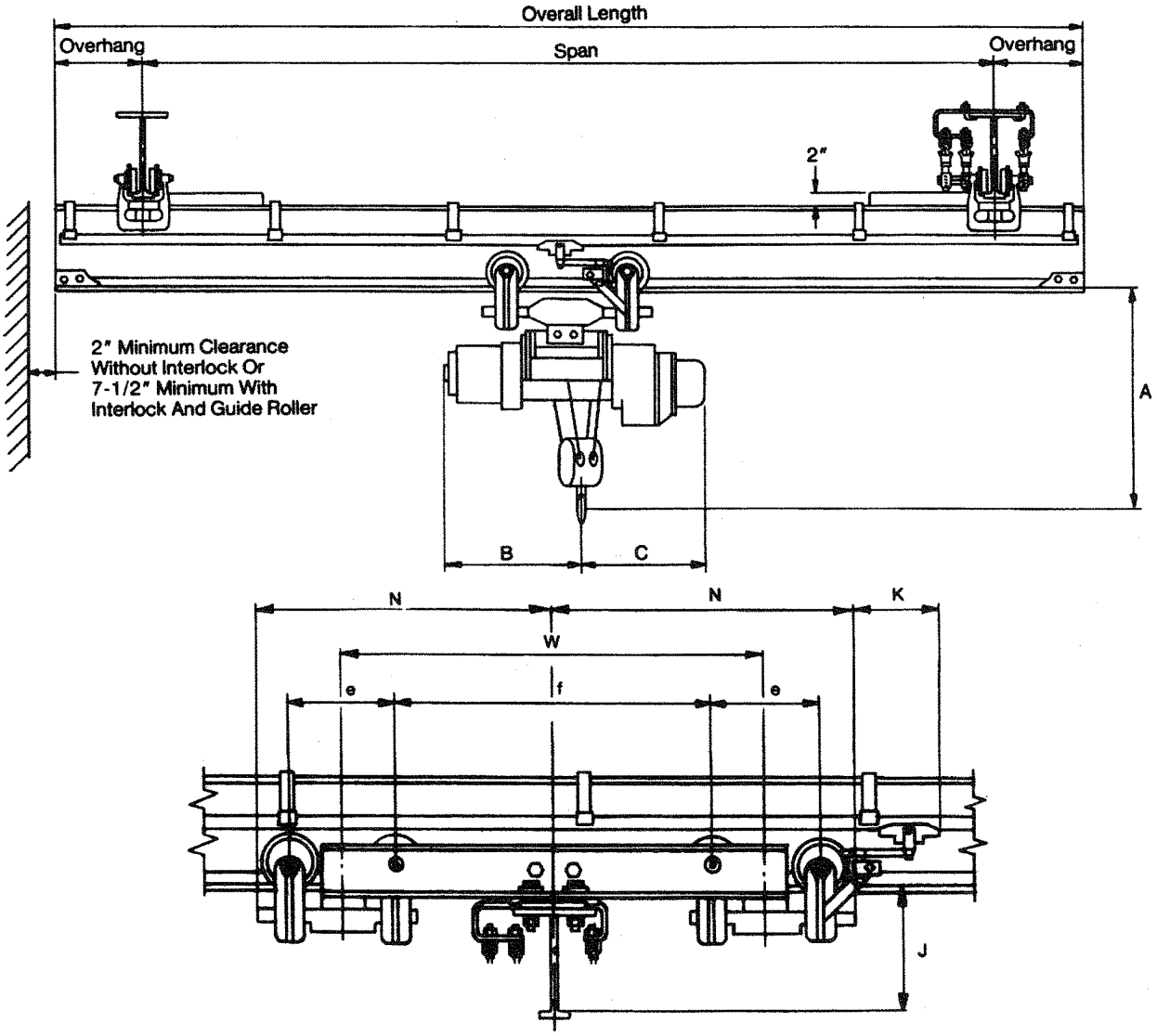
STANDARD SINGLE GIRDER CRANES

CLEARANCE DRAWING FOR HAND PROPELLED CRANES WITH 8-WHEEL END TRUCKS

The drawing illustrates the clearances of a hand propelled crane with 8-wheel end trucks and 3 conductor Insul-8-Bar electrification. Clearances of a non-electrified crane are the same except there is no collector overhang on the end truck. On electrified cranes, the runway end stops at the collector end of the crane should be located a sufficient distance from the end of the runway to prevent the collectors from leaving the conductors. When 2 or more electrified cranes operate on the same runway, cranes should be equipped with extension bumpers to prevent the collectors from hitting.

Dimensions e, f, J, K, N and W are shown on the facing page. To determine dimensions A, B and C, refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See Page CR-10 for minimum, maximum and standard bridge girder overhangs.



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STANDARD SINGLE GIRDER CRANES

HAND PROPELLED CRANES WITH 8-WHEEL END TRUCKS

HAND PROPELLED CRANES WITH 8-WHEEL END TRUCKS												
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	J	K	N	W
		HW16S212X14	1245	12	14	34011	1'-0	3'-8	10	9-1/2	3'-1-1/2	4'-8
		HW21S212X16	1339	14	16	34011	1'-0	3'-8	11-1/2	9-1/2	3'-1-1/2	4'-8
		HW21S212X18	1392	16	18	34011	1'-0	3'-8	11-1/2	9-1/2	3'-1-1/2	4'-8
		HW26S212X20	1528	18	20	34011	1'-0	3'-8	1'-1	9-1/2	3'-1-1/2	4'-8
		HW26S212X22	1624	20	22	34011	1'-0	3'-8	1'-1	9-1/2	3'-1-1/2	4'-8
		HW31S212X24	1759	22	24	34011	1'-0	3'-8	1'-2-1/2	9-1/2	3'-1-1/2	4'-8
		HW31S212X26	1822	24	36	34011	1'-0	3'-8	1'-2-1/2	9-1/2	3'-1-1/2	4'-8
3	8030	HW41S212X28	2147	36	28	34011	1'-0	3'-8	1'-3-1/4	9-1/2	3'-1-1/2	4'-8
		HW41S212X30	2233	28	30	34011	1'-0	3'-8	1'-3-1/4	9-1/2	3'-1-1/2	4'-8
		HW46S212X32	2448	30	32	34011	1'-0	3'-8	1'-5-1/4	9-1/2	3'-1-1/2	4'-8
		HW46S212X34	2542	32	34	34011	1'-0	3'-8	1'-5-1/4	9-1/2	3'-1-1/2	4'-8
		HW51S212X36	2909	34	36	34011	1'-0	3'-8	1'-7-1/4	9-1/2	3'-1-1/2	4'-8
		HW51S212X38	3016	36	38	34011	1'-0	3'-8	1'-7-1/4	9-1/2	3'-1-1/2	4'-8
		HW56S212X40	3312	38	40	34011	1'-0	3'-8	1'-9-1/4	9-1/2	3'-1-1/2	4'-8
		HW56S212X42	3431	40	42	34011	1'-0	3'-8	1'-9-1/4	9-1/2	3'-1-1/2	4'-8

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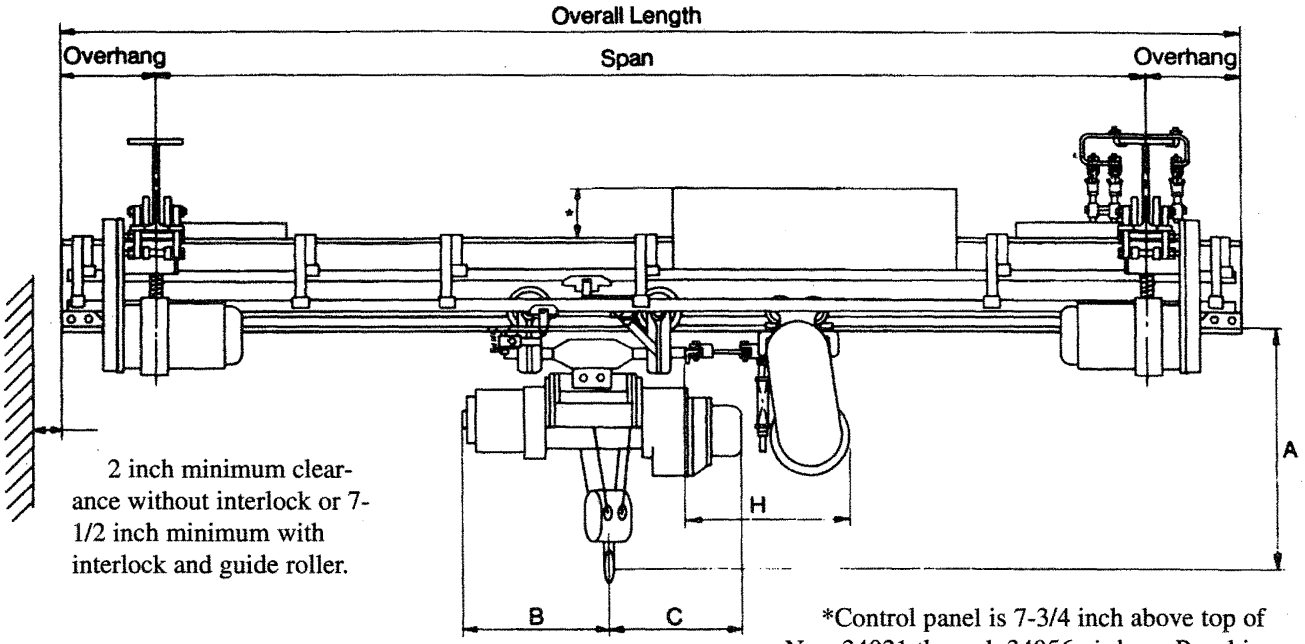
STANDARD SINGLE GIRDER CRANES

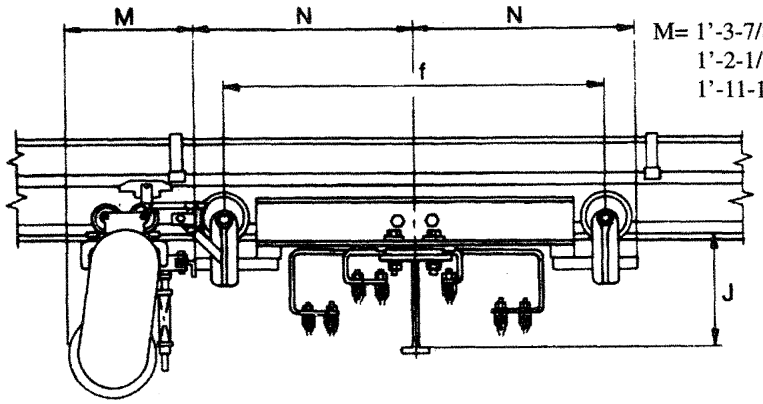
CLEARANCE DRAWING FOR MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS

The drawing illustrates the clearance of a motor driven crane with 4-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions f, J and N are shown on the facing page. To determine dimensions A, B, And H, refere to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See Page CR-10 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

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STANDARD SINGLE GIRDER CRANES

MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS									
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	f	J	N
1	3180	MW21S204X22	1523	20	22	34011	4'-0	11-1/2	2'-3-1/8
		MW21S204X24	1588	22	24	34011	4'-0	11-1/2	2'-3-1/8
		MW21S204X26	1654	24	26	34011	4'-0	11-1/2	2'-3-1/8
		MW26S204X28	1833	26	28	34011	4'-0	1'-0	2'-3-1/8
		MW26S204X30	1906	28	30	34011	4'-0	1'-0	2'-3-1/8
		MW26S204X32	1980	30	32	34011	4'-0	1'-0	2'-3-1/8
		MW31S204X34	2155	32	34	34011	4'-0	1'-2-1/2	2'-3-1/8
		MW31S204X36	2234	34	36	34011	4'-0	1'-2-1/2	2'-3-1/8
		MW41S206X38	2683	36	38	34011	4'-0	1'-3-1/4	2'-3-1/8
		MW41S206X40	2772	38	40	34011	4'-0	1'-3-1/4	2'-3-1/8
		MW46S206X42	3046	40	42	34011	4'-0	1'-5-1/4	2'-3-1/8
		MW46S207X44	3236	42	44	34011	6'-0	1'-5-1/4	3'-3-1/8
		MW51S207X46	3686	44	46	34011	6'-0	1'-7-1/4	3'-3-1/8
		MW51S207X48	3807	46	48	34011	6'-0	1'-7-1/4	3'-3-1/8
		MW56S207X50	4161	48	50	34011	6'-0	1'-9-1/4	3'-3-1/8
		MW56S207X52	4286	50	52	34011	6'-0	1'-9-1/4	3'-3-1/8
		MW56S207X54	4415	52	54	34011	6'-0	1'-9-1/4	3'-3-1/8
		MW56S207X56	4545	54	56	34011	6'-0	1'-9-1/4	3'-3-1/8
		MW61S207X58	5046	56	58	34011	6'-0	1'-11-3/4	3'-3-1/8
		MW61S207X60	5187	58	60	34011	6'-0	1'-11-3/4	3'-3-1/8
		MW61S207X62	5364	60	62	34011	6'-0	1'-11-3/4	3'-3-1/8
		MW66S215X64	5471	62	64	34037	7'-0	2'-2-7/8	3'-10-1/4
		MW66S215X66	6625	64	66	34037	7'-0	2'-2-7/8	3'-10-1/4
		MW66S215X68	6780	66	68	34037	7'-0	2'-2-7/8	3'-10-1/4
		MW71S215X70	7991	68	70	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW71S215X72	8177	70	72	34037	7'-0	2'-5-3/8	3'-10-1/4
2	5650	MW26S206X22	1642	20	22	34011	4'-0	1'-0	2'-3-1/8
		MW26S206X24	1715	22	24	34011	4'-0	1'-0	2'-3-1/8
		MW26S206X26	1788	24	26	34011	4'-0	1'-0	2'-3-1/8
		MW31S208X28	1975	26	28	34011	4'-0	1'-2-1/2	2'-3-3/4
		MW31S208X30	2048	28	30	34011	4'-0	1'-2-1/2	2'-3-3/4
		MW41S208X32	2421	30	32	34011	4'-0	1'-3-1/4	2'-3-3/4
		MW41S208X34	2519	32	34	34011	4'-0	1'-3-1/4	2'-3-3/4
		MW41S208X36	2616	34	36	34011	4'-0	1'-3-1/4	2'-3-3/4
		MW46S208X38	2865	36	38	34011	4'-0	1'-5-1/4	2'-3-3/4
		MW46S208X40	2970	38	40	34011	4'-0	1'-5-1/4	2'-3-3/4
		MW51S208X42	3395	40	42	34011	4'-0	1'-7-1/4	2'-3-3/4
		MW51S209X44	3679	42	44	34011	6'-0	1'-7-1/4	3'-3-3/4
		MW56S209X46	4015	44	46	34011	6'-0	1'-9-1/4	3'-3-3/4
		MW56S209X48	4145	46	48	34011	6'-0	1'-9-1/4	3'-3-3/4
		MW61S209X50	4589	48	50	34011	6'-0	1'-11-3/4	3'-3-3/4
		MW61S209X52	4732	50	52	34011	6'-0	1'-11-3/4	3'-3-3/4

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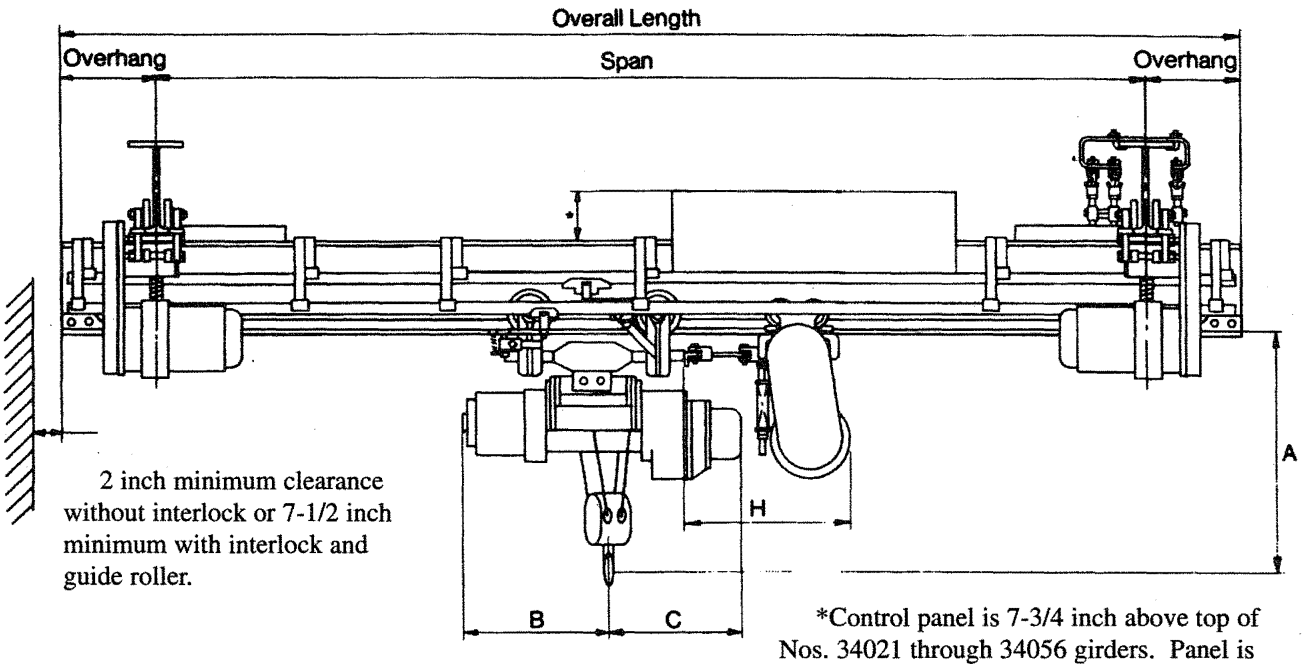
STANDARD SINGLE GIRDER CRANES

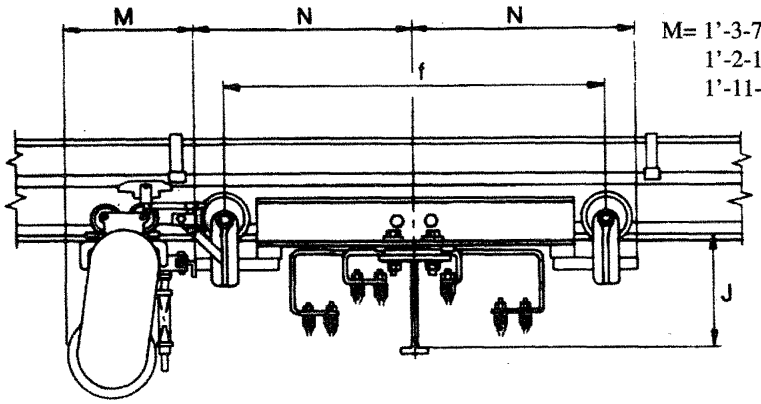
CLEARANCE DRAWING FOR MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS

The drawing illustrates the clearances of a motor driven crane with 4-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions f, J and N are shown on the facing page. To determine dimension A, B, C and H, refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See Page CR-10 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
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STANDARD SINGLE GIRDER CRANES

MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 4-WHEEL END TRUCKS									
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	f	J	N
		MW66S209X54	5214	52	54	34011	6'-0	2'-2-1/4	3'-3-3/4
		MW66S209X56	5369	54	56	34011	6'-0	2'-2-1/4	3'-3-3/4
		MW66S209X58	5524	56	58	34011	6'-0	2'-2-1/4	3'-3-3/4
		MW71S215X60	7033	58	60	34037	7'-0	2'-5-3/8	3'-10-1/4
2	5650	MW71S215X62	7652	60	62	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW71S215X64	7437	62	64	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW76S215X66	8229	64	66	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW76S215X68	8432	66	68	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW76S215X70	8628	68	70	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW77S215X72	10026	70	72	34037	7'-0	2'-9-7/8	3'-10-1/4
		MW37S214X22	2089	20	22	34037	4'-0	1'-2-3/8	2'-4-1/4
		MW37S214X24	2177	22	24	34037	4'-0	1'-2-3/8	2'-4-1/4
		MW37S214X26	2260	24	26	34037	4'-0	1'-2-3/8	2'-4-1/4
		MW41S214X28	2464	26	28	34037	4'-0	1'-3-7/8	2'-4-1/4
		MW41S214X30	2581	28	30	34037	4'-0	1'-3-7/8	2'-4-1/4
		MW46S214X32	2807	30	32	34037	4'-0	1'-5-7/8	2'-4-1/4
		MW46S214X34	2912	32	34	34037	4'-0	1'-5-7/8	2'-4-1/4
		MW51S214X36	3290	34	36	34037	4'-0	1'-7-7/8	2'-4-1/4
		MW51S214X38	3408	36	38	34037	4'-0	1'-7-7/8	2'-4-1/4
		MW56S214X40	3715	38	40	34037	4'-0	1'-9-7/8	2'-4-1/4
		MW61S214X42	4114	40	42	34037	4'-0	2'-0-3/8	2'-4-1/4
		MW61S215X44	4618	42	44	34037	7'-0	2'-0-3/8	3'-10-1/4
		MW61S215X46	4760	44	46	34037	7'-0	2'-0-3/8	3'-10-1/4
3	8290	MW66S215X48	5204	46	48	34037	7'-0	2'-2-7/8	3'-10-1/4
		MW66S215X50	5359	48	50	34037	7'-0	2'-2-7/8	3'-10-1/4
		MW71S215X52	6299	50	52	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW71S215X54	6484	52	54	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW71S215X56	6664	54	56	34037	7'-0	2'-5-3/8	3'-10-1/4
		MW76S215X58	7382	56	58	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW76S215X60	7585	58	60	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW76S215X62	7823	60	62	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW76S215X64	8019	62	64	34037	7'-0	2'-7-7/8	3'-10-1/4
		MW77S215X66	9318	64	66	34037	7'-0	2'-9-7/8	3'-10-1/4
		MW77S215X68	9561	66	68	34037	7'-0	2'-9-7/8	3'-10-1/4
		MW77S215X70	9797	68	70	34037	7'-0	2'-9-7/8	3'-10-1/4
		MW77S215X72	10034	70	72	34037	7'-0	2'-9-7/8	3'-10-1/4

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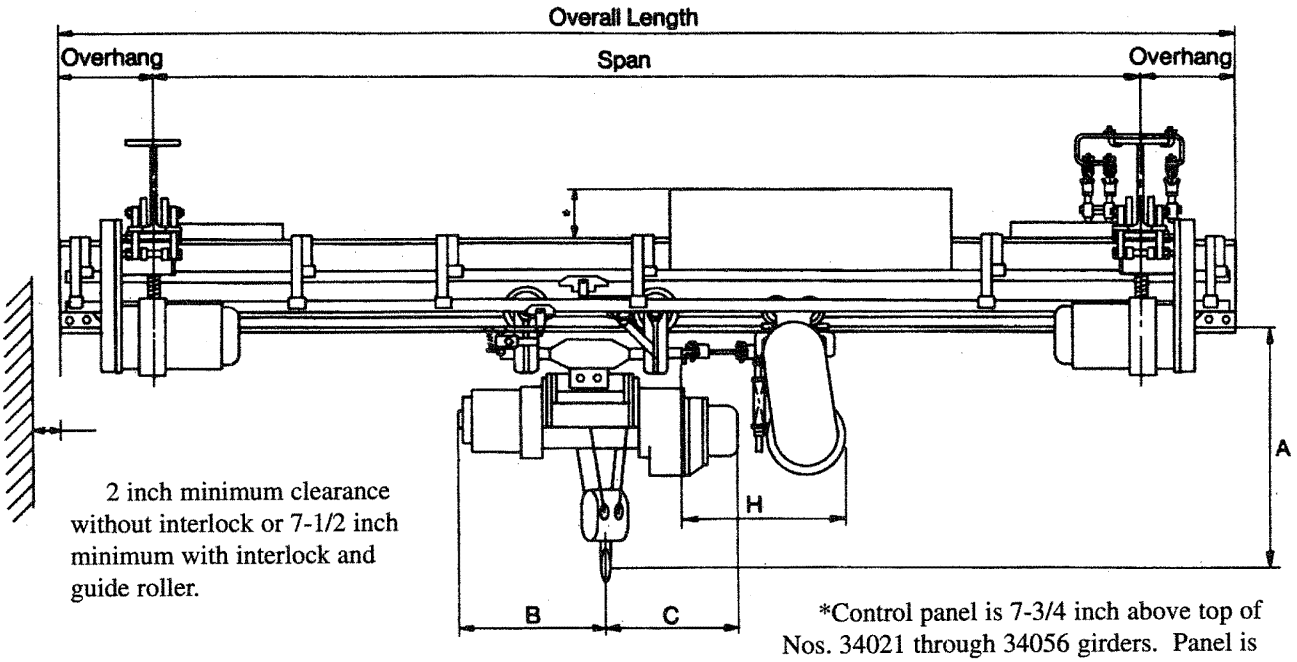
STANDARD SINGLE GIRDER CRANES

CLEARANCE DRAWING FOR MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

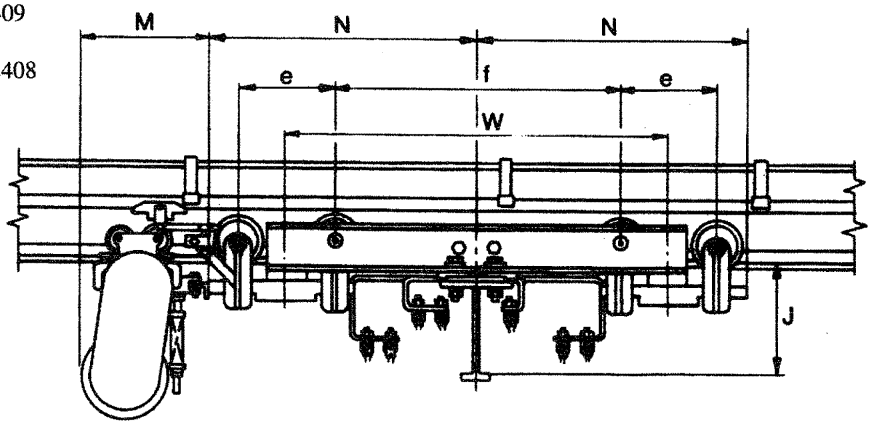
The drawing illustrates the clearances of a motor driven crane with 8-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions e, f, J, N and W are shown on the facing page. To determine dimension A, B, C and H, refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. See Page CR-10 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.

M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive



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STANDARD SINGLE GIRDER CRANES

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS												
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	J	N	W
		MW66S213X64	6551	62	64	34031	1'-0	7'-0	2'-2-1/4	4'-9-1/2	8'-0
		MW66S213X66	6705	64	66	34031	1'-0	7'-0	2'-2-1/4	4'-9-1/2	8'-0
		MW66S213X68	6860	66	68	34031	1'-0	7'-0	2'-2-1/4	4'-9-1/2	8'-0
		MW71S213X70	8071	68	70	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
		MW71S213X72	8257	70	72	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
		MW76S213X74	9114	72	74	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X76	9318	74	76	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X78	9521	76	78	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X80	9739	78	80	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
1	3180	MW77S213X82	11304	80	82	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW78S221X84	14019	82	84	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X86	14282	84	86	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X88	14537	86	88	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X90	14899	88	90	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X92	15063	90	92	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW79S221X94	16596	92	94	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X96	16886	94	96	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X98	17177	96	98	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X100	17477	98	100	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X102	17768	100	102	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW71S213X64	7517	62	64	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
		MW76S213X66	8309	64	66	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X68	8512	66	68	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X70	8708	68	70	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW77S213X72	10106	70	72	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S213X74	10358	72	74	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S213X76	10594	74	76	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S213X78	10831	76	78	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S213X80	11067	78	80	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
2	5650	MW77S213X82	11303	80	82	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW78S221X84	14019	82	84	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X86	14282	84	86	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X88	14537	86	88	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X90	14800	88	90	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X92	15063	90	92	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW79S221X94	16596	92	94	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X96	16886	94	96	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X98	17177	96	98	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0

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STANDARD SINGLE GIRDER CRANES

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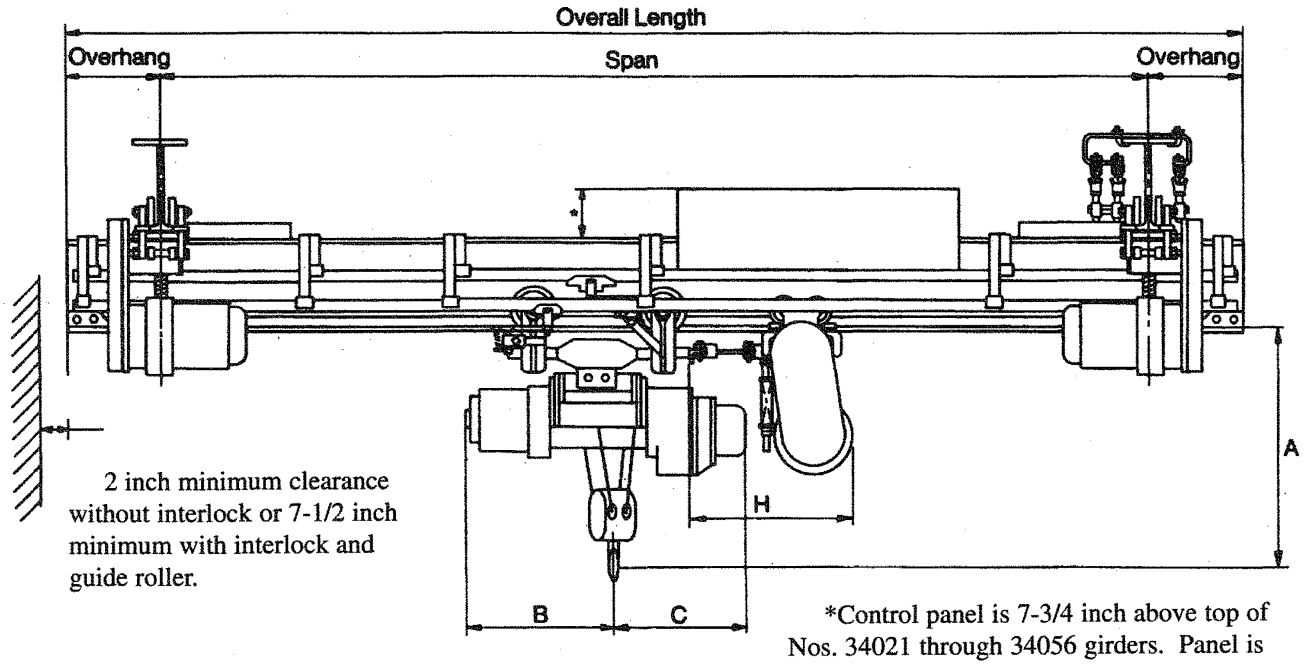

2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.

M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
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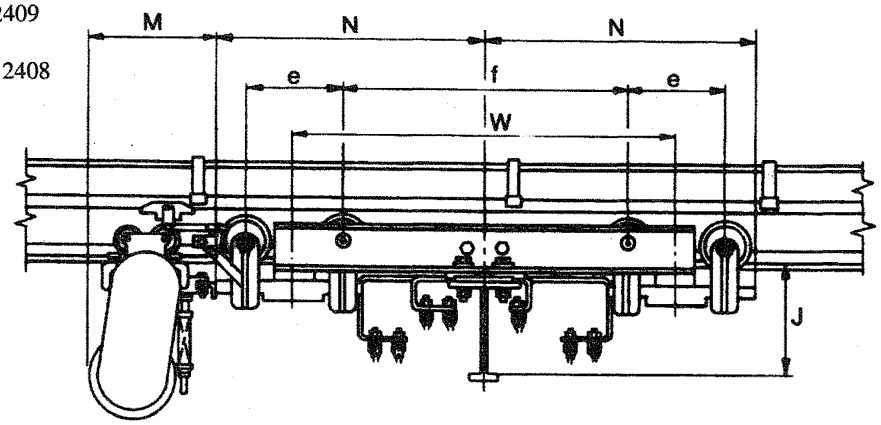

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STANDARD SINGLE GIRDER CRANES

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	J	N	W
		MW37S212X22	2346	20	22	34011	1'-0	3'-8	1'-1-3/4	3'-1-1/2	4'-8
		MW37S212X24	2414	22	24	34011	1'-0	3'-8	1'-1-3/4	3'-1-1/2	4'-8
		MW37S212X26	2517	24	26	34011	1'-0	3'-8	1'-1-3/4	3'-1-1/2	4'-8
		MW41S212X28	2741	26	28	34011	1'-0	3'-8	1'-3-1/4	3'-1-1/2	4'-8
		MW41S212X30	2838	28	30	34011	1'-0	3'-8	1'-3-1/4	3'-1-1/2	4'-8
		MW46S212X32	3064	30	32	34011	1'-0	3'-8	1'-5-1/4	3'-1-1/2	4'-8
		MW46S212X34	3169	32	34	34011	1'-0	3'-8	1'-5-1/4	3'-1-1/2	4'-8
		MW51S212X36	3547	34	36	34011	1'-0	3'-8	1'-7-1/4	3'-1-1/2	4'-8
		MW51S212X38	3665	36	38	34011	1'-0	3'-8	1'-7-1/4	3'-1-1/2	4'-8
		MW56S212X40	3972	38	40	34011	1'-0	3'-8	1'-9-1/4	3'-1-1/2	4'-8
		MW61S212X42	4371	40	42	34011	1'-0	3'-8	1'-11-3/4	3'-1-1/2	4'-8
		MW61S212X44	4509	42	44	34011	1'-0	3'-8	1'-11-3/4	3'-1-1/2	4'-8
		MW61S212X46	4651	44	46	34011	1'-0	3'-8	1'-11-3/4	3'-1-1/2	4'-8
		MW66S212X48	5095	46	48	34011	1'-0	3'-8	2'-2-1/4	3'-1-1/2	4'-8
		MW66S212X50	5438	48	50	34011	1'-0	3'-8	2'-2-1/4	3'-1-1/2	4'-8
		MW71S213X52	6378	50	52	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
		MW71S213X54	6563	51	54	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
3	8290	MW71S213X56	6743	54	56	34031	1'-0	7'-0	2'-4-3/4	4'-9-1/2	8'-0
		MW76S213X58	7461	56	58	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X60	7664	58	60	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X62	7903	60	62	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S213X64	8099	62	64	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW77S213X66	9398	64	66	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X68	10002	66	68	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X70	10238	68	70	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X72	10475	70	72	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X74	10719	72	74	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X76	10955	74	76	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW77S219X78	11192	76	78	34031	1'-0	7'-0	2'-9-1/4	4'-9-1/2	8'-0
		MW78S219X80	12508	78	90	34031	1'-0	7'-0	3'-1-1/4	4'-9-1/2	8'-0
		MW78S219X82	12772	80	82	34031	1'-0	7'-0	3'-1-1/4	4'-9-1/2	8'-0
		MW78S221X84	14010	82	84	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW79S221X86	15434	84	86	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X88	15725	86	88	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X90	16015	88	90	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0

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CLEARANCE DRAWING FOR MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

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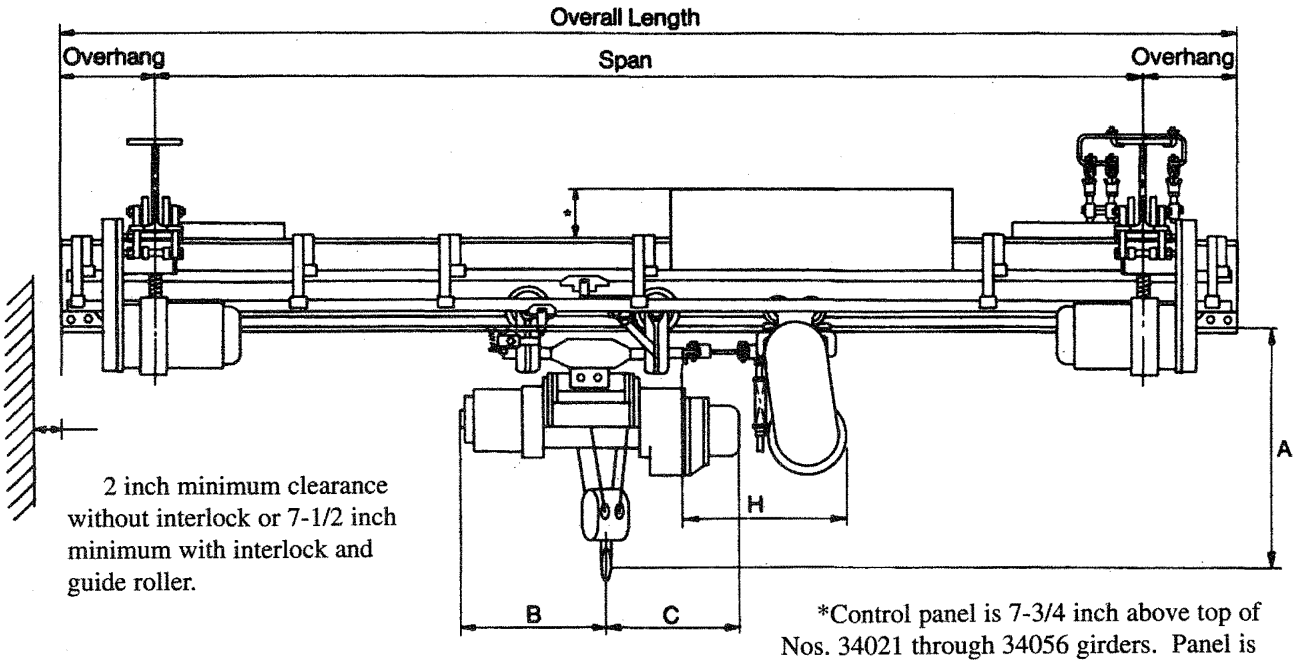

2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.

M= 1'-3-7/8" For No. 24010 Tractor Drive
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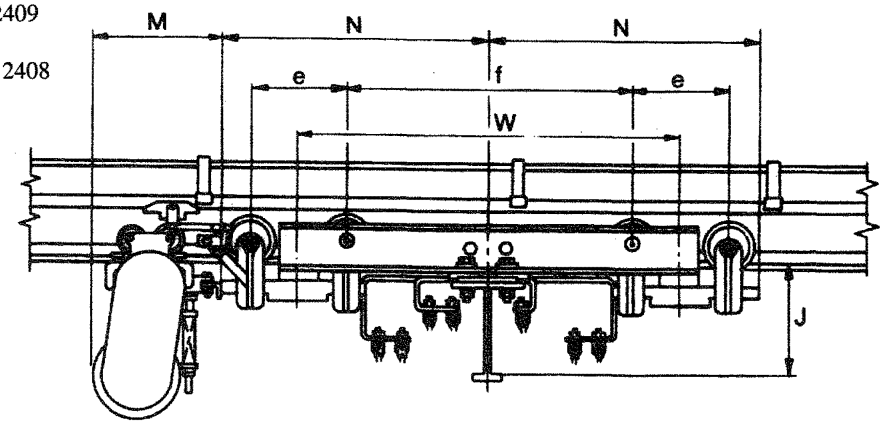

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MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	J	N	W
		MW41S218X22	2479	20	22	34011	1'-0	3'-8	1'-3-1/4	3'-1-1/2	4'-8
		MW41S218X24	2521	22	24	34011	1'-0	3'-8	1'-3-1/4	3'-1-1/2	4'-8
		MW46S218X26	2777	24	26	34011	1'-0	3'-8	1'-5-1/4	3'-1-1/2	4'-8
		MW46S218X28	2882	26	28	34011	1'-0	3'-8	1'-5-1/4	3'-1-1/2	4'-8
		MW51S218X30	3212	28	30	34011	1'-0	3'-8	1'-7-1/4	3'-1-1/2	4'-8
		MW56S218X32	3483	30	32	34011	1'-0	3'-8	1'-9-1/4	3'-1-1/2	4'-8
		MW56S218X34	3613	32	34	34011	1'-0	3'-8	1'-9-1/4	3'-1-1/2	4'-8
		MW61S218X36	3969	34	36	34011	1'-0	3'-8	1'-11-3/4	3'-1-1/2	4'-8
		MW61S218X38	4111	36	38	34011	1'-0	3'-8	1'-11-3/4	3'-1-1/2	4'-8
		MW66S218X40	4326	38	40	34011	1'-0	3'-8	2'-2-1/4	3'-1-1/2	4'-8
		MW66S218X42	4660	40	42	34011	1'-0	3'-8	2'-2-1/4	3'-1-1/2	4'-8
		MW71S218X44	5479	42	44	34011	1'-0	3'-8	2'-4-3/4	3'-1-1/2	4'-8
		MW71S218X46	5665	44	46	34011	1'-0	3'-8	2'-4-3/4	3'-1-1/2	4'-8
		MW71S218X48	5845	46	48	34011	1'-0	3'-8	2'-4-3/4	3'-1-1/2	4'-8
5	13360	MW76S219X50	7009	48	50	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S219X52	7213	50	52	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW76S219X54	7416	52	54	34031	1'-0	7'-0	2'-7-1/4	4'-9-1/2	8'-0
		MW77S220X56	8029	54	56	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X58	8264	56	58	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S221X60	9999	58	60	34041	1'-3	8'-9	2'-9-7/8	5'-11-3/4	10'-0
		MW77S221X62	10276	60	62	34041	1'-3	8'-9	2'-9-7/8	5'-11-3/4	10'-0
		MW77S221X64	10512	62	64	34041	1'-3	8'-9	2'-9-7/8	5'-11-3/4	10'-0
		MW77S221X66	10749	64	66	34041	1'-3	8'-9	2'-9-7/8	5'-11-3/4	10'-0
		MW78S221X68	11910	66	68	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X70	12173	68	70	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X72	13422	70	72	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW79S221X74	13684	72	74	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X76	13982	74	76	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X78	14273	76	78	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0

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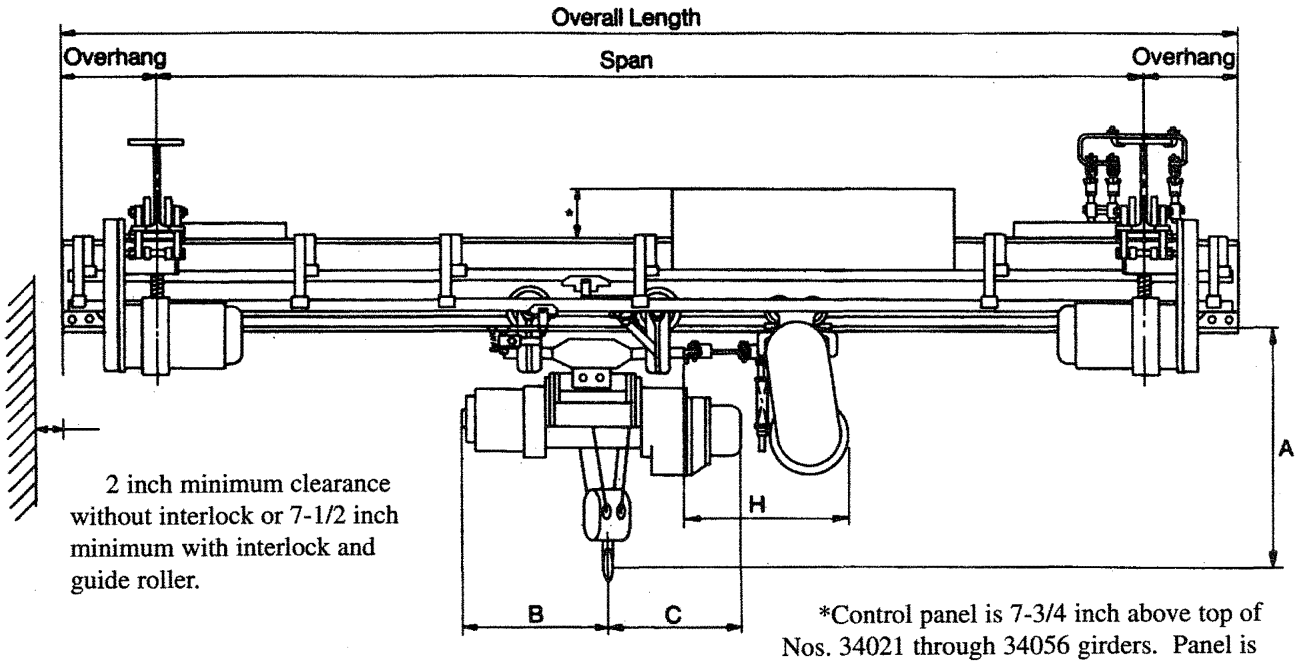

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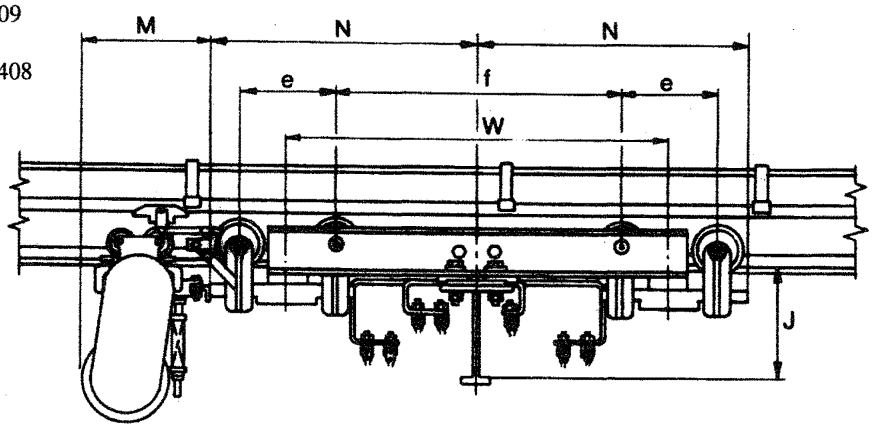
*Control panel is 7-3/4 inch above top of Nos. 34021 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.

M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive



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STANDARD SINGLE GIRDER CRANES

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS

MOTOR DRIVEN CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Net Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	J	N	W
		MW46S220X22	3148	20	22	34037	1'-3	4'-6	1'-5-7/8	3'-10-1/4	5'-9
		MW51S220X24	3436	22	24	34037	1'-3	4'-6	1'-7-7/8	3'-10-1/4	5'-9
		MW51S220X26	3553	24	26	34037	1'-3	4'-6	1'-7-7/8	3'-10-1/4	5'-9
		MW56S220X28	3805	26	28	34037	1'-3	4'-6	1'-9-7/8	3'-10-1/4	5'-9
		MW61S220X30	4126	28	30	34037	1'-3	4'-6	2'-0-3/8	3'-10-1/4	5'-9
		MW61S220X32	4268	30	32	34037	1'-3	4'-6	2'-0-3/8	3'-10-1/4	5'-9
		MW66S220X34	4635	32	34	34037	1'-3	4'-6	2'-2-7/8	3'-10-1/4	5'-9
		MW66S220X36	4791	34	36	34037	1'-3	4'-6	2'-2-7/8	3'-10-1/4	5'-9
		MW71S220X38	5505	36	38	34037	1'-3	4'-6	2'-5-3/8	3'-10-1/4	5'-9
		MW71S220X40	5689	38	40	34037	1'-3	4'-6	2'-5-3/8	3'-10-1/4	5'-9
		MW76S220X42	6261	40	42	34037	1'-3	4'-6	2'-7-7/8	3'-10-1/4	5'-9
7-1/2	19480	MW76S220X44	6464	42	44	34037	1'-3	4'-6	2'-7-7/8	3'-10-1/4	5'-9
		MW76S220X46	6667	44	46	34037	1'-3	4'-6	2'-7-7/8	3'-10-1/4	5'-9
		MW77S220X48	7667	46	48	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X50	7898	48	50	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X52	8134	50	52	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X54	8371	52	54	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X56	8613	54	56	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S220X58	8849	56	58	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW78S221X60	10851	58	60	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	5'-9
		MW78S221X62	11106	60	62	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW78S221X64	11369	62	64	34041	1'-3	8'-9	3'-1-7/8	5'-11-3/4	10'-0
		MW79S221X66	12524	64	66	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X68	12821	66	68	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW79S221X70	13104	68	70	34041	1'-3	8'-9	3'-5-7/8	5'-11-3/4	10'-0
		MW56S220X22	3424	20	22	34037	1'-3	4'-6	1'-9-7/8	3'-10-1/4	5'-9
		MW56S220X24	3553	22	24	34037	1'-3	4'-6	1'-9-7/8	3'-10-1/4	5'-9
		MW61S220X26	3849	24	26	34037	1'-3	4'-6	2'-0-3/8	3'-10-1/4	5'-9
		MW61S220X28	3992	26	28	34037	1'-3	4'-6	2'-0-3/8	3'-10-1/4	5'-9
		MW66S220X30	4319	28	30	34037	1'-3	4'-6	2'-2-7/8	3'-10-1/4	5'-9
		MW71S220X32	4957	30	32	34037	1'-3	4'-6	2'-5-3/8	3'-10-1/4	5'-9
		MW71S220X34	5142	32	34	34037	1'-3	4'-6	2'-5-3/8	3'-10-1/4	5'-9
		MW71S220X36	5327	34	36	34037	1'-3	4'-6	2'-5-3/8	3'-10-1/4	5'-9
		MW76S222X38	6445	36	38	34037	1'-3	4'-6	2'-7-7/8	3'-10-1/4	5'-9
10	26270	MW76S222X40	6644	38	40	34037	1'-3	4'-6	2'-7-7/8	3'-10-1/4	5'-9
		MW77S222X42	7544	40	42	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S222X44	7785	42	44	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S222X46	8022	44	46	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S222X48	8263	46	48	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW77S222X50	8489	48	50	34037	1'-3	4'-6	2'-9-7/8	3'-10-1/4	5'-9
		MW78S222X52	9427	50	52	34037	1'-3	4'-6	3'-1-7/8	3'-10-1/4	5'-9
		MW78S222X54	9690	52	54	34037	1'-3	4'-6	3'-1-7/8	3'-10-1/4	5'-9
		MW78S222X56	9954	54	56	34037	1'-3	4'-6	3'-1-7/8	3'-10-1/4	5'-9
		MW79S222X58	11006	56	58	34037	1'-3	4'-6	3'-5-7/8	3'-10-1/4	5'-9
		MW79S223X60	12124	58	60	34041	1'-3	8'-0	3'-5-7/8	5'-7-1/4	9'-3
		MW79S223X62	13242	60	62	34041	1'-3	8'-0	3'-5-7/8	5'-7-1/4	9'-3

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SINGLE GIRDER TRANSFER CRANES

Single girder transfer cranes permit the transfer of loads from the area to area, either directly from crane to crane or by fixed transfer sections or spur tracks. They are of the same design as standard single girder cranes with the addition of interlock mechanisms at one or both ends of the girder. The discharge point is a part of the interlocking equipment and is installed at the end of each track where a carrier is to be transferred. Direct interlocking cranes have discharge points installed on one or both ends of the girder depending on the number of cranes to be interlocked.

Forks are provided on interlock mechanisms and discharge points which raise to permit passage of the carrier when the interlock and discharge point are latched. When they are not latched, the forks prevent carriers from being accidentally run off the end of the girder or discharge track.

The throw-out mechanism activates the interlock latch and may be manually or motor operated. Manually operated mechanisms are located on the bridge girder and are operated by pull chains. Motor operated mechanisms are controlled by a push button station located on the carrier or crane.

The drawings show the interlock mechanism in the unlatched and latched positions and illustrate the operation of the transfer equipment. When the girder is aligned with the discharge track, the forks remain in the down position until the interlock is thrown into the latch position. When the throw-out mechanism is operated, the throat of the latch extends into the discharge point, locking the girder and discharge track in alignment. As the latch extends, it contacts the discharge point forks and the interlock forks contact the discharge point plates, causing both sets of forks to raise. With the throat of the latch engaging the discharge point and the fork in the raised position, the carrier may travel on or off the girder or discharge track. After the carrier has transferred, the latch is retracted by the throw-out mechanism and the forks return to the down position.

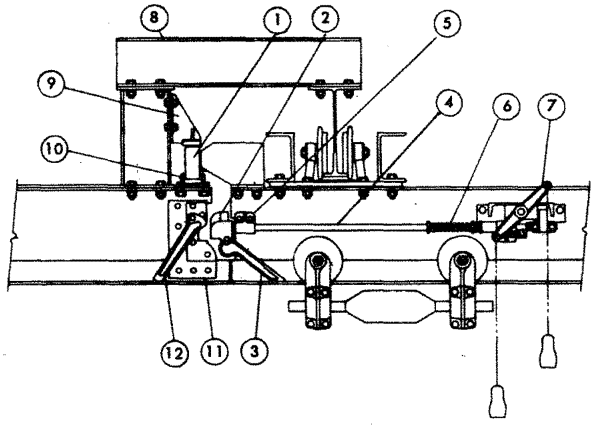
Forks are steel castings. The latch is also a steel casting and is held in the extended position by spring pressure. The throw-out mechanism is a direct acting cam arrangement.

INTERLOCK MECHANISM

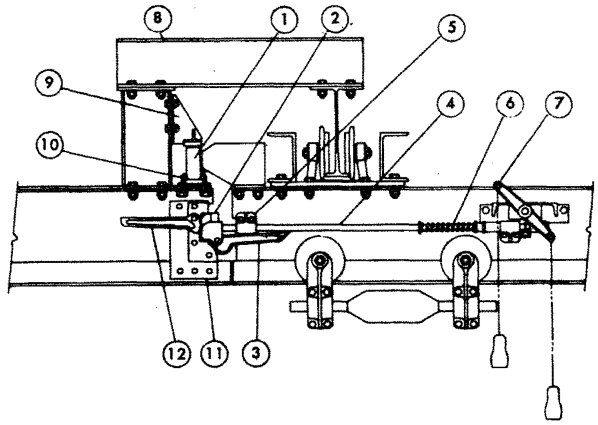
1 Guide Roller
2 Latch
3 Interlock Fork
4 Slide Rod
5 Slide Rod Bearing
6 Spring
7 Throw-out Mechanism

DISCHARGE POINT

8 Structural Tie
9 Upper Guide Roller Guide
10 Lower Guide Roller Guide
11 Discharge Point Plate
12 Discharge Fork



UNLATCHED POSITION



LATCHED POSITION

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SINGLE GIRDER TRANSFER CRANES

INTERLOCKS AND DISCHARGE POINTS

Three types of interlocking equipment are available: Type L interlocks and discharge points for carriers with 4 inch and 5 inch diameter wheels; Type H for carriers with 6-1/2 inch diameter wheels; and Type J for carriers with 8 inch diameter wheels. Item numbers for all interlocks and discharge points are listed on Page CR-32. In laying out transfer crane systems, the same type of interlock and discharge must be used throughout the system.

Type L interlocks are installed only on No. 34021 (10 inch) or larger girders. The depth of Nos. 34011 and 34016 track does not provide clearance for the slide rod bearings and throw-out mechanism. Type L discharge points are installed only on No. 34026 (11-1/2 inch) or larger girders. The depth of Nos. 34011, 34016 and 34021 tracks does not provide clearance for the forks and discharge plates: however, when used as spur tracks, they can be built up to 11-1/2 inch depth to accommodate the discharge point.

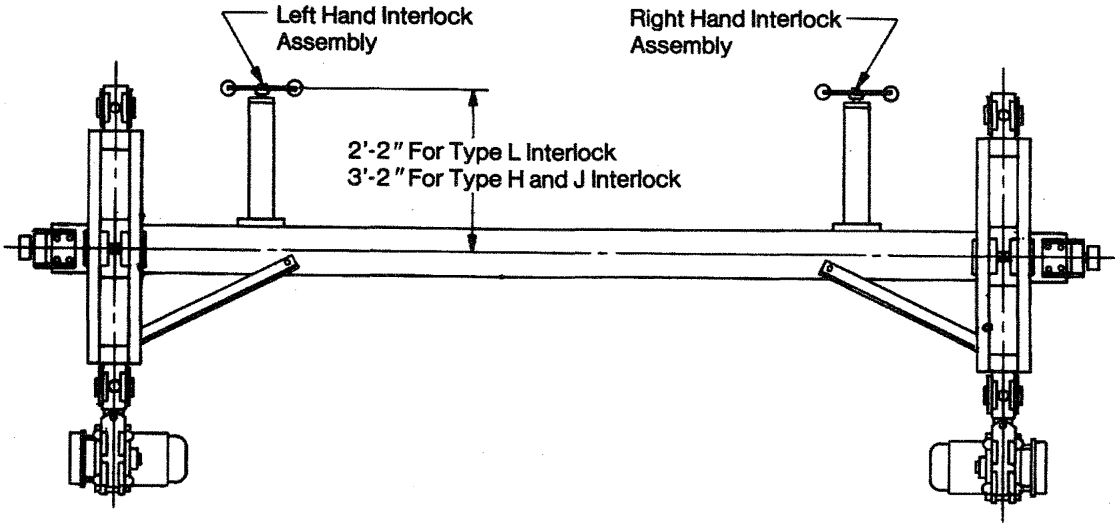
Type H interlocks and discharge points are installed only on heavy rail sections (Nos. 34037 through 34079).

Type J interlocks and discharge points are installed only on No. 34046 (16 inch) or larger girders, transfer tracks and spur tracks. Nos. 34037 and 34041 tracks do not provide clearance for the interlock or discharge point: however, when used as a spur track, they can be built up to 16 inch depth to accommodate the discharge point.

When 2 or more transfer cranes with different size girders operate on the same runway, a constant girder depth must be established at the end trucks to allow the cranes to engage the discharge track. When carriers are motor driven, the girders must also have the same rail tread thickness to allow for operation of the tractor drive on all cranes. The constant girder depth is accomplished by coping the larger girders to the depth of the smaller girder. Minimum depths of coped bridge girders for transfer cranes are:

- Nos. 34026 and 34031 girders may be coped to 10 inch depth when cranes are arranged for interlocking through fixed transfer sections or to spur tracks.
- Nos. 34037 and 34041 girders may be coped to 11-1/2 inch depth when hand pushed carriers with 4 inch Or 5 inch Diameter wheels are used on the system.
- Girders with Type H interlocks may be coped to 12-1/2 inch depth.
- Girders with Type J interlocks may be coped to 16 inch depth.

Manually operated throw-out mechanisms for Type L interlocks have the hand chains located 2'-2 from centerline of the girder. Type H and J interlock throw-out mechanisms have the hand chains located 3'-2 from centerline of the girder. Type H throw-outs may be used with Type L interlocks to provide additional clearance between the hand chains and the hoist or carrier. Throw-out mechanisms are located on the side of the girder opposite the brace angles resulting in right and left hand assemblies. The drawing below illustrates these assemblies.



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SINGLE GIRDER TRANSFER CRANES

CATALOG NUMBERS OF INTERLOCKS AND DISCHARGE POINTS

ITEM NUMBERS OF INTERLOCKS AND DISCHARGE POINTS									
Track Item Number	Interlocks							Discharge Points	
	Type L		Type H		Type J		Type L	Type H	Type J
	RH Assem.	LH Assem.	RH Assem.	LH Assem.	RH Assem.	LH Assem.			
34011 8"	-----	-----	-----	-----	-----	-----	-----	-----	-----
34016 8-1/2"	-----	-----	-----	-----	-----	-----	-----	-----	-----
34021 10"	450100E	450100F	-----	-----	-----	-----	-----	-----	-----
34026 11-1/2"	450100E	450100F	-----	-----	-----	-----	45030T	-----	-----
34031 13"	450100E	450100F	-----.-----	-----	-----	-----	45030T	-----	-----
34037 12-1/2"	450101E	450101F	450106E	450106F	-----	-----	45030U	45031R	-----
34041 14"	450101E	450101F	450106E	450106F	-----	-----	45030U	45031S	-----
34046 16"	450101E	450101F	450106E	450106F	450109E	450109F	45030U	45031S	45033E
34051 18"	450102E	450102F	450107E	450107F	450110E	450110F	45030V	45031T	45033F
34056 20"	450102E	450102F	450107E	450107F	450110E	450110F	45030V	45031T	45033F
34061 22-1/2"	450102E	450102F	450107E	450107F	450110E	450110F	45030V	45031T	45033F
34066 25"	450102E	450102F	450107E	450107F	450110E	450110F	45030V	45031T	45033F
34071 27-1/2"	450103E	450103F	450108E	450108F	450112E	450112F	45030W	45031U	45033G
34076 30"	450103E	450103F	450108E	450108F	450112E	450112F	45030W	45031U	45033G
34077 32"	450103E	450103F	450108E	450108F	450112E	450112F	45030W	45031U	45033G
34078 36"	450103E	450103F	450108E	450108F	450112E	450112F	45030W	45031U	45033G
34079 40"	450103E	450103F	450108E	450108F	450112E	450112F	45030W	45031U	45033G

-----Not Available

GUIDE ROLLER ARRANGEMENT

Guide rollers and guide roller guides maintain vertical and horizontal alignment of bridge girders and transfer tracks. The guide roller arrangement allows the transfer crane to pass spur tracks, fixed transfer sections or other transfer cranes without interference. They are recommended for (1) hand propelled carriers of more than 2 tons rated load, (2) motor driven carriers, (3) motor driven transfer cranes and (4) all direct interlocking cranes. The guide roller is mounted on the bridge girder and the guide roller guide on the spur track or fixed transfer section.

The roller is machined from alloy steel and operates on a prelubricated double row ball bearing. The roller assembly is mounted in a welded steel bracket. The complete assembly is designated as Item No. 4504.

Two guide roller guides are available. The one piece assembly (Item No. 4501007) is used at the discharge end of direct interlocking cranes. The two piece assembly (Item Nos. 4501004 upper guide and 4501005 lower guide) is used on spur tracks and fixed transfer sections. When a crane is equipped with a guide roller, all connecting spur tracks, fixed transfer sections and direct interlocking cranes must be equipped with guide roller guides.

ELECTRIFIED TRANSFER CRANES

Insul-8-Bar's 90 amp conductor is the standard electrification for transfer cranes. Consult factory for assistance when other types of electrification are used. Transfer cranes generally are not electrified with festooned or tagline electrification.

The power conductor arrangement for transfer cranes is shown in the Electrification Section. The power conductors must be 6-1/8 inch above the tread for Type L interlocks, 7-3/4 inch For Type H interlocks and 9-1/2 inch for Type J interlocks to prevent interference with the latch.

The control conductors on motor driven transfer cranes with Type I control are located 1-7/8 inch above the girder tread for Nos. 34021 through 34056 girders and at the same elevation as the power conductors for No. 34061 and larger girders. If a switch is incorporated in the spur track, the control conductors must be lowered to provide clearance between the control collectors and the switch; consult factory for recommendations on these applications.

The control conductors are not carried through the interlock gap, eliminating the need for control conductors on spur tracks or fixed transfer sections. No. 550491 pickup guides and No. 550278 transfer caps are used at the ends of the con-

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SINGLE GIRDER TRANSFER CRANES

trol conductors to enable the collectors to leave and pick up the conductors as the carrier moves off and on the transfer crane. Carriers operating on transfer cranes use No. 560395 collectors for the power conductors and No. 560393 self-centering collectors for the control conductors.

All carriers operating on direct interlocking cranes, cranes interlocking through transfer sections, or cranes interlocking at both ends with spur tracks require tandem collectors for the common conductor (X) and the mainline conductor (M) to activate the mainline contactor as the transfer is made. The tandem collector arrangement requires 2 additional No. 560393 collectors.

MOTOR DRIVEN TRANSFER CRANES

Motor driven transfer crane use Types I or III control arrangements as described on Pages CR-7 and CR-8. Accessory equipment can be furnished on motor driven transfer cranes to increase their flexibility and improve their operation. Some accessory equipment is furnished as standard and some as optional.

A limit switch is furnished on the throw-out mechanism as standard on transfer cranes interlocking with spur tracks or fixed transfer sections. The switch interrupts the crane control circuit when the latch is extended and prevents the operator from moving the crane while it is latched to the discharge track.

When a system has 2 or more discharge tracks and 2 or more transfer cranes with Type I control, an auxiliary push button station may be installed on the crane for controlling the crane motion. This enables the operator to move the crane from one discharge track to another without the hoist and carrier being on the crane.

When transfer cranes are arranged for direct crane to crane interlocking it may be desirable to have them travel as a unit when interlocked. This is accomplished by contacts at the ends of the cranes which connect the crane control circuits. A limit switch disconnects the contacts when the cranes are not interlocked allowing the cranes to pass without connecting their control circuits.

Other limit switch arrangements are used to prevent the crane from traveling when the latch is extended and the crane is not aligned with the other crane. Consult factory for information on limit switch arrangements, clearances and girder overhangs on all direct interlocking cranes.

MOTOR OPERATED INTERLOCKS

Motor operated interlocks can be furnished on all motor driven transfer cranes as optional equipment. The latch and slide rod assembly are the same as used on manually operated interlocks. The throw-out mechanism uses a gearmotor and roller chain drive to extend and retract the latch. A magnetic contactor is furnished for control of the gearmotor; limit switches control the movement of the latch and also interrupt the crane motion when the interlock is extended.

The interlock is controlled from 2 additional buttons in the carrier push button station (Type I control) or crane push button station (Type III control) or from an auxiliary push button station suspended from the crane. On cab operated systems, a push button station is mounted in the cab. When controlled from the carrier, 2 additional control conductors are required for the crane electrification and 2 additional control collectors for the carrier.

When transfer cranes with motor operated interlocks are arranged for direct crane to crane interlocking, contacts to connect the crane control circuits may be required to meet the following conditions: (1) control of the interlock from either of the 2 interlocked cranes; (2) cranes to travel as a unit when interlocked; and (3) the combination of conditions (1) and (2). When contacts are used, a limit switch is provided to disconnect the contacts when the cranes are not interlocked allowing the cranes to pass without connecting their control circuits. Other limit switches are provided to prevent the crane from traveling when the latch is extended and the crane is not aligned with the other crane. Consult factory for information on limit switch arrangements, clearances and girder overhangs on all direct interlocking cranes where contacts are required.

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SINGLE GIRDER TRANSFER CRANE CLEARANCES

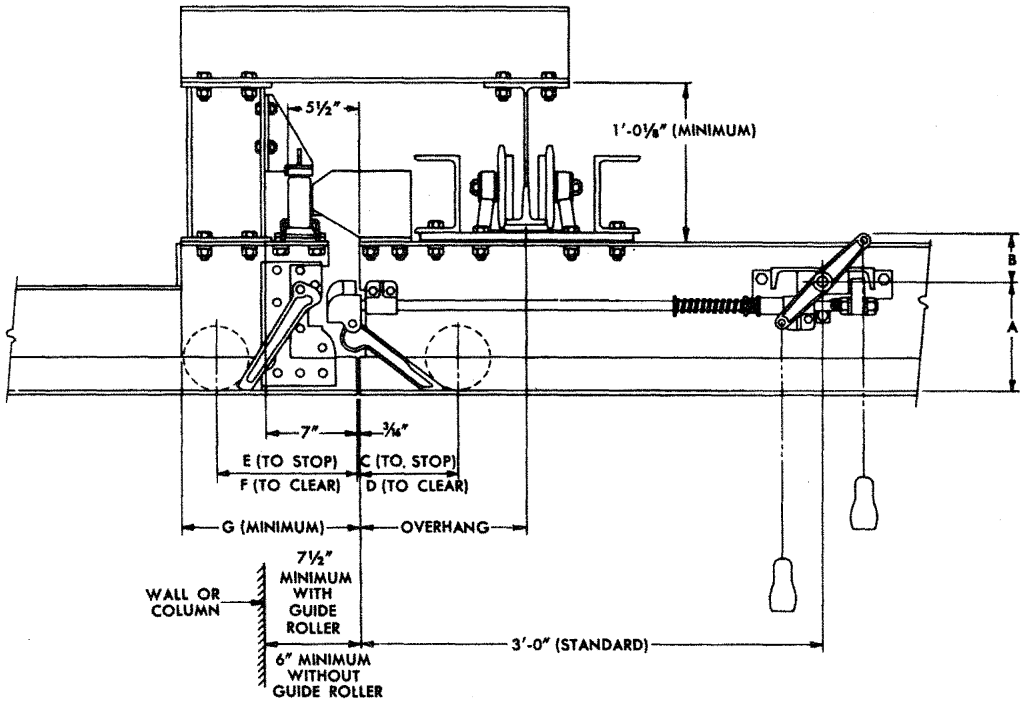
SPUR TRACK ARRANGEMENT

The arrangement of a transfer crane interlocking with a spur track is shown in the drawing. Spur tracks interlocking with the transfer crane are equipped with discharge points and guide roller guides (where applicable).

A structural tie is required between the discharge track and crane runway. The tie maintains the gap between the ends of the discharge track and the girder and permits the crane to pass the discharge track without interference. It also provides the support for the upper guide roller guide. The tie may be bolted or welded to the runway track. It is installed with the transfer crane latched to the spur and with a 3/16 inch gap between the ends of the discharge track and girder. When bolting, holes in the runway track are field drilled.

The discharge track is supported from the building structure or steel superstructure adjacent to the structural tie. The structural tie is not designed to support the end of the discharge track.

Bracing of the discharge track is recommended to maintain alignment. The bracing is made in the field to suit the conditions and consists of steel angles installed perpendicular to the track. Bracing is installed after system has been aligned.



Interlock Mechanism	A	B	C	D	E	F	G
Type L	8-1/16	3-11/16	7-3/4	10-1/2	10-3/4	1'-2-5/8	1'-2
Type H	10-1/8	6-13/16	10-3/8	1'-2-1/4	1'-0-1/2	1'-5-5/8	1'-4-1/2
Type J	11-7/8	6-13/16	1'-1-1/8	1'-5-7/8	1'-1-7/8	1'-8-1/8	1'-6-1/2

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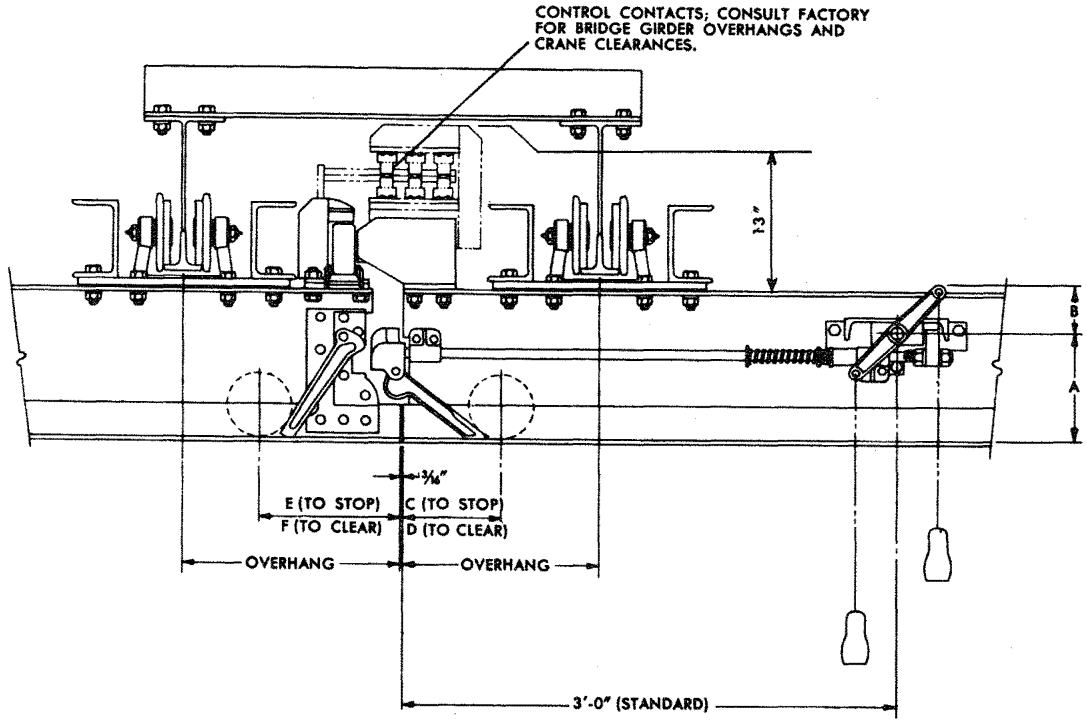
SINGLE GIRDER TRANSFER CRANE CLEARANCES

DIRECT CRANE TO CRANE INTERLOCK ARRANGEMENT

The arrangement of 2 direct interlocking transfer cranes is shown in the drawing. This arrangement is frequently used in an assembly bay area where operations on one side of the bay are different from those on the other side. It provides greater availability of the cranes and permits transfer of loads from one side of the bay to the other.

Consult factory for clearance dimensions when cranes are required to travel as a unit, as girder overhangs may have to be increased to accommodate the control contacts. Data on desired control functions, girder and runway track sizes and type of end trucks are required to determine clearances.

Structural ties are required between adjacent runways. These ties maintain the gap between the ends of the girder and permit the cranes to pass without interference. They are located at the support points and at intermediate points as required to maintain a spacing of not more than 10'-0 centers. The ties may be bolted or welded to the runway tracks. They are installed with the cranes located directly under the ties with a 3/16 inch gap between the ends of the girders. When bolting, holes in runway track are field drilled.



Interlock Mechanism	A	B	C	D	E	F
Type L	8-1/16	3-11/16	7-3/4	10-1/2	10-3/4	1'-2-5/8
Type H	10-1/8	6-13/16	10-3/8	1'-2-1/4	1'-0-1/2	1'-5-5/8
Type J	11-7/8	6-13/16	1'-1-1/8	1'-5-7/8	1'-1-7/8	1'-8-1/8

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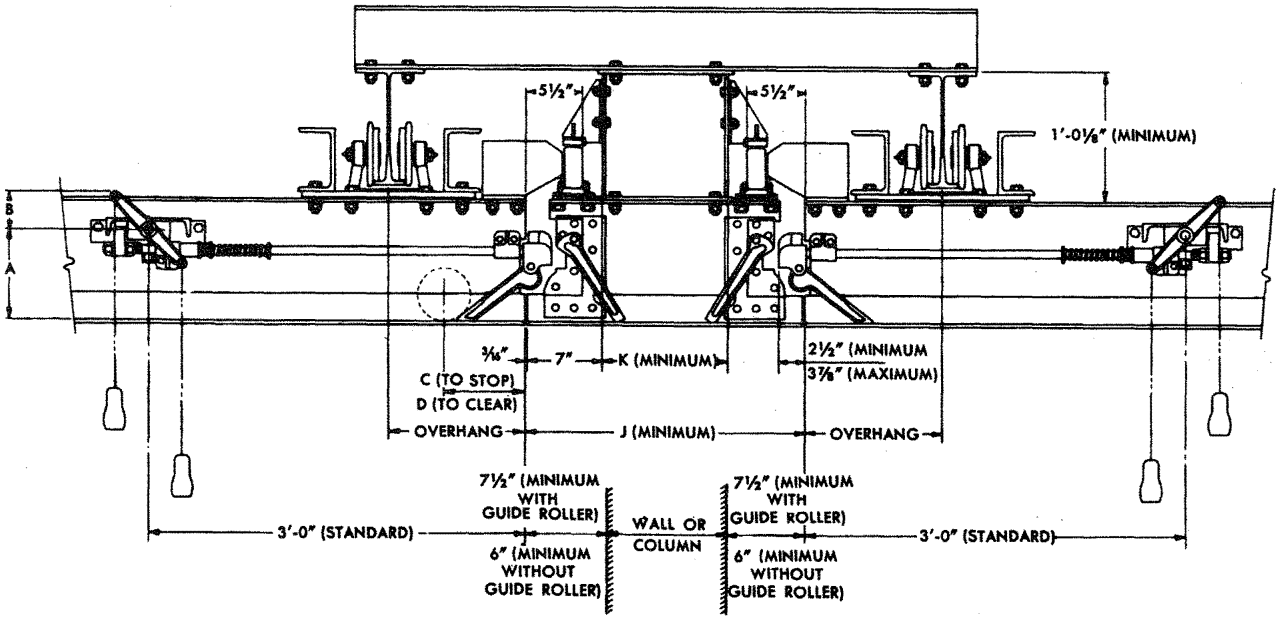
SINGLE GIRDER TRANSFER CRANE CLEARANCES

FIXED TRANSFER SECTION ARRANGEMENT

The arrangement of 2 transfer cranes interlocking with a fixed transfer section is shown in the drawing. This arrangement is used where transfer of loads from one bay to another is desired.

The transfer track is suspended from the adjacent runway tracks by a structural support. The support maintains the gaps between the ends of the transfer track and bridge girders and permits the cranes to pass the transfer track without interference. The support may be bolted or welded to the runway tracks. It is installed with the transfer cranes latched to the transfer track and with 3/16 inch gaps between the ends of the transfer track and bridge girders. When bolting, holes in the runway tracks are field drilled.

Bracing of the transfer track is recommended to maintain alignment. The bracing is made in the field to suit the conditions and consists of steel angles installed perpendicular to the track. Bracing is installed after systems has been aligned.



Interlock Mechanism	A	B	C	D	J	K
Type L	8-1/16	3-11/16	7-3/4	10-1/2	2'-3-3/8	1'-1
Type H	10-1/8	6-13/16	10-3/8	1'-2-1/4	2'-8-3/8	1'-6
Type J	11-7/8	6-13/16	1'-1-1/8	1'-5-7/8	3'-0-3/8	1'-10

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LOW HEADROOM SINGLE GIRDER CRANES

Rigid frame, prefabricated buildings are used by many companies for manufacturing and storage. Low headroom cranes are available for these buildings and other buildings with low trusses or obstructions which may restrict the hook lift. Low headroom cranes have the bridge girder framed into the sides of the end trucks and offer maximum lift. However, because the girder is framed into the end truck, carrier end approaches are reduced.

Low headroom construction is used only on standard single girder cranes. It cannot be furnished on light duty cranes. When used with electrically operated hoists or when motor driven, low headroom cranes are equipped with an electrification system as described in the Electrification Section

Low headroom construction can be furnished on one or both ends of the crane. When used on both ends, the crane cannot be used as a transfer crane. When used on one end, the crane can be used as a transfer crane by adding an interlock mechanism to the end with standard construction.

The rated load and span of low headroom cranes are limited because the bridge girder, not being supported from the top flange, is less stable than it is when used on standard canes. Standard low headroom construction is restricted to cranes with No. 34046 (16 inch) or smaller bridge girders and to 4-wheel end trucks with 5 inch or 6-1/2 inch diameter wheels and 8-wheel end trucks with 5 inch diameter wheels. Where greater rated loads and spans are required, special low headroom construction can be designed; consult factory for recommendations.

Low headroom construction consists of a special girder connection and a modification to the end truck. This construction allows the girder to be framed into the end truck load bar and raises the girder by about its depth. Two types of construction are available - one for 4 wheel end trucks and the other for 8-wheel end trucks. Clearance dimensions for low headroom construction are indicated on Page CR-38.

Dimensions between the supporting structure or overhead obstructions and high point of the crane should be checked to allow clearance for control panels, conductor bar supports, conduit, etc. Where headroom is critical and the girder must be raised as near as possible to the overhead obstruction, submit complete data on the application to the factory for recommendations.

COPED BRIDGE GIRDERS

The available lift of many single girder cranes can be improved by coping the bridge girder at the end trucks. While not offering as much lift as cranes with low headroom construction, this construction has none of the limitations of the low headroom crane. Carrier approaches are not reduced and cranes with coped girders may be equipped with interlock mechanisms. See Page CR-31 for limitations on coped girders for transfer cranes.

Limitations on the amount of cope are necessary to maintain a stable girder condition. On applications requiring coping below the neutral axis of the girder, a special connection is required between the girder and end truck loadbar. Minimum depths for coped bridge girders are:

No. 34021 - 8-1/2 inch
No. 34026 - 8-1/2 inch
No. 34031 - 8-1/2 inch
No. 34037 - 8-1/2 inch*
No. 34041 - 10 inch*
No. 34046 - 10 inch*
No. 34051 - 10 inch*
No. 34056 - 10 inch*
No. 34061 - 10 inch*
No. 34066 - 12-1/2 inch
No. 34071 - 14 inch
No. 34076 - 16 inch

*Bridge girders can be coped to this depth only if the carrier has 4 inch Or 5 inch diameter wheels. Minimum girder depth is 11-1/2 inch for carriers with 6-1/2 inch diameter wheels and 12-1/2 inch for carriers with 8 inch diameter wheels. Consult factory for recommendations on coping No. 34077 or larger girders.

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LOW HEADROOM SINGLE GIRDER CRANES

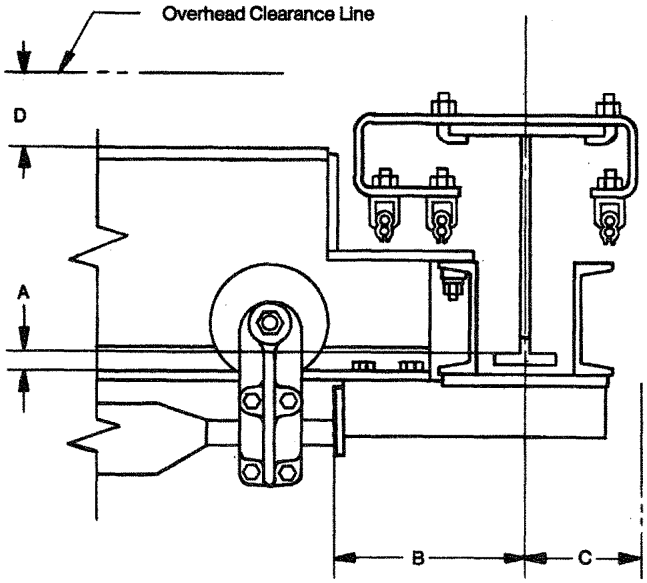
Low headroom construction arrangements for 4-wheel and 8-wheel end trucks are shown in the drawings.

Dimension C is the dimension from the centerline of the runway track to the extreme of the end truck. For all motor driven low headroom cranes, use dimension C for electrified units to allow clearance for the tractor drive.

Dimension D is the dimension between the bottom of the supporting structure or overhead obstruction and the top of the bridge girder. On electrified and motor driven cranes, this dimension should be checked for clearance of control panels, conductor bar supports, conduit, etc.

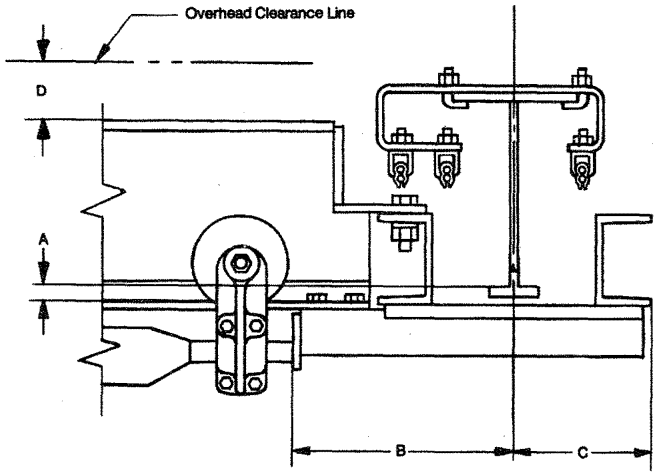
4-WHEEL END TRUCK CONSTRUCTION

End Truck Item Number	A		B	C	
	Light Rail Girder	Heavy Rail Girder		Non-Elect.	Elect.
170304 170305 170306 170307	1"	3/4"	11"	5-1/2"	8-7/8"
170308 170309	1"	3/4"	10-1/2"	5-1/2"	8-1/4"
170314	1-5/8"	1-3/8"	10-1/2"	6-1/8"	8-1/4"
170315			10-5/8"	6-3/8"	



8-WHEEL END TRUCK CONSTRUCTION

End Truck Item Number	A		B	C	
	Light Rail Girder	Heavy Rail Girder		Non-Elect.	Elect.
170312	1"	3/4"	1'-1-1/4"	8-3/4"	8-7/8"
170313					11-3/4"
170318	1"	3/4"	1'-1-1/4"	8-3/4"	8-3/4"
170319				8-5/8"	11-3/4"



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HAND RACKED SINGLE GIRDER CRANES

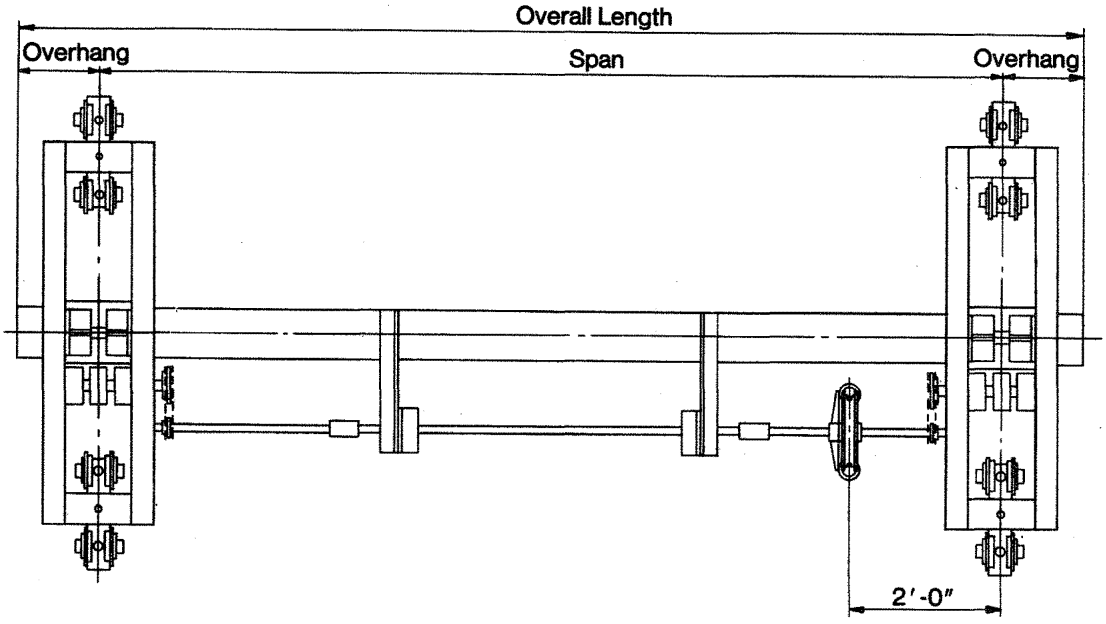
Standard, hand propelled, single girder cranes may be arranged for hand racking by the addition of a squaring shaft drive. Hand racked cranes use 4-wheel extended wheelbase end trucks or 8-wheel end trucks.

These cranes are limited to spans of 42'-0 maximum and to end trucks with 5 inch or 6-1/2 inch diameter wheels. When electric hoists operate on the crane, they are equipped with conductors and current collectors as described in the Electrification Section. They can be used as transfer cranes by the addition of interlock mechanisms.

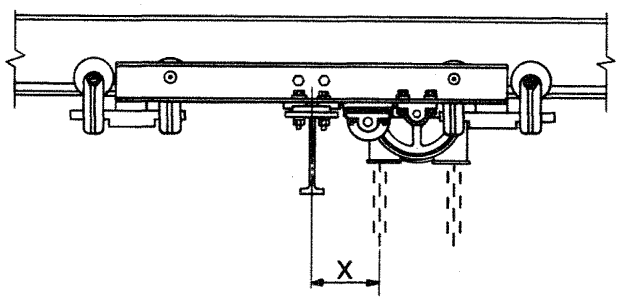
The drive consists of rubber wheels mounted in each end truck which bear the bottom of the runway and provide traction to propel the crane. The wheels are connected to a squaring shaft by roller chains. The squaring shaft operates on self-aligning ball bearing pillow block; the assembly is propelled by a hand chain and chain wheel.

The standard location for the hand chain is 2'-0 from the centerline of the end truck as indicated in the drawing. The hand chain may be located at any point between the end trucks when specified. A second hand chain may also be furnished when specified. The hand chain may be located up to 1'-6 outside of the end truck providing the girder overhang is at least 6 inch beyond the hand chain location.

The arrangement of a hand racked crane is shown in the drawing. Clearances are the same as those shown on preceding pages for a comparable hand propelled crane. Dimension X should be checked for possible interference between the hoist and/or carrier and the hand chain.



End Truck Item Number	Dimension X
170305 170307 170309 170315	1'-0-3/4"
170318	11-1/4"
170320	11-3/4"



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STANDARD DOUBLE GIRDER CRANES

Standard 2-runway, double girder Trambeam cranes are cataloged for rated loads to 15 tons and for spans to 100'-0. Multiple runway and heavier rated load cranes are available; consult factory for assistance on these applications. Selection of 2-runway double girder cranes is made in accordance with the procedure outlined on Page CR-47.

These cranes may be hand propelled, hand racked or motor driven depending on travel distance, frequency of operation, span, elevation and rated load. However, they are generally motor driven and the data that follows applies to motor driven cranes. When electric hoists operate on the crane, they are equipped with an electrification system as described in the Electrification Section.

Service classifications for cranes are described in ANSI MH 27.1 Specifications for Underhung Cranes and Monorail Systems. Cataloged cranes will generally meet the service classification of the hoist selected to operate on the crane and the requirements of the comparable ANSI MH 27.1 service classification.

For Class D heavy duty cranes with speeds greater than 200 FPM and all class E severe duty cranes, consult factory for recommendations.

Complete specifications for bridge girders, girder connections, end trucks, crane drives and crane electrification are described below and on subsequent pages.

BRIDGE GIRDERS

All heavy rail track sections (Nos. 34037 through 34079) are used for bridge girders of double girder cranes. These sections are described in the Track & Fitting Section.

Three types of bridge girders have been established to: (1) maintain a constant headroom dimension from the top of the girders at the end trucks to the hook in the high position and (2) provide a simplified carrier design. Type 1 girders are fabricated from Nos. 34037 or 34041 track and have a 12-1/2 inch depth at the end trucks. Type 2 girders are fabricated from Nos. 34046 through 34076 track and have a 16 inch depth at the end trucks. Type 3 girders are fabricated from Nos. 34077 through 34079 track and have a 22-1/2 inch depth at the end trucks.

Bridge girder deflection is limited to 1/450 of the span for cranes with spans of 46'-0 or less. For spans greater than 46'-0, the ratio is reduced so that the actual deflection does not exceed 1-1/4 inch

Bridge girders are structurally framed together on the gauge of the carrier by steel angles attached to the top flanges. This framing provides lateral stability and maintains the gauge between the girders.

> NOTE:
> Where the depth of the girder cope is large, i.e. No.34076 (30 inch) tracks arranged as Type 2 girders are coped to 16 inch depth at the end trucks, check the clearance above the girder top flanges and bracing for possible interference with the building structure, lights, heaters, etc.

GIRDER CONNECTIONS

Girder connections to the end trucks utilize keys which are welded to the end truck load bars when the crane is assembled at the factory. The keys are welded into position adjacent to the girder flanges after the load bars have been aligned with the girders. The keys provide a rigid connection which does not rely on the fit of the attaching hardware in the mounting holes.

END TRUCKS

A complete line of end trucks is available with rated loads from 8,000 to 60,000 pounds. The end truck wheel base is variable and depends on the gauge between the bridge girders. The girder gauge may be determined by referring to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane.

End truck load bars consist of steel channels, plates and bars which are welded into a rigid assembly. After welding, the load bar is machined to control vertical dimensions and squareness of trucks. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

Cranes with trucks having 5 inch diameter wheels can operate on any size Trambeam track. Cranes with trucks having 6-1/2 inch and 8 inch diameter wheels can operate only on heavy rail track sections. Cranes with No. 180209 end trucks can operate only on No. 34041 or larger track because of the height of the load bar channels. These runway restrictions are noted on Pages CR-44, CR-45 and CR-46 and in the crane tables.

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STANDARD DOUBLE GIRDER CRANES

CRANE DRIVES

Double girder cranes are motor driven by tractor drives attached to each end truck. Three drives (Nos. 2408, 2409 and 24010) are available to meet a wide range of applications. All are satisfactory for Class D heavy duty service. Complete data on tractor drives, motor control and horsepower requirements are contained in the Tractor Drive Section.

Nominal speeds for double girder cranes are 55 and 90 FPM when No. 24010 drives are used; 100, 125, 150 and 200 FPM when No. 2409 drives are used; and 100, 150, 200, 250 and 300 FPM when No. 2408 drives are used. Other speeds can be furnished.

Wiring and control panels comply with the requirements of OSHA electrical standards and Article 610 of the National Electric Code. Wiring is enclosed in rigid conduit insofar as possible. Crane control panels are furnished with fused motor circuit switch, mainline contactor, motor overcurrent protection, thermal overload relays in 3 phases and NEMA 12 dust-tight enclosure as standard.

CRANE ELECTRIFICATION

The crane electrification system for double girder cranes is similar to that used on single girder cranes and varies only in the location of the conductors. A description of the crane electrification system and the method of determining the number of conductors are contained on Pages CR-7 and CR-8. Standard conductor arrangements are shown on Page CR-42.

Collectors are required for the carrier to pick up current from the power conductors and supply power to the hoist and carrier motors. They are also required for transferring control functions form the operating station to the control conductors. The number of carrier collectors is generally the same as the number of crane conductors. On transfer crane applications, tandem collector arrangements are usually required to activate the mainline contactor.

Insul-8-Bar's 90 amp steel conductor is the standard electrification for double girder cranes. Complete descriptions on conductor bars, insulating covers, collectors and accessories are in the electrification Section.

Double girder cranes, except transfer cranes, may be equipped with festooned electrification. Transfer cranes are equipped with rigid conductors to provide continuous power to the hoist and carrier motors as the transfer is made. Festooned electrification is described in the Electrification Section.

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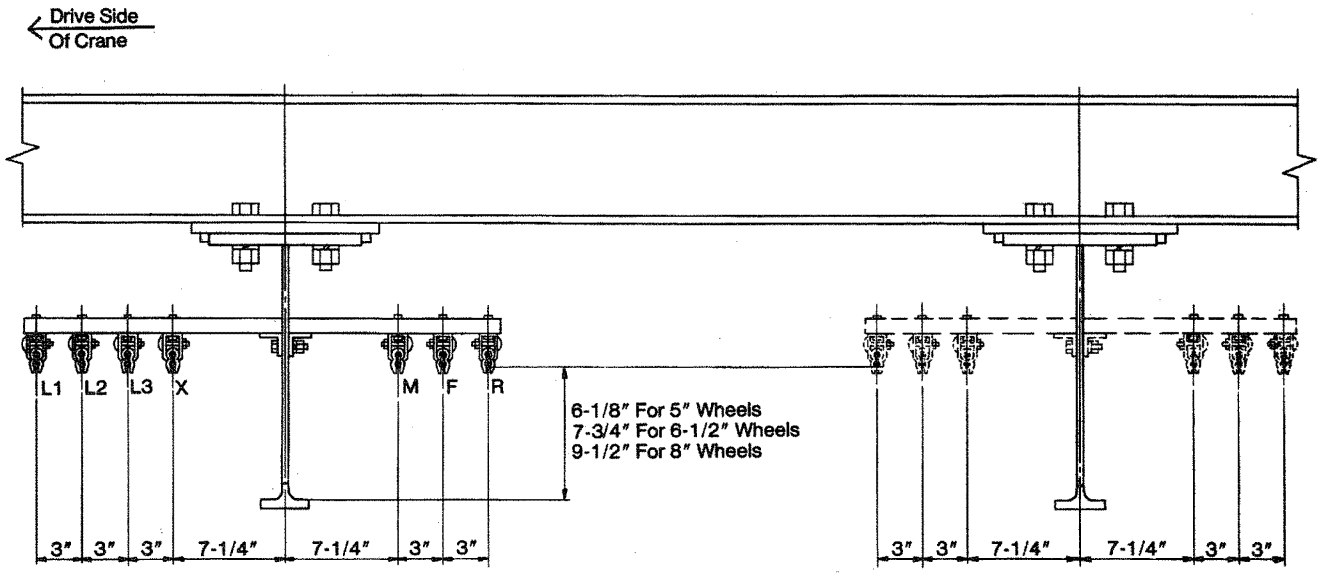
STANDARD DOUBLE GIRDER CRANES

CONDUCTOR ARRANGEMENT

The drawing illustrates the standard arrangement of power and control conductors for double girder cranes with Insul-8-Bar electrification. The power (L1, L2 and L3) and control (F, R, X and M) conductors are 6-1/8 inch above the girder tread for carriers with 5 inch diameter wheels, 7-3/4 inch for carriers with 6-1/2 inch diameter wheels or 9-1/2 inch for carriers with 8 inch diameter wheels.

The conductors and supports shown by the solid lines indicate the 7 conductor arrangement used with Type I single speed crane control. The dotted lines indicate the location of additional conductors for other control arrangements.



TYPICAL FOR ALL GIRDER SIZES

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STANDARD DOUBLE GIRDER CRANES

BRIDGE GIRDER OVERHANGS

The table lists the minimum, standard and maximum girder overhangs for double girder cranes. Wherever possible, standard overhangs should be used.

Minimum overhangs are based on runways electrified with 3 conductor Insul-8-Bar electrification arranged with 2 conductors mounted on the side of the runway away from the overhang.

The maximum overhang should be limited to a length that will not allow the hoist hook to travel beyond the center of the runway when the carrier wheels are against the stop or interlock fork. In some cases overhangs greater than the listed maximum can be furnished; consult factory for assistance on these applications.

Minimum overhangs for interlock and discharge ends should be used on transfer cranes to utilize the standard interlock mechanism and to provide for mounting of guide rollers and guides. When overhangs are greater than the minimum at the interlock end, the slide rod length may have to be increased to allow the throw out mechanism to clear the end truck load bar.

> IMPORTANT; When laying out transfer crane systems or if installation of a future interlock is anticipated, check clearance between the extreme of the guide roller or latch and the nearest obstruction.

End Truck Item Number	Minimum			Standard	Maximum		
	Plain End	Interlock End*	Discharge End**		Type 1 Girders	Type 2 Girders	Type 3 Girders
180102; 180202	8-7/8	1'-1-1/4	1'-0-5/8	1'-0	2'-0	2'-6	2'-6
180104; 180204	8-7/8	1'-3-3/8	1'-2-3/4	1'-0	2'-0	2'-6	2'-6
180205	8-7/8	1'-3-3/8	1'-2-3/4	1'-0	2'-0	2'-6	2'-6
180106; 180206	8-1/4	1'-5-3/8	1'-4-3/4	1'-0	2'-0	2'-6	2'-6
180108; 180208	10	1'-7	1'-6-3/8	1'-0	2'-6	3'-0	3'-0
180209	11-1/2	1'-8-1/2	1'-7-7/8	1'-0	2'-6	3'-0	3'-0
180112; 180212	8-3/4	1'-5-3/4	1'-5-1/8	1'-0	2'-6	3'-0	3'-0
180113; 180213	10	1'-7	1'-6-3/8	1'-0	2'-6	3'-0	3'-0
180214	1'-0	1'-9	1'-8-3/8	1'-0	2'-6	3'-0	3'-0

*Minumum overhang provides for mounting No. 45090 continuous roller guides. When No. 4504 guide rollers are used, the overhangs may be reduced by 4-3/4"..
**Minumum overhang provides for mounting No. 45091 guide rollers or No. 4501007 guide roller guide.

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STANDARD DOUBLE GIRDER CRANES

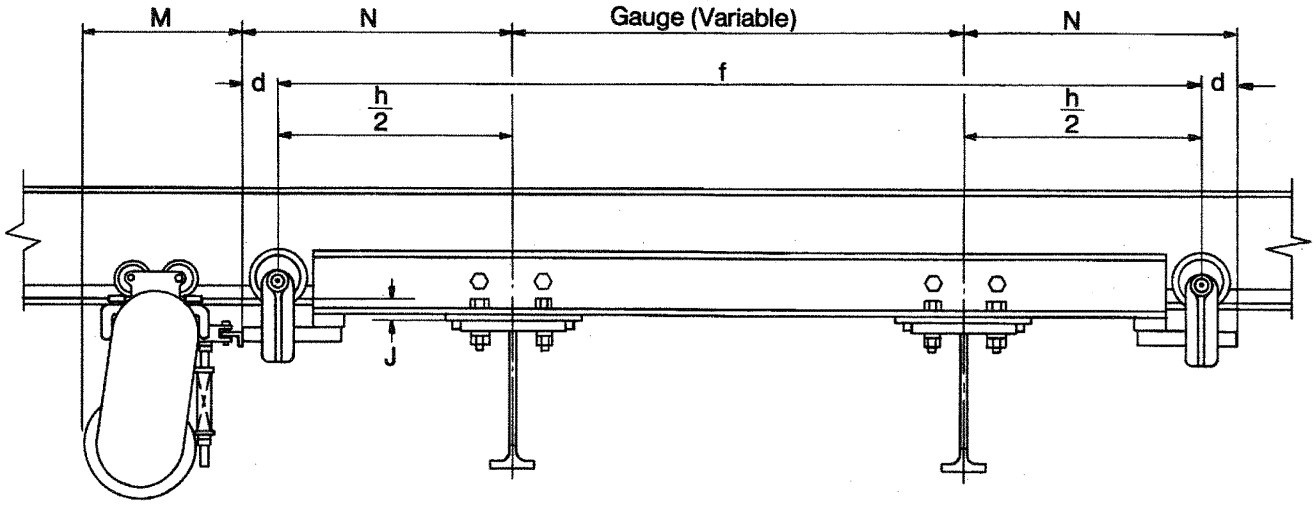
4-WHEEL END TRUCKS

The drawing illustrates the No. 180102 end truck and is typical for all 4-wheel trucks. The table indicates the item number, rated load, carrier head, net weight, minimum size of runway track and principal dimensions. See Carrier Section for specifications on carrier heads and wheel assemblies.

Dimension f is determined by adding dimension h to the girder gauge. The girder gauge is variable and depends on the hoist and carrier selected for the crane. The gauge is determined by referring to the appropriate clearance drawing in the Carrier Section. Net weights are based on 6'-6 girder gauge. The additional net weight is the additional weight to be added for each 6 inch of gauge over 6'-6 .

Load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

All end trucks have self aligning bushings between the carrier head and the load bar to provide equal wheel loading and free swivel of the heads.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

End Truck Item Number	Rated Load (Pounds)	Carrier Head Item Number	Net Weight 6'-6 Gauge (Pounds)	*Add'l Net Weight (Pounds)	Minimum Runway Size	d	h	J	N
180102	8,000	010207	283	9	34016	3-3/4	3'-0	1-1/2	1'-9-3/4
180202	8,000	010208	295	9	34016	3-3/4	3'-0	1-1/2	1'-9-3/4
180104	13,000	010209	657	20	34037	4-1/4	4'-0	2-1/8	2'-4-1/4
180204	13,000	010210	679	20	34037	4-1/4	4'-0	2-1/8	2'-4-1/4
180205	15,000	010211	757	20	34037	4-1/4	4'-0	2-1/4	2'-4-1/4

*Additional net weight of end truck for each 6" of gauge over 6'-6".

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STANDARD DOUBLE GIRDER CRANES

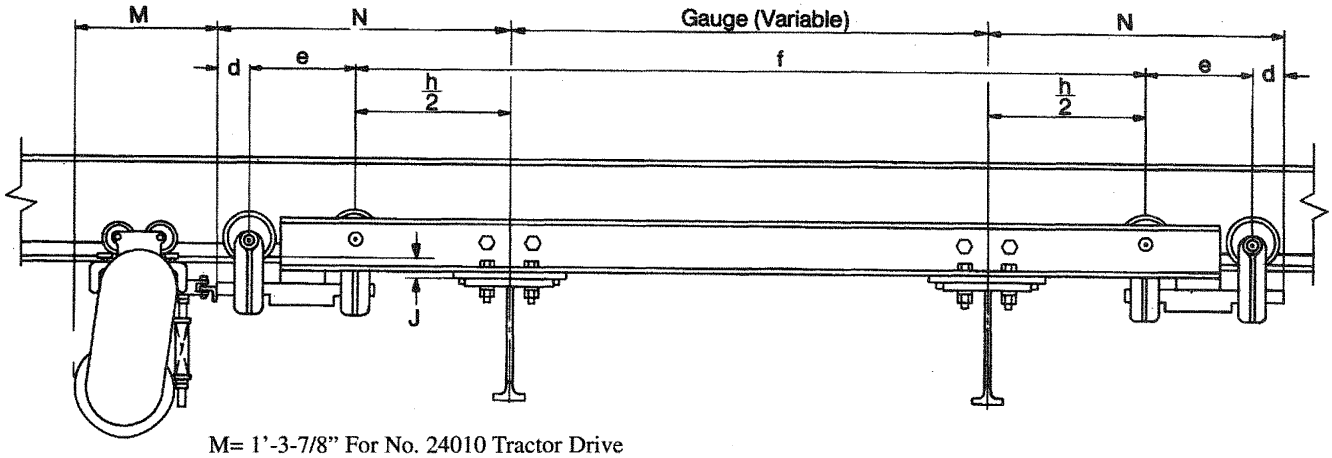
8-WHEEL END TRUCKS

The drawing illustrates the No. 180106 end truck and is typical for all 8-wheel end trucks. The table indicates the item number, rated load, carrier head, net weight, minimum size of runway track and principal dimensions. See Carrier Section for specifications on carrier heads and wheel assemblies.

Dimension f is determined by adding dimension h to the girder gauge. The girder gauge is variable and depends on the hoist and carrier selected for the crane. The gauge is determined by referring to the appropriate clearance drawing in the Carrier Section. Net weights are based on 6'-6 girder gauge. The additional net weight is the additional weight to be added for each 6 inch of gauge over 6'-6 .

Load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

The 4-wheel carrier load bars are made from steel plate which is machined to control vertical elevations. Self-aligning bushings are used between the carrier load bars and main load bar to provide equal carrier head loading. Self-aligning bushings are also used between the carrier heads and carrier load bar to provide equal wheel loading and free swivel of the heads.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

End Truck Item Number	Rated Load (Pounds)	Carrier Head Item Number	Net Weight 6'-6 Gauge (Pounds)	*Add'l Net Weight (Pounds)	Minimum Runway Size	d	e	h	J	N
180106	16,000	010207	720	20	34016	3-3/4	1'-0	2'-11	1-1/2	2'-9-1/4
180206	16,000	010208	744	20	34016	3-3/4	1'-0	2'-11	1-1/2	2'-9-1/4
180108	26,000	010209	1,031	22	34037	4-1/4	1'-3	3'-0	2-1/8	3'-1-1/4
180208	26,000	010210	1,075	22	34037	4-1/4	1'-3	3'-0	2-1/8	3'-1-1/4
180209	30,000	010211	1,290	21	34041	4-1/4	1'-3	3'-0	2-1/4	3'-1-1/4

*Additional net weight of end truck for each 6" of gauge over 6'-6".

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STANDARD DOUBLE GIRDER CRANES

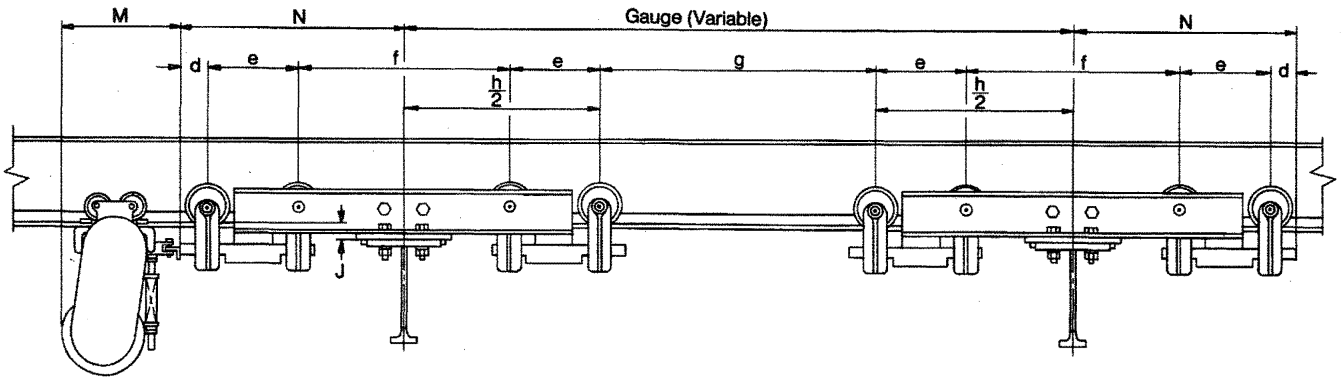
16-WHEEL END TRUCKS

The drawing illustrates the No. 180112 end truck and is typical for all 16-wheel end trucks. The design consists of individual 8-wheel end trucks on each girder; structural ties between the girders maintain the gauge. The table indicates the item number, rated load, carrier head, net weight, minimum size of runway track and principal dimensions of these trucks. See Carrier Section for specifications on carrier heads and wheel assemblies.

Dimension g is determined by subtracting dimension h from the girder gauge. The girder gauge is variable and depends on the hoist and carrier selected for the crane. The gauge is determined by referring to the appropriate clearance drawing in the Carrier Section.

Load bars consist of steel channels, plates and bars welded into a rigid assembly. After welding, the load bars are machined to control vertical elevations and squareness. Lugs are provided in the load bar to limit the drop of the end truck to 1 inch or less in the event of wheel or axle failure.

The 4-wheel carrier load bars are made from steel plate which is machined to control vertical elevations. Self-aligning bushings are used between the carrier load bars and main load bar to provide equal carrier head loading. Self-aligning bushings are also used between the carrier heads and carrier load bar to provide equal wheel loading and free swivel of the heads.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

End Truck Item Number	Rated Load (Pounds)	Carrier Head Item Number	Net Weight (Pounds)	Minimum Runway Size	d	e	f	h	J	N
180112	32,000	010207	908	34016	3-3/4	1'-0	3'-0	5'-0	1-1/2	2'-9-3/4
180212	32,000	010208	956	34016	3-3/4	1'-0	3'-0	5'-0	1-1/2	2'-9-3/4
180113	52,000	010209	1,355	34037	4-1/4	1'-3	3'-0	5'-6	2-1/8	3'-1-1/4
180213	52,000	010210	1,443	34037	4-1/4	1'-3	3'-0	5'-6	2-1/8	3'-1-1/4
180214	60,000	010211	2,061	34037	4-1/4	1'-3	3'-0	5'-6	2-1/4	3'-1-1/4

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SELECTION OF DOUBLE GIRDER CRANES

Standard double girder, 2-runway cranes are tabulated on subsequent pages by: (1) number of end truck wheels, (2) rated load and (3) span. The tables provide a simple means for crane selection and indicate the crane code number, basic crane weight, minimum runway size and clearance dimensions. End truck wheel base dimensions are also provided to assist in determining the runway size.

Cranes are listed for rated loads of 2, 3, 5, 7-1/2, 10 and 15 tons and spans from 28'-0 to 100'-0. Heavier rated load cranes are available; consult factory for data.

Crane rated loads are based on a design load which is adequate for most applications. The design load includes: (1) hoist and carrier weights, (2) rated load and (3) 15% impact allowance. The design load is shown in the tables.

Crane selection is made by:

Step 1 - Determine actual load (weights of hoist and carrier selected for the crane, rated load and impact allowance).

Step 2 - Select crane from table providing actual load is no greater than the design load.

If the actual load exceeds the design load, it is necessary to calculate the girder and end truck loads and select the components on the basis of the calculated loads.

Crane code numbers indicate the means of propulsion, type of crane electrification, bridge girder size, type of end truck and overall length of bridge girders. Page CR-2 provides a complete explanation of the crane code numbering system.

The basic crane weight includes the weight of the bridge girders, 7 conductors of Insul-8-Bar, end trucks with 6'-6 girder gauge and motorization with No. 2409 tractor drives. It does not include the structural top flange bracing weight as this weight varies with span and girder gauge. Another variable is in the 4-wheel and 8-wheel end truck weight which varies with the girder gauge. The tables on Pages CR-60 and CR-61 list the variable weight factors.

The net weight is determined by adding the weight factor from Pages CR-60 or CR-61 to the basic crane weight shown in the crane tables. Cranes with No. 2408 drives are approximately 400 pounds more than the basic weight indicated in the tables. This additional weight does not affect crane rated load as the drive is independent of the end truck. No. 24010 drives are approximately 120 pounds less than the basic weight indicated in the tables.

Cranes are listed with an overall length based on a nominal spans between runway tracks and 1'-0 nominal girder overhangs. See Page CR-43 for minimum, maximum and standard girder overhangs when determining the crane span and overall length.

A clearance drawing is provided on the page facing each crane table. The drawings locate the control panel elevation for cranes with Nos. 34037 through 34056 bridge girders. The horizontal spacing of the panel varies with the type of control and collector arrangement. Consult factor for this dimension if the possibility exists for interference between the panel and building structure, lights, etc.

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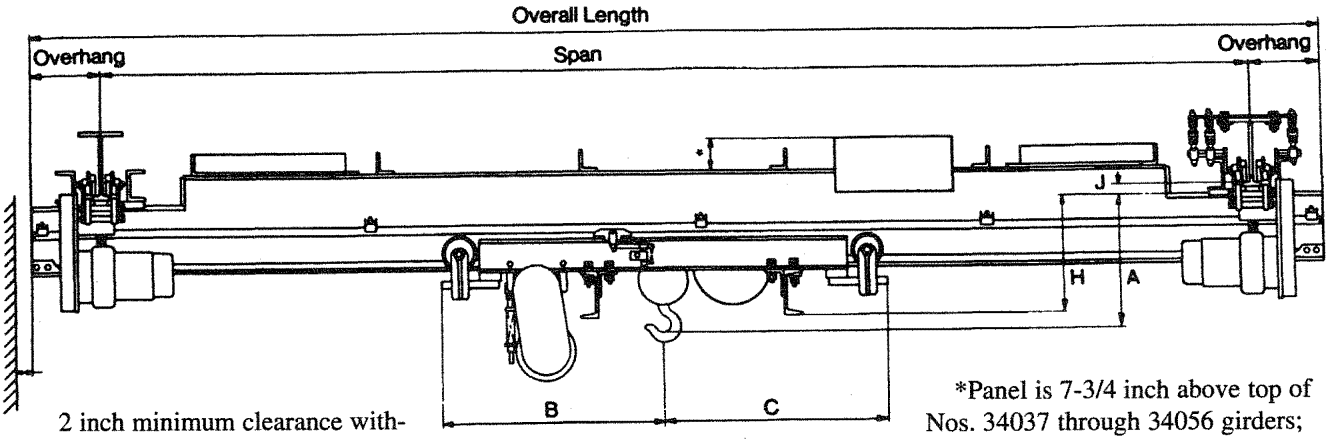
STANDARD DOUBLE GIRDER CRANES

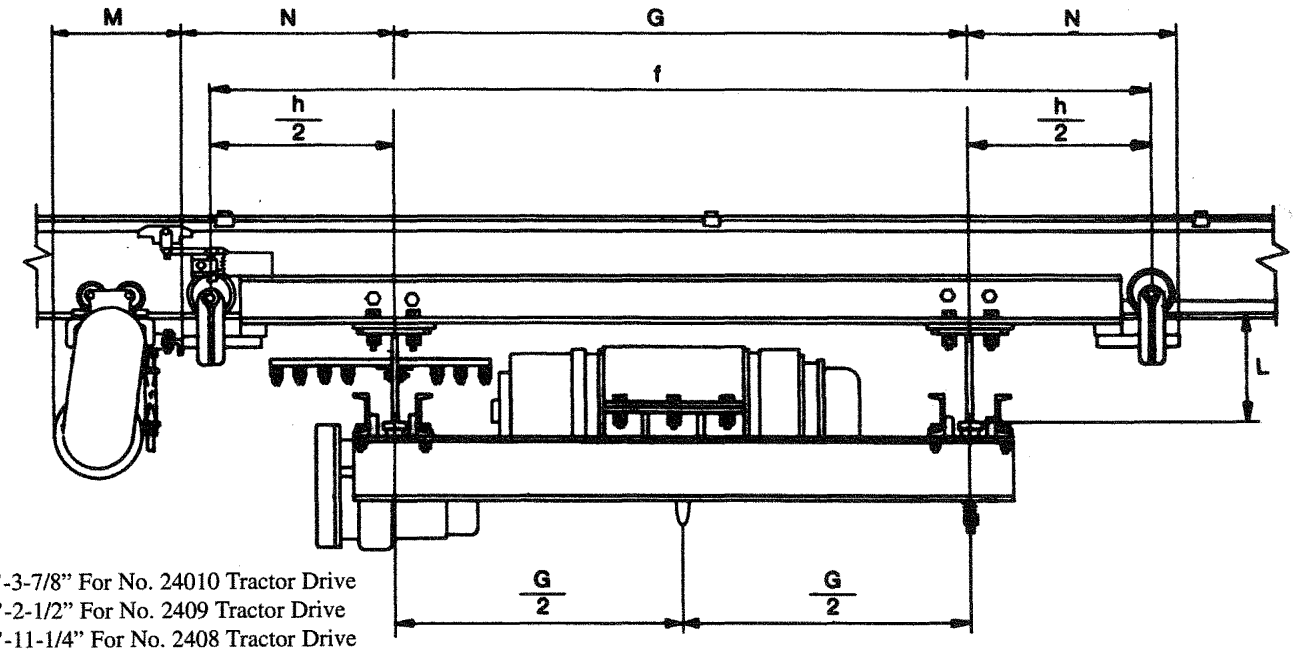
CLEARENCE DRAWING FOR CRANES WITH 4-WHEEL END TRUCKS

The drawing illustrates the clearances of a double girder crane with 4-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions h, J, L and N are shown on the facing page. To determine dimensions A, B, C, G and H refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. To determine dimension F, add dimension h to the girder gauge (dimension G). See Page CR-43 for minimum, maximum and standard girder overhangs.



2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 4-WHEEL TRUCKS

CRANES WITH 4-WHEEL END TRUCKS										
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	h	J	L	N
2	6330	MW37D202X30	3299	28	30	34016	3'-0	1-1/2	1'-1-3/8	1'-9-3/4
		MW37D202X32	3450	30	32	34016	3'-0	1-1/2	1'-1-3/8	1'-9-3/4
		MW37D202X34	3601	32	34	34016	3'-0	1-1/2	1'-1-3/8	1'-9-3/4
		MW41D202X36	4105	34	36	34016	3'-0	1-1/2	1'-1-3/8	1'-9-3/4
		MW41D202X38	4275	36	38	34016	3'-0	1-1/2	1'-1-3/8	1'-9-3/4
		MW46D204X40	5512	38	40	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW46D204X42	5699	40	42	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW46D204X44	5885	42	44	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X46	6761	44	46	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X48	6978	46	48	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X50	7194	48	50	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW56D204X52	7889	50	52	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW56D204X54	8124	52	54	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X56	9075	54	56	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X58	9336	56	58	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X60	9596	58	60	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X62	9857	60	62	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW66D204X64	10924	62	64	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW66D204X66	11209	64	66	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW66D204X68	11495	66	68	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW71D204X70	13881	68	70	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW71D204X72	14227	70	72	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
3	9040	MW37D204X30	4046	28	30	34037	4'-0	2-1/8	1'-2	2'-4-1/4
		MW37D204X32	4197	30	32	34037	4'-0	2-1/8	1'-2	2'-4-1/4
		MW37D204X34	4348	32	34	34037	4'-0	2-1/8	1'-2	2'-4-1/4
		MW41D204X36	4852	34	36	34037	4'-0	2-1/8	1'-2	2'-4-1/4
		MW41D204X38	5022	36	38	34037	4'-0	2-1/8	1'-2	2'-4-1/4
		MW46D204X40	5512	38	40	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW46D204X42	5699	40	42	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW46D204X44	5885	42	44	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X46	6761	44	46	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X48	6978	46	48	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW51D204X50	7194	48	50	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW56D204X52	7889	50	52	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW56D204X54	8124	52	54	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X56	9075	54	56	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X58	9336	56	59	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4
		MW61D204X60	9596	58	60	34037	4'-0	2-1/8	1'-5-1/2	2'-4-1/4

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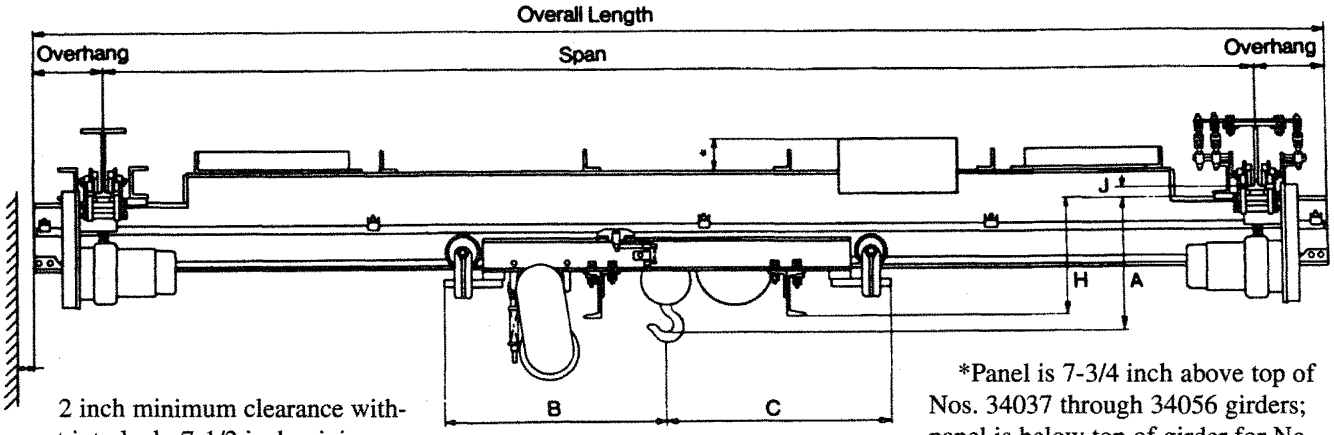
STANDARD DOUBLE GIRDER CRANES

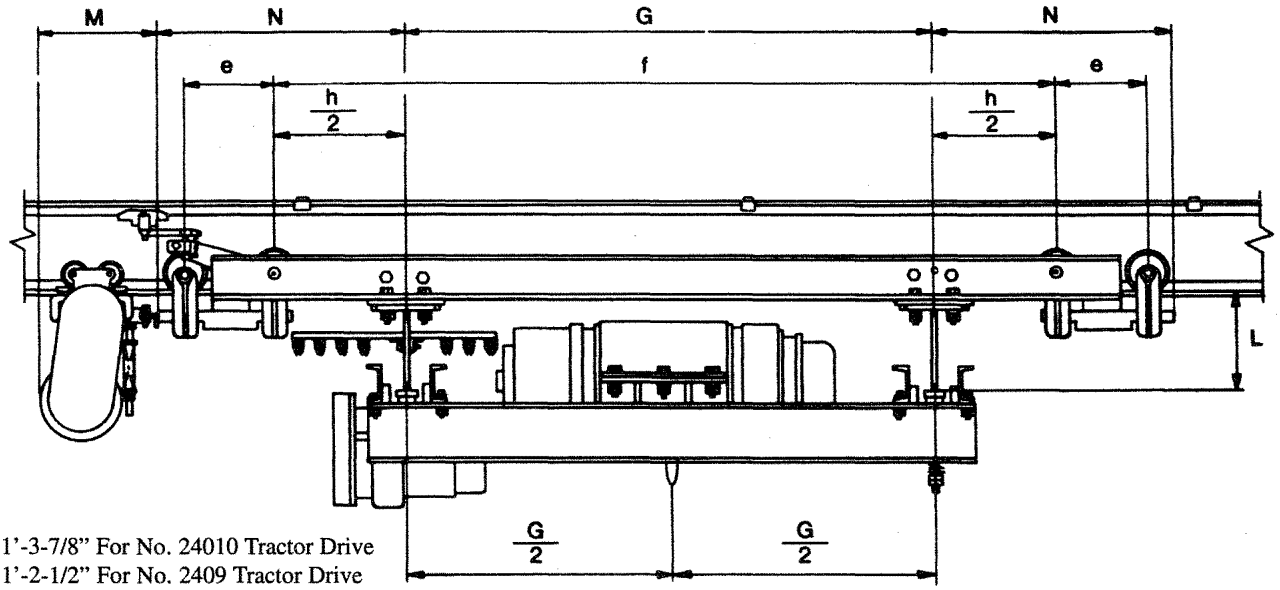
CLEARANCE DRAWING FOR CRANES WITH 8-WHEEL END TRUCKS

The drawing illustrated the clearances of a motor driven double girder crane with 8-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions e, h, J, L and N are shown on the facing page. To determine dimensions A, B, C, G and H refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. To determine dimension f, add dimension h to the girder gauge (dimension G). See Page CR-43 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 8-WHEEL TRUCKS

CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	h	J	L	N
2	6330	MW71D206X74	14698	72	74	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW76D206X76	16427	74	76	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW76D206X78	16810	76	78	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW76D206X80	17211	78	80	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW76D206X82	17594	80	82	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW77D208X84	21387	82	84	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW77D208X86	21836	84	86	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X88	24626	86	88	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X90	25145	88	90	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X92	25647	90	92	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X94	26150	92	94	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X96	26652	94	96	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X98	29801	96	98	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X100	30353	98	100	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X102	30914	100	102	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
3	9040	MW61D206X62	9984	60	62	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW66D206X64	11051	62	64	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW66D206X66	11336	64	66	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW66D206X68	11622	66	68	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW71D206X70	14007	68	70	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW71D206X72	14353	70	72	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW71D206X74	14698	72	74	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW76D208X76	17069	74	76	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X78	17451	76	78	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X80	17833	78	80	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X82	18216	80	82	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW77D208X84	21387	82	84	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW77D208X86	21836	84	86	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X88	24626	86	88	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X90	25145	88	90	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X92	25647	90	92	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X94	26150	92	94	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X96	26652	94	96	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X98	29801	96	98	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X100	30353	98	100	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D208X102	30914	100	102	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4

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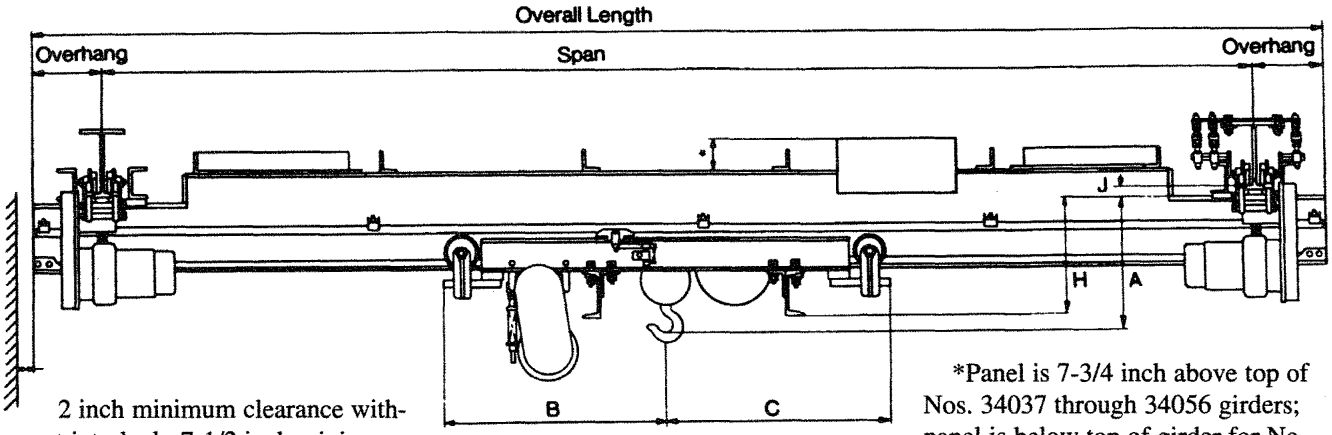
STANDARD DOUBLE GIRDER CRANES

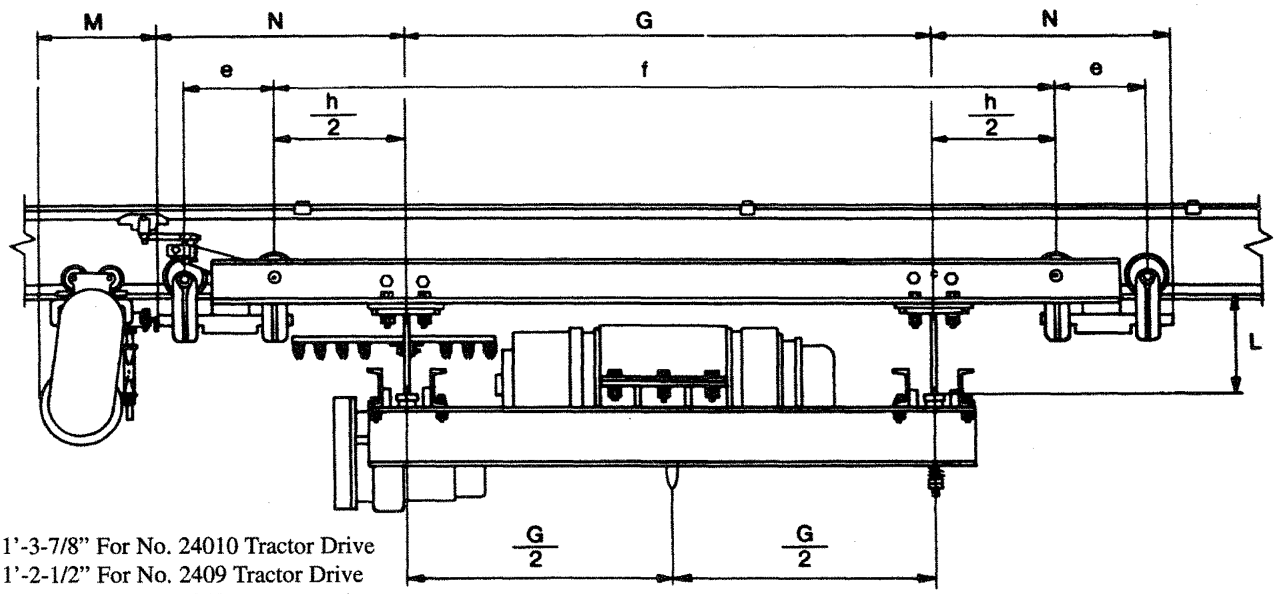
CLEARANCE DRAWING FOR CRANES WITH 8-WHEEL END TRUCKS

The drawing illustrated the clearances of a motor driven double girder crane with 8-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions e, h, J, L and N are shown on the facing page. To determine dimensions A, B, C, G and H refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. To determine dimension f, add dimension h to the girder gauge (dimension G). See Page CR-43 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 8-WHEEL TRUCKS

CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	h	J	L	N
		MW41D206X30	4487	28	30	34016	1'-0	2'-11	1-1/2	1'-1-3/8	2'-9-1/4
		MW41D206X32	4637	30	32	34016	1'-0	2'-11	1-1/2	1'-1-3/8	2'-9-1/4
		MW46D206X34	5079	32	34	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW46D206X36	5266	34	36	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW46D206X38	5452	36	38	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW51D206X40	6243	38	40	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW51D206X42	6459	40	42	34016	1'-0	2'-11	1-1/2	1'-4-7/8	2'-9-1/4
		MW51D208X44	7298	42	44	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW56D208X46	7937	44	46	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW56D208X48	8172	46	48	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW56D208X50	8407	48	50	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X52	9307	50	52	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X54	9568	52	54	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X56	9827	54	56	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X58	10077	56	58	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X60	11105	58	60	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X62	11391	60	62	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X64	11675	62	64	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X66	13929	64	66	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
5	14185	MW71D208X68	14274	66	68	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X70	14619	68	70	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X72	14979	70	72	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X74	16686	72	74	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X76	17069	74	76	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D208X78	17451	76	78	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW77D208X80	20489	78	80	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW77D208X82	20937	80	82	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW77D208X84	21403	82	84	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X86	24174	84	86	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X88	24643	86	88	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X90	25145	88	90	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X92	25647	90	92	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW78D208X94	26150	92	94	34037	1'-3	3'-0	2-1/8	2'-0	3'-1-1/4
		MW79D209X96	29562	94	96	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW79D209X98	30119	96	98	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW79D209X100	30675	98	100	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW79D209X102	31231	100	102	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4

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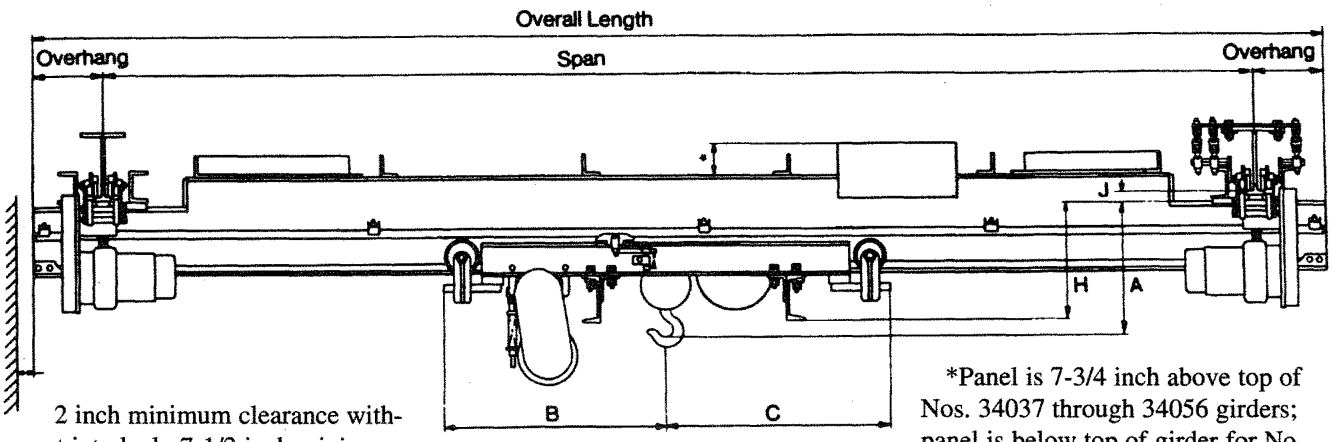
STANDARD DOUBLE GIRDER CRANES

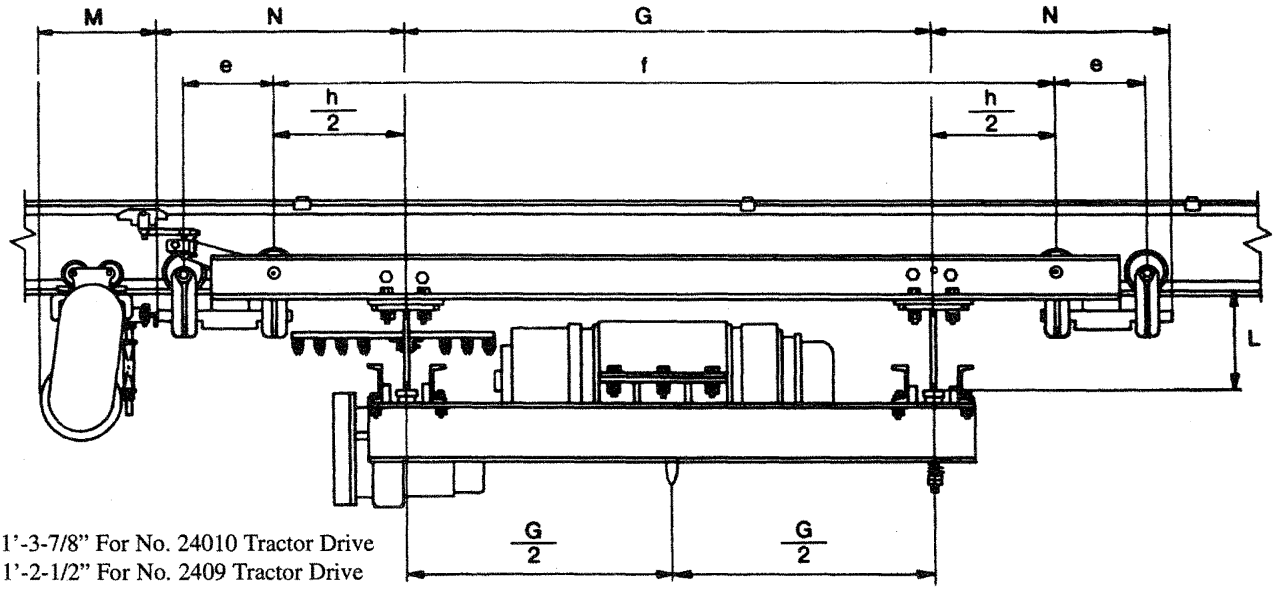
CLEARANCE DRAWING FOR CRANES WITH 8-WHEEL END TRUCKS

The drawing illustrates the clearances of a motor driven double girder crane with 8-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions e, h, J, L and N are shown on the facing page. To determine dimensions A, B, C, G and H refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. To determine dimension f, add dimension h to the girder gauge (dimension G). See Page CR-43 for minimum, maximum and standard girder overhangs.



2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



M= 1'-3-7/8" For No. 24010 Tractor Drive
1'-2-1/2" For No. 2409 Tractor Drive
1'-11-1/4" For No. 2408 Tractor Drive

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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 8-WHEEL END TRUCKS

CRANES WITH 8-WHEEL END TRUCKS											
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	h	J	L	N
		MW46D208X30	5333	28	30	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW46D208X32	5519	30	32	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW51D208X34	6216	32	34	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW51D208X36	6431	34	36	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW51D208X38	6648	36	38	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW56D208X40	7233	38	40	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW56D208X42	7467	40	42	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X44	8265	42	44	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X46	8525	44	46	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D208X48	8786	46	48	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X50	9687	48	50	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
7-1/2	21290	MW66D208X52	9963	50	52	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X54	10248	52	54	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D208X56	10534	54	56	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X58	12559	56	58	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X60	12893	58	60	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D208X62	13239	60	62	34037	1'-3	3'-0	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D209X64	15280	62	64	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW76D209X66	15675	64	66	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW76D209X68	16057	66	68	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW77D209X70	18764	68	70	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW77D209X72	19213	70	72	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW77D209X74	19662	72	74	34041	1'-3	3'-0	2-1/4	2'-0-1/8	3'-1-1/4
		MW51D209X30	6297	28	30	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW51D209X32	6513	30	32	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
10	28850	MW56D209X34	7042	32	34	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW56D209X36	7277	34	36	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW56D209X38	7512	36	38	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4
		MW61D209X40	8259	38	40	34041	1'-3	3'-0	2-1/4	1'-5-5/8	3'-1-1/4

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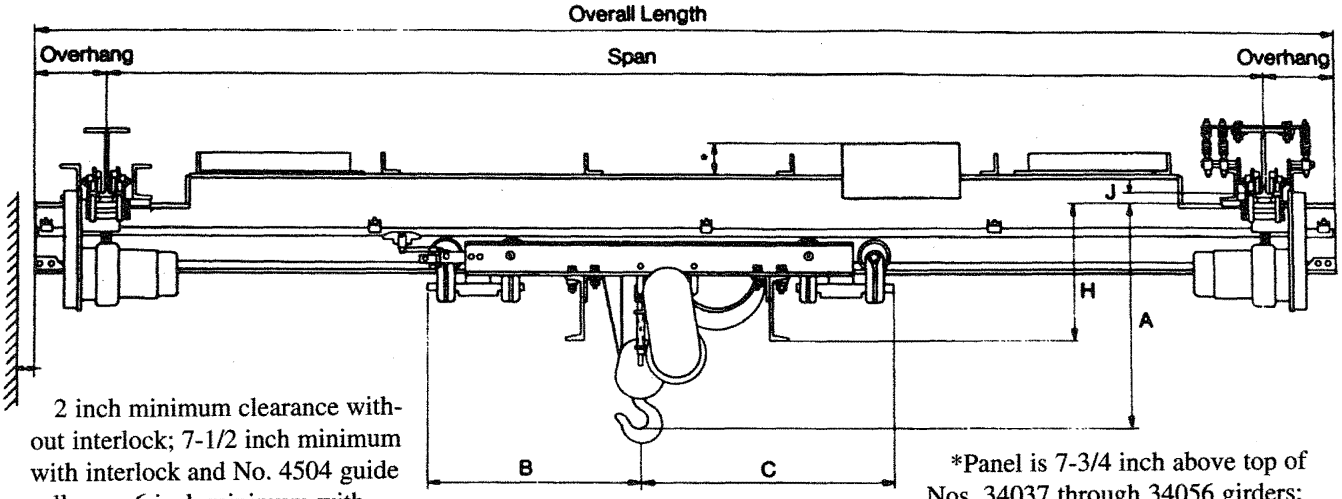
STANDARD DOUBLE GIRDER CRANES

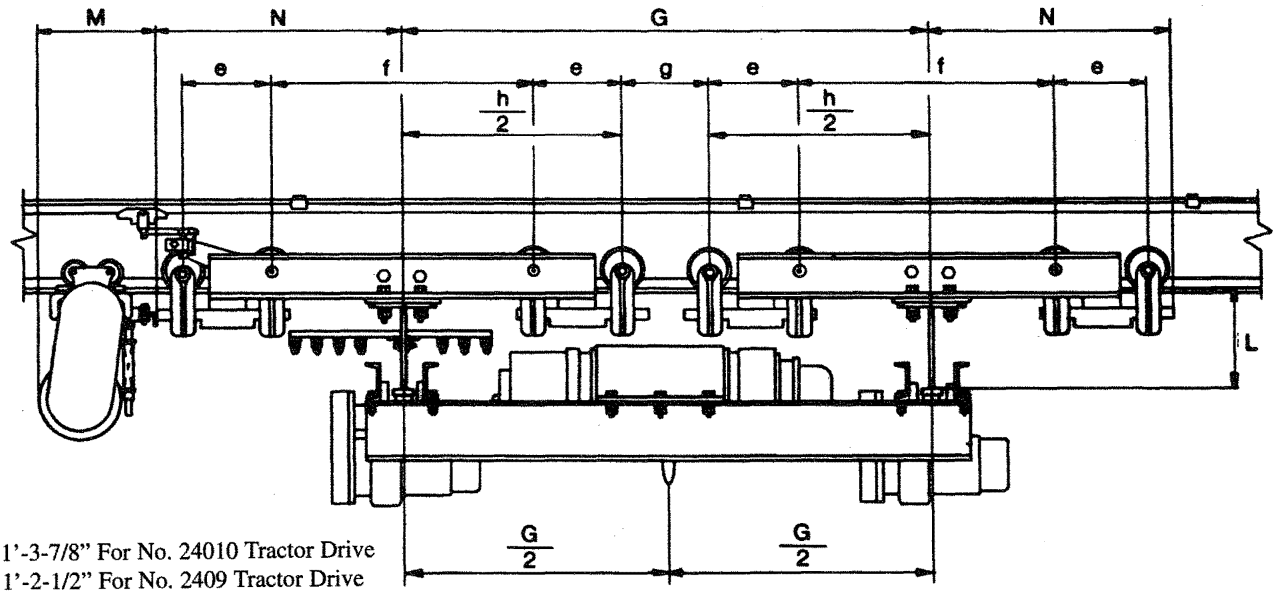
CLEARANCE DRAWING FOR CRANES WITH 16-WHEEL END TRUCKS

The drawing illustrated the clearances of a motor driven double girder crane with 16-wheel end trucks and 7 conductor Insul-8-Bar electrification. Dimensions e, f, h, J, L and N are shown on the facing page. To determine dimensions A, B, C, G and H refer to the appropriate clearance drawing in the Carrier Section for the hoist and carrier selected for the crane. To determine Dimension g, subtract dimension h to the girder gauge (dimension G). See Page CR-43 for minimum, maximum and standard bridge girder overhangs.



2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 16-WHEEL END TRUCKS

CRANES WITH 16-WHEEL END TRUCKS												
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	h	J	L	N
		MW78D212X76	21382	74	76	34016	1'-0	3'-0	5'-0	1-1/2	1'-11-3/8	2'-9-3/4
		MW78D212X78	21885	76	68	34016	1'-0	3'-0	5'-0	1-1/2	1'-11-3/8	2'-9-3/4
		MW78D212X80	22387	68	80	34016	1'-0	3'-0	5'-0	1-1/2	1'-11-3/8	2'-9-3/4
		MW78D212X82	22906	80	82	34016	1'-0	3'-0	5'-0	1-1/2	1'-11-3/8	2'-9-3/4
7-1/2	21290	MW79D213X84	26571	82	84	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X86	27109	84	86	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X88	27666	86	88	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X90	28259	88	90	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW61D212X42	7755	40	42	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW61D212X44	8016	42	44	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW66D212X46	8856	44	46	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW66D212X48	9141	46	48	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW71D212X50	10931	48	50	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW71D212X52	11276	50	52	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW71D212X54	11621	52	54	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW71D212X56	11957	54	56	34016	1'-0	3'-0	5'-0	1-1/2	1'-4-7/8	2'-9-3/4
		MW76D213X58	14264	56	58	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D213X60	14657	58	60	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
10	28850	MW76D213X62	15040	60	62	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW77D213X64	17546	62	64	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW77D213X66	18008	64	66	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X68	20293	66	68	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X70	20769	68	70	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X72	21271	70	72	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X74	21789	72	74	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X76	24343	74	76	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X78	24884	76	78	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X80	25441	78	80	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X82	26030	80	82	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4

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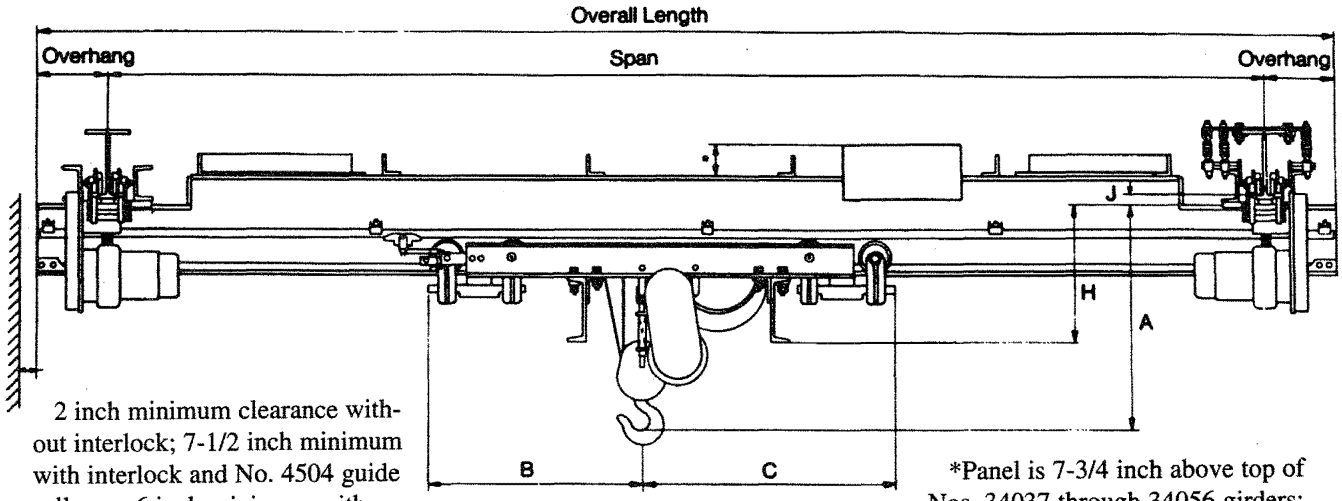
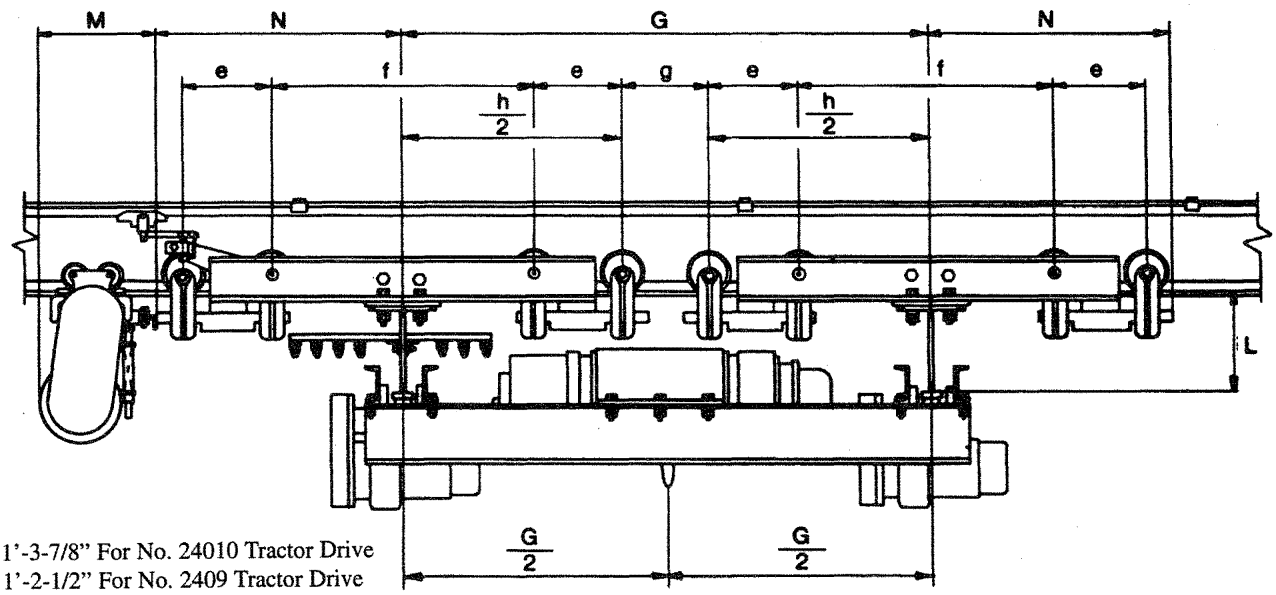


2 inch minimum clearance without interlock; 7-1/2 inch minimum with interlock and No. 4504 guide roller; or 6 inch minimum with interlock and No. 45090 guide.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders; panel is below top of girder for No. 34061 and larger girders.



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STANDARD DOUBLE GIRDER CRANES

CRANES WITH 16-WHEEL END TRUCKS

CRANES WITH 16-WHEEL END TRUCKS												
Rated Load (Tons)	Design Load (Lbs.)	Crane Code Number	Basic Weight (Lbs.)	Span (Ft.)	Overall Length (Ft.)	Minimum Runway Size	e	f	h	J	L	N
		MW56D213X30	6707	28	30	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D213X32	7351	30	32	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D213X34	7612	32	34	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW61D213X36	7864	34	36	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D213X38	8611	36	38	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW66D213X40	8897	38	40	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D213X42	10442	40	42	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D213X44	10787	42	44	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D213X46	11134	44	46	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW71D213X48	11469	46	48	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
15	41380	MW76D213X50	12735	48	50	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D213X52	13116	50	52	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW76D213X54	13509	52	54	34037	1'-3	3'-0	5'-6	2-1/8	1'-5-1/2	3'-1-1/4
		MW77D213X56	15762	54	56	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW77D213X58	16189	56	58	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X60	18257	58	60	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X62	18759	60	62	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X64	19262	62	64	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW78D213X66	19777	64	66	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X68	22116	66	68	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X70	22659	68	70	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4
		MW79D213X72	23243	70	72	34037	1'-3	3'-0	5'-6	2-1/8	2'-0	3'-1-1/4

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STANDARD DOUBLE GIRDER CRANES

WEIGHT FACTORS FOR DOUBLE GIRDER CRANES

The tables on this page and Page CR-61 are used in determining the total weight of double girder cranes. They list the weight of the top flange bracing, the weight of structural ties between the girders for cranes with 16-wheel end trucks and the additional weight of 4-wheel and 8-wheel end trucks when girder gauge is greater than 6'-6. The net crane weight is determined by adding the weight factor to the basic weight shown in the crane tables.

Span	End Truck Item Number	Gauge														
		6'-6	7'-0	7'-6	8'-0	8'-6	9'-0	9'-6	10'-0	10'-6	11'-0	11'-6	12'-0	12'-6	13'-0	13'-6
	180102	134	160	186	213	238	-	-	-	-	-	-	-	-	-	-
	180104	134	182	230	278	325	437	490	541	-	-	-	-	-	-	-
	180205	134	182	230	278	325	437	490	541	-	-	-	-	-	-	-
Up to	180106	134	183	233	283	332	446	500	553	-	-	-	-	-	-	-
36'-0	180108	134	187	241	295	348	465	523	580	637	693	980	1047	-	-	-
	180209	134	186	236	288	338	453	509	563	618	671	956	1021	1084	1149	1212
	180112	321	343	366	389	411	498	525	700	733	765	1029	1072	1114	1157	1199
	180113	321	343	366	389	411	498	525	700	733	765	1029	1072	1114	1157	1199
	180214	321	343	366	389	411	498	525	700	733	765	1029	1072	1114	1157	1199
	180102	163	191	219	248	275	-	-	-	-	-	-	-	-	-	-
	180104	163	213	263	313	362	493	549	603	-	-	-	-	-	-	-
	180205	163	213	263	313	362	493	549	603	-	-	-	-	-	-	-
36'-1	180106	163	214	266	318	369	502	559	615	-	-	-	-	-	-	-
to	180108	163	218	274	330	385	521	582	642	701	760	1106	1178	-	-	-
44'-0	180209	163	216	269	323	375	509	568	625	682	738	1082	1152	1220	1290	1359
	180112	350	374	399	424	448	554	584	762	797	832	1155	1203	1250	1298	1346
	180113	350	374	399	424	448	554	584	762	797	832	1155	1203	1250	1298	1346
	180214	350	374	399	424	448	554	584	762	797	832	1155	1203	1250	1298	1346
	180104	192	244	296	348	399	549	608	665	-	-	-	-	-	-	-
	180205	192	244	296	348	399	549	608	665	-	-	-	-	-	-	-
44'-1	180106	192	245	299	353	406	558	618	677	-	-	-	-	-	-	-
to	180108	192	249	307	365	422	577	641	704	765	827	1232	1309	-	-	-
52'-0	180209	192	247	302	358	412	565	627	687	746	805	1208	1283	1356	1431	1506
	180112	379	405	432	459	485	610	643	824	861	899	1281	1334	1386	1439	1493
	180113	379	405	432	459	485	610	643	824	861	899	1281	1334	1386	1439	1493
	180214	379	405	432	459	485	610	643	824	861	899	1281	1334	1386	1439	1493
	180104	221	275	329	383	436	605	667	727	-	-	-	-	-	-	-
	180205	221	275	329	383	436	605	667	727	-	-	-	-	-	-	-
52'-1	180106	221	276	332	388	443	614	677	739	-	-	-	-	-	-	-
to	180108	221	280	340	400	459	633	700	766	829	894	1358	1440	-	-	-
62'-0	180209	221	278	335	393	449	621	686	749	810	872	1334	1414	1492	1572	1653
	180112	408	436	465	494	522	666	702	886	925	966	1407	1492	1522	1580	1640
	180113	408	436	465	494	522	666	702	886	925	966	1407	1492	1522	1580	1640
	180214	408	436	465	494	522	666	702	886	925	966	1407	1492	1522	1580	1640

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STANDARD DOUBLE GIRDER CRANES

WEIGHT FACTORS CONTINUED

Span	End Truck Item Number	Gauge														
		6'-6	7'-0	7'-6	8'-0	8'-6	9'-0	9'-6	10'-0	10'-6	11'-0	11'-6	12'-0	12'-6	13'-0	13'-6
	180104	250	306	362	418	473	661	726	-	-	-	-	-	-	-	-
	180205	250	306	362	418	473	661	726	-	-	-	-	-	-	-	-
62'-1	180106	250	307	365	423	480	670	736	-	-	-	-	-	-	-	-
to	180108	250	311	373	435	496	689	759	828	893	961	1484	1571	-	-	-
72'-0	180209	250	309	368	428	486	677	745	811	874	939	1460	1545	1628	1713	1800
	180112	437	467	498	529	559	722	761	948	989	1033	1533	1596	1658	1721	1787
	180113	437	467	498	529	559	722	761	948	989	1033	1533	1596	1658	1721	1787
	180214	437	467	498	529	559	722	761	948	989	1033	1533	1596	1658	1721	1787
	180106	279	338	398	458	517	726	795	-	-	-	-	-	-	-	-
72'-1	180108	279	342	406	470	533	745	818	890	957	1028	-	-	-	-	-
to	180209	279	340	401	463	523	733	804	873	938	1006	1586	1676	1764	1854	1947
82'-0	180112	466	498	531	564	596	778	820	1010	1053	1100	1659	1727	1794	1862	1934
	180113	466	498	531	564	596	778	820	1010	1053	1100	1659	1727	1794	1862	1934
	180214	466	498	531	564	596	778	820	1010	1053	1100	1659	1727	1794	1862	1934
82'-1	180108	308	373	439	505	570	801	877	952	1021	1095	-	-	-	-	-
to	180209	308	371	434	498	560	789	863	935	1002	1073	1712	1807	1900	1995	2094
92'-0	180112	495	529	564	599	633	834	879	1072	1117	1167	1785	1858	1930	2003	2081
	180113	495	529	564	599	633	834	879	1072	1117	1167	1785	1858	1930	2003	2081
92'-0	180108	337	404	472	540	607	857	936	1014	1085	1162	-	-	-	-	-
to	180209	337	402	467	533	597	845	922	997	1066	1140	1838	1938	2036	2136	2241
100'-0	180112	524	560	597	634	670	890	938	1134	1181	1234	1911	1989	2066	2144	2228
	180113	524	560	597	634	670	890	938	1134	1181	1234	1911	1989	2066	2144	2228

DOUBLE GIRDER TRANSFER CRANES

Double girder transfer cranes are of the same design as standard double girder cranes with the addition of interlock mechanisms at one or both ends of the girder. Discharge points are installed at the ends of tracks where a carrier is to be transferred.

The interlocks and discharge points used on double girder transfer cranes are similar to those used on single girder cranes. The operation of double girder interlock mechanisms is the same as shown and described on Page CR-30 for single girder interlocks.

Forks are provided on interlock mechanisms and discharge points which raise to permit passage of the carrier when the interlock and discharge point are latched. When they are not latched, the forks prevent carriers from being accidentally run off the end of the girders or discharge tracks.

The throw-out mechanism actuates the interlock latch and may be manually or motor operated. Manually operated mechanisms are located on one of the girders and are operated by pull chains. Motor operated mechanisms are controlled by a push button station located on the carrier or crane.

Two or more transfer cranes may be directly interlocked or interlocked through fixed transfer sections. Direct interlocking cranes have discharge points installed on one or both of the cranes depending on the number of cranes to be interlocked.

Double girder transfer cranes use Type I or Type III control arrangements as described on Pages CR-7 and CR-8. Type II control is not used as the control station is on the crane.

INTERLOCKS AND DISCHARGE POINTS

Three types of interlocking equipment are available: Type L interlocks and discharge points for carriers with 5 inch diameter wheels; Type H for carriers with 6-1/2 inch diameter wheels or less; and Type J for carriers with 8 inch diameter wheels or less. In laying out transfer crane systems, the same type of interlock and discharge point must be used throughout the system.

Interlock mechanisms are installed at one or both ends of

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CATALOG NUMBERS OF INTERLOCKS

ITEM NUMBERS OF INTERLOCKS						
	Type L Interlock		Type H Interlock		Type J Interlock	
Girder Item Number	Right Hand Assembly	Left Hand Assembly	Right Hand Assembly	Left Hand Assembly	Right Hand Assembly	Left Hand Assembly
34037 34041 34046	45084C	45084D	45087C	45087D	N/A	N/A
34051 through 34066	45085C	45085D	45088C	45088D	45092C	45092D
34071 through 34079	45086C	45086D	45089C	45089D	45093C	45093D

DOUBLE GIRDER TRANSFER CRANES

both girders. The latch and slide rod assemblies are the same as used on single girder transfer cranes. The throw-out mechanism is designed to operate both interlocks at one end from one set of operating chains. The table below lists the item numbers of double girder interlock mechanisms.

The discharge points used with double girder interlock mechanisms are the same as used with single girder interlocks. Item numbers of discharge points are listed on Page CR-32.

When 2 or more transfer crane with different types of girders operate on the same runway, a constant girder depth must be established at the end trucks to allow the cranes to engage the discharge tracks. When cranes have Type 1 and Type 2 girders, the constant depth is accomplished by shimming the Type 1 girders to 16 inch at the trucks or, alternately, Type 2 girders can be furnished on all cranes. Consult factory for recommendations when Type 3 girders are used with Type 1 and Type 2 girders.

GUIDE ROLLER ARRANGEMENT

Guide rollers and guide roller guides maintain vertical and horizontal alignment of bridge girders and transfer tracks. The guide roller arrangement allows the transfer crane to pass spur tracks, fixed transfer section or other transfer cranes without interference. They are recommended for all double girder crane applications.

Two guide roller arrangements are available: (1) individual guide rollers and guide roller guides as used on single girder cranes, and (2) continuous guide roller guides with horizontal and vertical guide rollers. The following guidelines have been established for selecting double girder guide roller arrangements:

1. For Class B (light service) and Class C (moderate service) transfer cranes interlocking with spur tracks or fixed transfer sections and having a maximum span of 38'-0 and a maximum rated load of 5 tons, No. 4504 guide rollers are installed on one end or both ends of both girders. All spur tracks and fixed transfer sections are equipped with individual guide roller guides (No. 4501004 upper guide and No. 4501005 lower guide). Clearances for transfer cranes with this guide roller arrangement are the same as indicated on Pages CR-34 and CR-36 except for clearances on the throw-out mechanism which are shown on Pages CR-65 and CR-67. Minimum girder overhangs are determined from the table on Page CR-43.

2. Continuous guide roller guides and horizontal and vertical guide rollers are installed on all other double girder transfer cranes. The continuous guide roller guide is designated as Item No. 45090 and is mounted on the bridge girders. It is a steel weldment which is machined after welding to provide guiding surfaces for the horizontal and vertical rollers. The guide roller assembly is designated as Item No. 45091 and is mounted on the spur tracks or fixed transfer section. The roller bracket is a steel weldment which is machined after welding for the horizontal and vertical rollers. The rollers are lubricated through readily accessible fittings. Clearances for this guide roller arrangement are shown on Pages CR-65, CR-66 and CR-67. Minimum girder overhangs are determined from the table on Page CR-43.

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DOUBLE GIRDER TRANSFER CRANES

ELECTRIFIED TRANSFER CRANES

Insul-8-Bar's 90 amp conductor is the standard electrification for transfer cranes. Consult factory for assistance when other types of electrification are used. Transfer cranes generally are not electrified with festooned or tagline electrification.

The power conductor arrangement for transfer cranes is shown in the Electrification Section. The power conductors must be 6-1/8 inch above the tread for Type L interlocks, 7-3/4 inch for Type H interlocks and 9-1/8 inch for Type J interlocks to prevent interference with the latch.

The control conductors are not carried through the interlock gap eliminating the need for control conductors on spur tracks or fixed transfer sections. No. 550491 pickup guides and No. 450278 transfer caps are used at the ends of the control conductors to enable the collectors to leave and pick up the conductors as the carrier moves off and on the transfer crane. Carriers operating on transfer cranes use No. 560395 collectors for the power conductors and No. 560393 self-centering collectors for the control conductors.

All carriers operating on direct interlocking crane, cranes interlocking through fixed transfer sections or cranes interlocking at both ends with spur tracks require tandem collectors for the common conductor (X) and the mainline contactor conductor (M) to activate the mainline contactor as the transfer is made. The tandem collector arrangement requires 2 additional No. 560393 collectors.

ACCESSORY EQUIPMENT

Accessory equipment can be furnished on double girder transfer cranes to increase their flexibility and improve their operation. Some accessory equipment is furnished as standard and some are optional.

A limit switch is furnished on the throw-out mechanism as standard on transfer cranes interlocking with spur tracks or fixed transfer sections.

The switch interrupts the crane control circuit when the latch is extended and prevents the operator from moving the crane while it is latched to the discharge track.

When a system has 2 or more discharge tracks and 2 or more transfer cranes with Type I control, and auxiliary push button station may be installed on the crane for controlling the crane motion. This enables the operator to move the crane from one discharge track to another without the hoist and carrier being on the crane.

When transfer cranes are arranged for direct crane to crane interlocking it may be desirable to have them travel as a unit when interlocked. This is accomplished by contacts at the ends of the cranes switch connect the crane control circuits. A limit switch disconnects the contacts when the cranes are not interlocked allowing the cranes to pass without connecting their control circuits. Other limit switch arrangements are used to prevent the crane from traveling when the latch is extended and the crane is not aligned with the other crane. Consult factory for information on limit switch arrangements, clearances and girder overhangs on all direct interlocking cranes.

MOTOR OPERATED INTERLOCKS

Motor operated interlocks can be furnished on all double girder transfer cranes as optional equipment. The latches and slide rod assemblies are the same as used on manually operated interlocks. The throw-out mechanism uses a gearmotor and roller chain drive to extend and retract the latches. A magnetic contactor is furnished for control of the gearmotor; limit switches control the movement of the latches and also interrupt the crane motion when the interlock is extended.

The interlock is controlled from 2 additional buttons in the carrier push button station (Type I control) or crane push button station (Type III control) or from an auxiliary push button station suspended from the crane. On cab operated systems, a push button is mounted in the cab. When controlled from the carrier, 2 additional control conductors are required for the crane electrification and 2 additional control collectors for the carrier.

When transfer cranes with motor operated interlocks are arranged for direct crane to crane interlocking, contacts to connect the crane control circuits may be required to meet the following conditions: (1)control of the interlock from either of the 2 interlocked cranes; (2) cranes to travel as a unit when interlocked; and (3) the combination of conditions (1) and (2). When contacts are used, a limit switch is provided to disconnect the contacts when the cranes are not interlocked allowing the cranes to pass without connecting their control circuits. Other limit switches are provided to prevent the crane from traveling when latches are extended and the crane is not aligned with the other crane. Consult factory for information on limit switch arrangements, clearances and girder overhangs on all direct interlocking cranes where contacts are used.

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DOUBLE GIRDER TRANSFER CRANE CLEARANCES

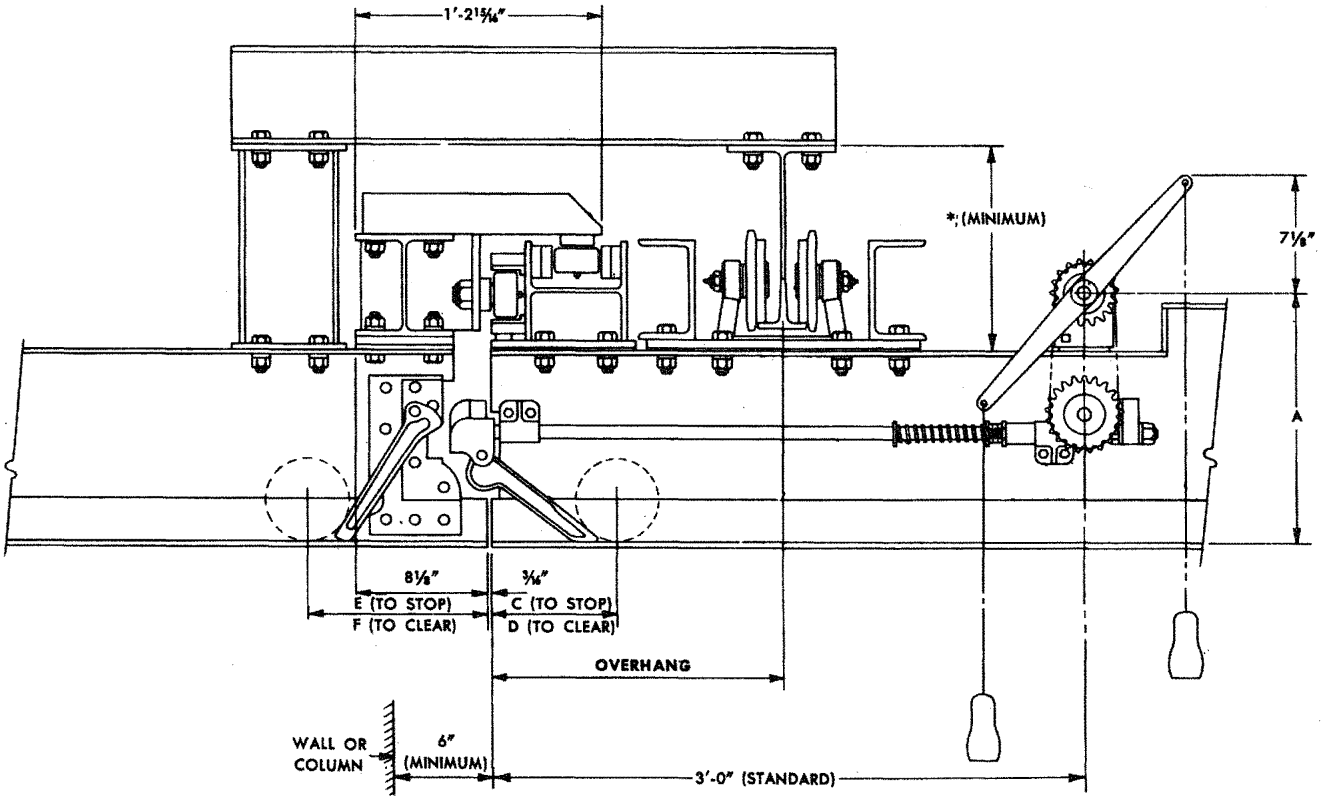
SPUR TRACK ARRANGEMENT

The arrangement of a transfer crane interlocking with a spur track is shown in the drawing. Spur tracks interlocking with the transfer crane are equipped with discharge points and guide rollers.

Structural ties are required between the discharge tracks and crane runway. These ties maintain the gap between the ends of the discharge tracks and girders and permit the crane to pass the discharge tracks without interference. The ties may be bolted or welded to the top flange of the runway track. They are installed with the transfer crane latched to the spur and with a 3/16 inch gap between the ends of the discharge tracks and girders. When bolting, holes in runway tracks are field drilled.

The discharge tracks are supported from the building structure or steel superstructure adjacent to the structural ties. The structural ties are not designed to support the end of the discharge tracks.

Bracing of the discharge tracks is recommended to maintain alignment. The bracing is made in the field to suit the conditions and consists of steel angles installed perpendicular to the tracks. Bracing is installed after system has been aligned.



*11-1/2 inch minimum with 5 inch wheel end trucks; 14 inch minimum with 6-1/2 inch or 8 inch wheel end trucks.

Interlock Mechanism	A			C	D	E	F
	Type 1 Girders	Type 2 Girders	Type 3 Girders				
Type L	1'-3-3/8	1'-6-7/8	2'-1-3/8	7-3/4	10-1/2	10-3/4	1'-2-5/8
Type H	1'-3-3/8	1'-6-7/8	2'-1-3/8	10-3/8	1'-2-1/4	1'-0-1/2	1'-5-5/8
Type J	N. A.	1'-6-7/8	2'-1-3/8	1'-1-1/8	1'-5-7/8	1'-1-7/8	1'-8-1/8

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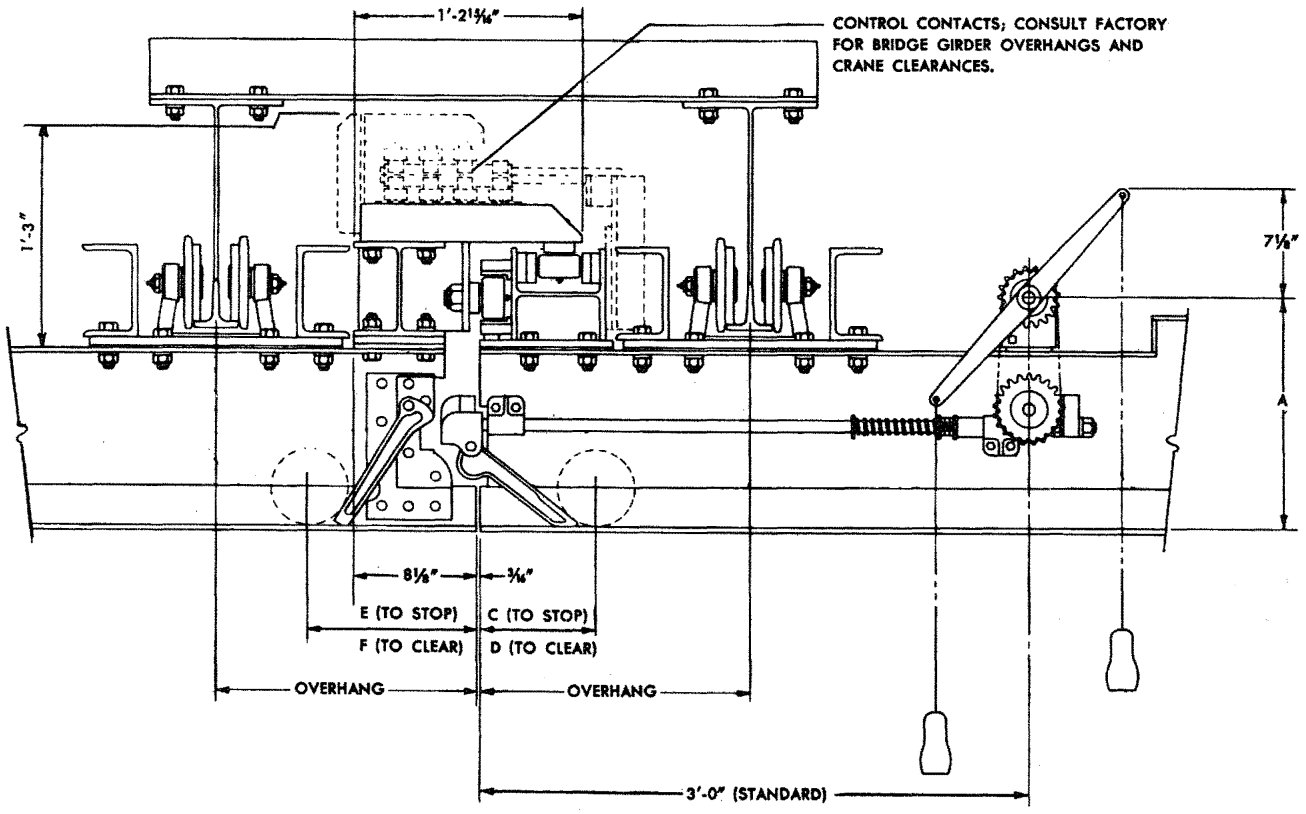
DOUBLE GIRDER TRANSFER CRANE CLEARANCES

DIRECT CRANE TO CRANE
INTERLOCK ARRANGEMENT

The arrangement of 2 direct interlocking transfer cranes is shown in the drawing. This arrangement is frequently used in an assembly bay area where operations on one side of the bay are different from those on the other side. It provides greater availability of the cranes and permits transfer of loads from one side of the bay to the other.

Consult factory for clearance dimensions when cranes are required to travel as a unit, as girder overhangs may have to be increased to accommodate the control contacts. Data on desired control functions, girder and runway track sizes and type of end trucks are required to determine clearances.

Structural ties are required between adjacent runways. These ties maintain the gap between the ends of the girders and permit the cranes to pass without interference. They are located at the support point and intermediate points as required to maintain a tie spacing of not more than 10'-0 centers. The ties may be bolted or welded to the top flange of the runway tracks. They are installed with the cranes located directly under the tie and latched with a 3/16 inch gap between the ends of the girders. When bolting, holes in runway tracks are field drilled.



Interlock Mechanism	A			C	D	E	F
	Type 1 Girders	Type 2 Girders	Type 3 Girders				
Type L	1'-3-3/8	1'-6-7/8	2'-1-3/8	7-3/4	10-1/2	10-3/4	1'-2-5/8
Type H	1'-3-3/8	1'-6-7/8	2'-1-3/8	10-3/8	1'-2-1/4	1'-01/2	1'-5-5/8
Type J	N. A.	1'-6-7/8	2'-1-3/8	1'-1-1/8	1'-5-7/8	1'-1-7/8	1'-8-1/8

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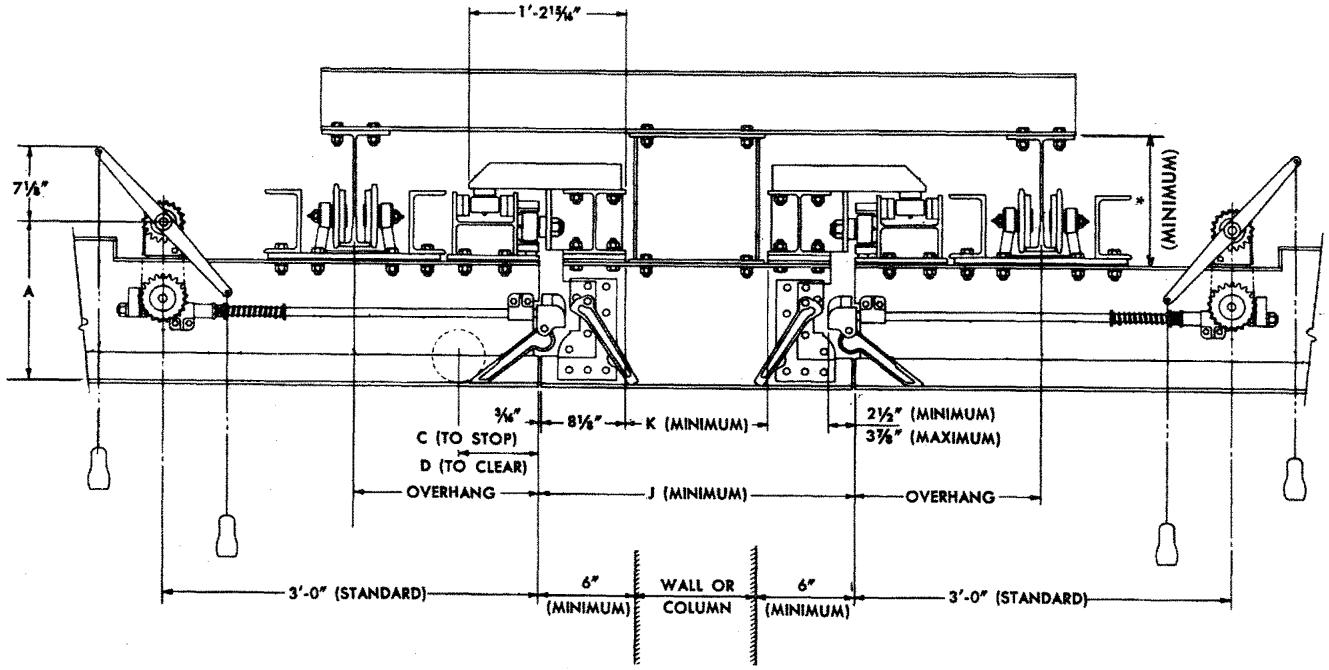
DOUBLE GIRDER TRANSFER CRANE CLEARANCES

FIXED TRANSFER SECTION ARRANGEMENT

The arrangement of 2 transfer cranes interlocking with a fixed transfer section is shown in the drawing. This arrangement is used where transfer of loads from one bay to another is desired.

The transfer tracks are suspended from the adjacent runway tracks by structural supports. The supports maintain the gaps between the ends of transfer tracks and bridge girders and permit the cranes to pass the transfer tracks without interference. The supports may be bolted or welded to the top flange of the runway tracks. They are installed with the transfer cranes latched to the transfer tracks with 3/16 inch gaps between the ends of the transfer tracks and bridge girders. When bolting, holes in runway tracks are field drilled.

Bracing of the transfer tracks is recommended to maintain alignment. The bracing is made in the field to suit the conditions and consists of steel angles installed perpendicular to the tracks. Bracing is installed after system has been aligned.



*11-1/2 inch minimum with 5 inch wheel end trucks; 14 inch minimum with 6-1/2 inch or 8 inch wheel end trucks.

Interlock Mechanism	A			C	D	J	K
	Type 1 Girders	Type 2 Girders	Type 3 Girders				
Type L	1'-3-3/8	1'-6-7/8	2'-1-3/8	7-3/4	10-1/2	2'-3-3/8	11-3/8
Type H	1'-3-3/8	1'-6-7/8	2'-1-3/8	10-3/8	1'-2-1/4	2'-8-3/8	1'-4-1/8
Type J	N. A.	1'-6-7/8	2'-1-3/8	1'-1-1/8	1'-5-7/8	3'-0-3/8	1'-8-1/8

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GANTRY CRANES

Trambeam gantry cranes are generally used where no building structure exists for support of the runway or where a single work area or group of work areas are to be serviced repetitively.

One of the more common applications is the installation of single leg gantry cranes in the same bay in which an overhead traveling crane operates. The gantry cranes, generally with a lighter rated load than the overhead crane, handle loads within their individual work area. The overhead crane handles loads in and out of individual work areas and heavy loads over the entire bay. This arrangement increases productivity by eliminating man-hours lost in waiting for crane service. It may also result in fewer overhead cranes being required and a lower initial investment.

Gantry cranes can have single or double leg construction depending on the availability of a structure to support the upper runway. Single leg construction is shown in the drawings on Pages CR-69 and CR-70; double leg construction is shown on Page CR-71. Gantry legs are supported on end trucks operating on ASCE crane rails. Single leg gantry cranes use Trambeam end trucks and runway tracks for the upper runway (See drawing on Page CR-69) or top running end trucks and runways with ASCE rails (See drawing on Page CR-70).

Girder construction can be single or double girder depending on the span, rated load and lift required. Single girder gantry cranes are shown on Pages CR-69 and CR-70; a double girder gantry is shown on Page CR-71.

Gantry cranes are generally motor driven but can be hand propelled or hand racked. Individual drives on each end truck are used on motor driven gantry cranes eliminating the need for a squaring shaft, vertical drive shaft and bevel gearing.

Specifications for bridge girders, girder connections, end trucks, drives, control and electrification are as follows:

- BRIDGE GIRDERS are fabricated from Trambeam heavy rail sections (No. 34037 through No. 34079). They are limited to a maximum carrier head load of 7,500 pounds. Girder deflection is limited to 1/600 of the span for cranes having spans of 60'-0" or less. For spans greater than 60'-0", the ratio is reduced so that deflection does not exceed 1-1/4".

- GIRDER CONNECTIONS at the gantry leg are braced from the girder top flange to the gantry leg. Bolt holes in the bracing, top flange and leg are drilled and reamed in shop assembly. Turned bolts are used for bracing connections to maintain alignment. On single leg gantry cranes, standard girder connections are used for Trambeam end trucks; girder connections for top running end trucks use gusset plates between the trucks and girders and shelf angles welded to the girder web.

- END TRUCKS for gantry legs use double flanged, steel wheels, rotating axles and prelubricated, double row, roller bearings. Cartridge type bearings provide easy removal of wheel assemblies for maintenance or replacement. End trucks are designed to operate on 40 or 60 pound ASCE crane rails.

- DRIVES are located at each end truck. Gantry leg trucks are driven by double reduction, helical gear motoreducers. A roller chain final reduction is used between the motoreducer and the drive axle. The same drive is used for the upper truck of single leg gantry cranes when the upper runway has ASCE rails. Trambeam end trucks for single leg gantry cranes with a Trambeam upper runway are driven by No. 2408 or No. 2409 tractor drives. Motors are furnished with adjustable magnetic disc brakes.

- CONTROL PANELS and wiring comply with OSHA electrical standards and Section 610 of the National Electrical Code. Crane panels are furnished with fused motor circuit switch, mainline contactor, motor overcurrent protection, thermal overload relays in 3 phases and NEMA 12 dust-tight enclosure as standard.

- ELECTRIFICATION consists of Insul-8-Bar conductors as described in the Electrification Section. Standard conductor arrangements as shown on Pages CR-9 and CR-42 are used on single and double girder gantry cranes. Festooned electrification is also available.

The clearance drawings on Pages CR-68, CR-69 and CR-70 illustrate typical gantry crane arrangements. Many of the clearance dimensions are determined by the height of the leg, span and rated load. Consult factory for assistance in determining clearances as these dimensions are not readily cataloged.

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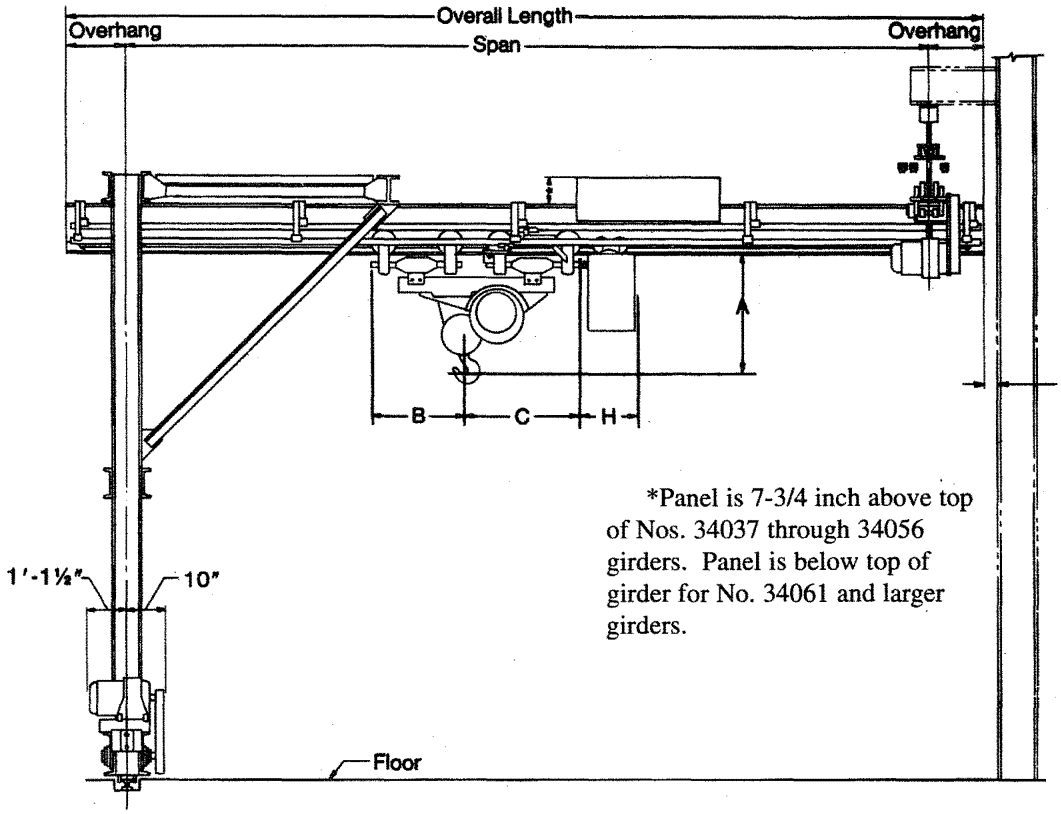
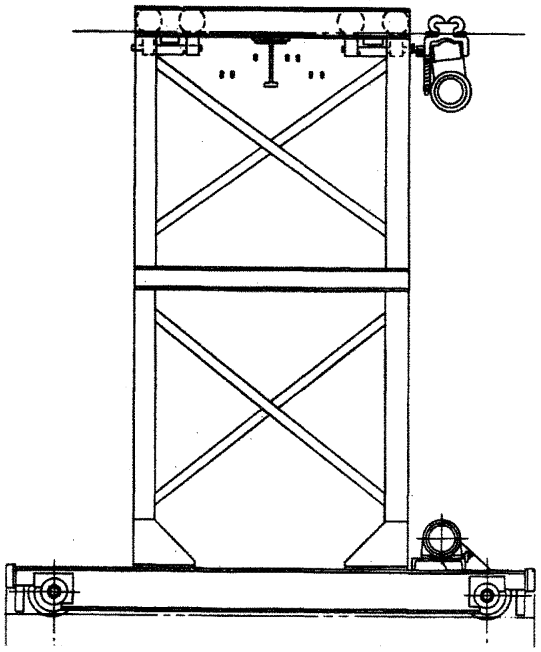
GANTRY CRANES

CLEARANCE DRAWING
SINGLE LEG, SINGLE GIRDER GANTRY CRANE



2 inch minimum clearance without interlock or 7-1/2 inch minimum with interlock and guide roller.

*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.



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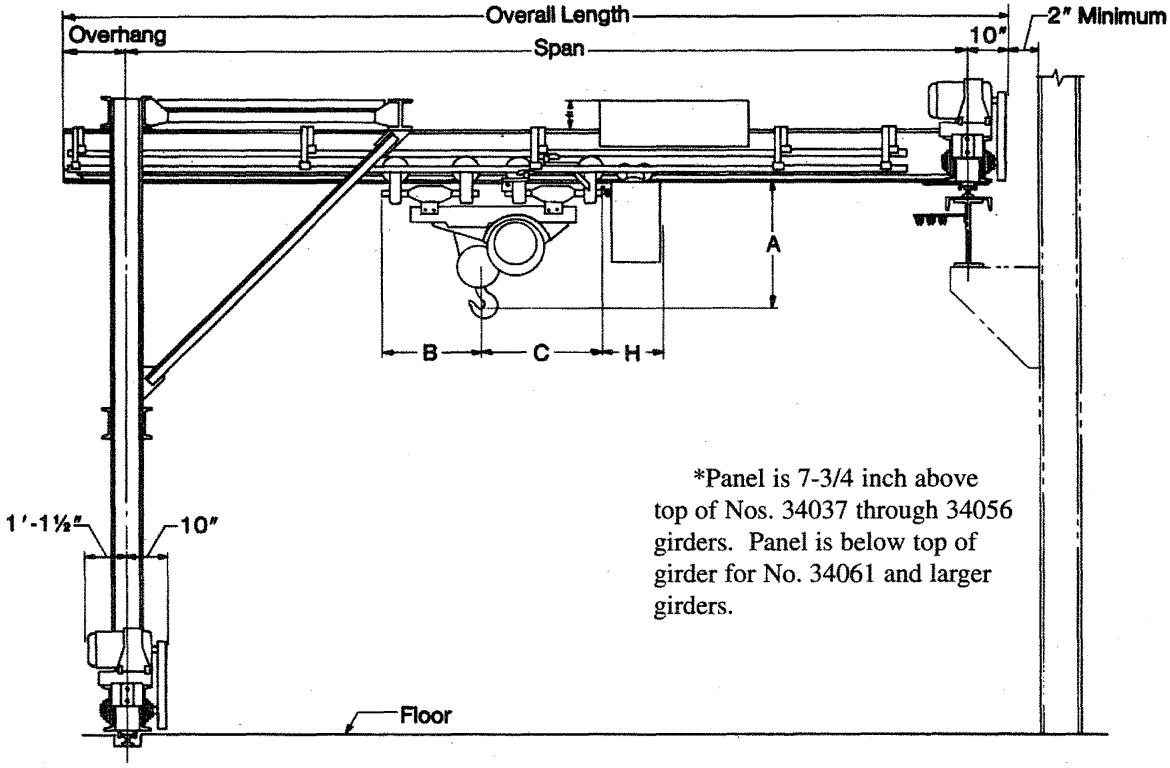
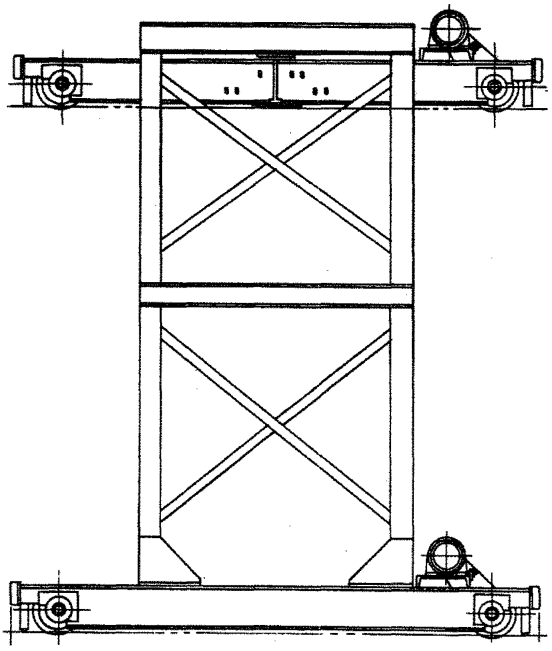
GANTRY CRANES

CLEARANCE DRAWING
SINGLE LEG, SINGLE GIRDER GANTRY CRANE



*Panel is 7-3/4 inch above top of Nos. 34037 through 34056 girders. Panel is below top of girder for No. 34061 and larger girders.



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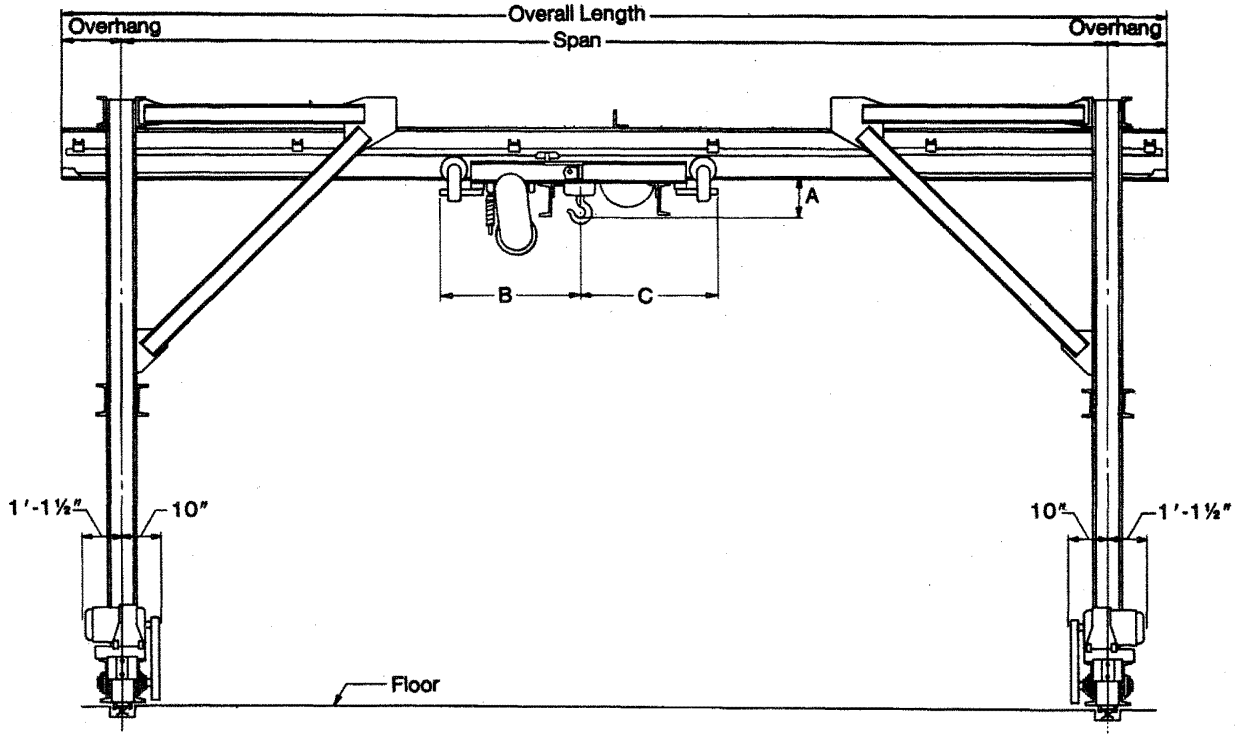
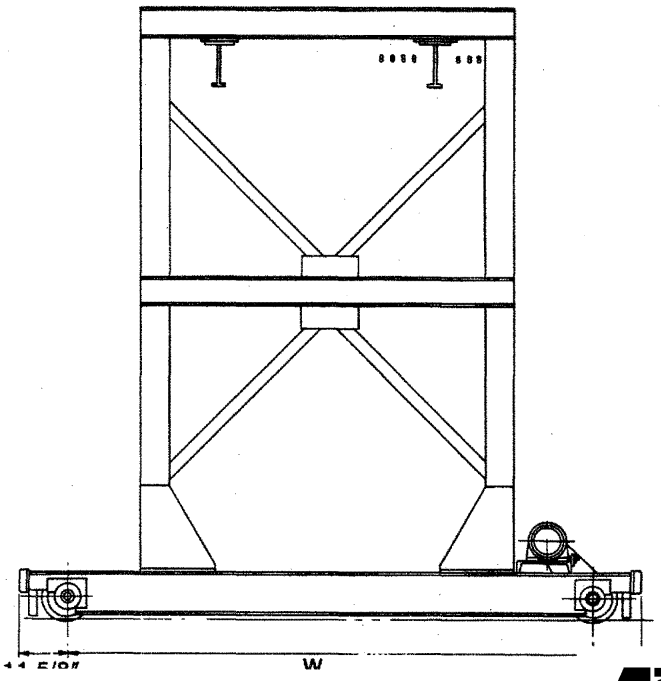
GANTRY CRANES

CLEARANCE DRAWING
DOUBLE LEG, GIRDER GANTRY CRANE





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GENERAL INFORMATION

When there is frequent operation of a carrier or a crane or travel distances are long, motor driven equipment will increase the efficiency of a system by enabling the operator to do more work in less time, with greater accuracy and less fatigue. The additional cost for motor driven equipment will usually pay for itself in a short period of time. Motor driven equipment will also improve employee morale.

Tractor drives propel all motor driven Trambeam carriers and cranes except double girder carriers. Double girder carriers are propelled by modified tractor drives. Traction on all drives is obtained by polyurethane drive wheels bearing against the bottom of the track. Pressure is applied to the drive wheels by compression springs and is adjustable to provide the necessary traction to propel the unit.

Three tractor drives are available to meet a wide range of applications. All are satisfactory for class A, B, C and D service. They are available with a variety of motors and control systems. Descriptions of the control equipment and systems are provided on Pages TD-10 and TD-11.

Specifications and arrangement drawings for each drive are described and illustrated on subsequent pages.

DRIVE WHEELS

Drive wheels for all drives are polyurethane covered. The polyurethane covering combines hardness, resilience and abrasion resistance to provide a superior traction wheel. It has exceptional wear characteristics, high tensile and tear strengths and a high load rating. The tensile and tear strength characteristics contribute to the excellent wearing qualities of the wheel. The high load rating allows high drive wheel pressures. The combination of high drive wheel pressures and high coefficient of friction results in a tractive effort that is double that of comparable steel drive wheels.

All drive wheels have cast iron hubs. The polyurethane covering is machined after it is applied to the wheel for concentricity of the outside diameter and bore. Wheels are keyed to the drive shaft.

MOTORS

Motors are crane-hoist type with high slip, high torque characteristics. Class B insulation is furnished as standard on Nos. 2409 and 24010 drives; Class F insulation is standard on No. 2408 drives . Special insulations are available where high ambient temperatures are present or where indicated by the service. Motors are designed for operation on 3 phase, 60 hertz, 230 or 460 volts alternating current as standard; they can be supplied for operation on other current characteristics.

All drives are furnished with totally enclosed, non-ventilated (TENV) motors. TENV motors are rated 30 minutes, 55 Degree C rise above an ambient temperature of 40 Degree C. They are suitable for indoor and outdoor applications and where excessive moisture, vapor, dust, etc. are present.

Squirrel cage motors are used with single speed and adjustable frequency control systems. Multi-speed squirrel cage motors are used with 2-speed control systems. Wound rotor motors are also available and are used with variable speed control systems.

Motor horsepower requirements are listed on Pages TD-8 and TD-9. Page TD-8 lists the horsepower requirements for single motor drives. Page TD-9 lists the horsepower requirements for dual motor drives.

BRAKES

Brakes are available for all motors. They are magnetic disc type and can be furnished as holding or parking brakes. Holding brakes are effective when power to the motors is off; parking brakes are effective only when power is shut off by the mainline contactor. ANSI B30.11 Safety Standards require holding brakes for cab, remote, automatic, pulpit or radio controlled equipment. Holding brakes are not required or recommended for floor controlled equipment as the motors and control systems are designed for plugging service.

Brakes are usually sized for 50% of full load motor torque. Brakes are required for drives operating on monorails with grades and are sized to stop and hold the carrier on the grade.

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NO. 2408 TRACTOR DRIVE

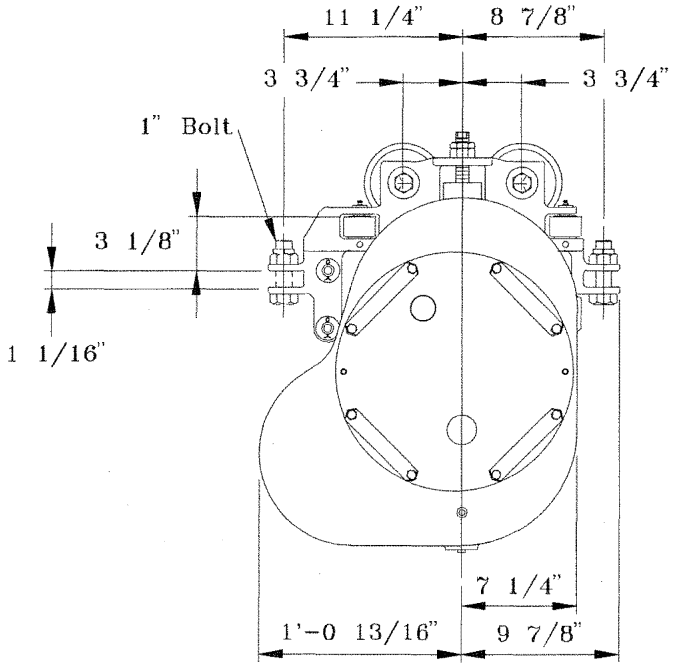
No. 2408 tractor drives are powered by NEMA D flanged mounted motors driving through fully enclosed double reduction gearing to 10 in. diameter polyurethane drive wheels. Gearing operates in an oil bath. Traction is obtained by the drive wheel bearing against the bottom of the track. Pressure is applied by two compression springs and is adjustable.

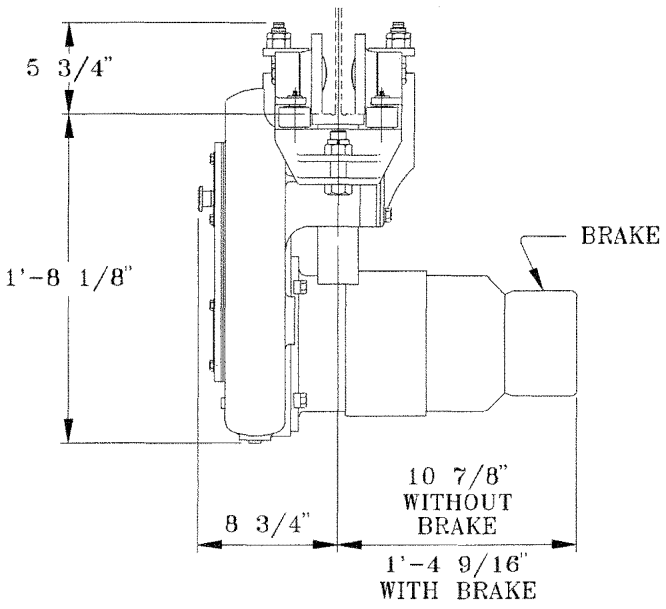
Parallel links connect the drive assembly to the 4-wheel carrier assembly and transmit the motor torque directly to the 4-wheel assembly instead of adding to or subtracting from the drive wheel pressure. This results in the drive producing the same drawbar pull for both directions of travel.

These drives are available with 1/2 through 5 horsepower motors. Nominal speeds are 100, 150, 200, 250 and 300 FPM; other speeds can be furnished. They are available with squirrel cage motors and single speed solid state or variable frequency control, multi-speed squirrel cage motors and 2-speed solid state control, and wound rotor motors and variable speed control. Other motor and control systems are available for special applications.

No. 2408J drives are used on all applications except where conductors are at 6-1/8 in. elevation. No. 2408K drives are used where conductors are at 6-1/8 in. elevation.

The drawing provides maximum clearance dimensions for drives without control panels. Consult factory for dimensions of control panels.





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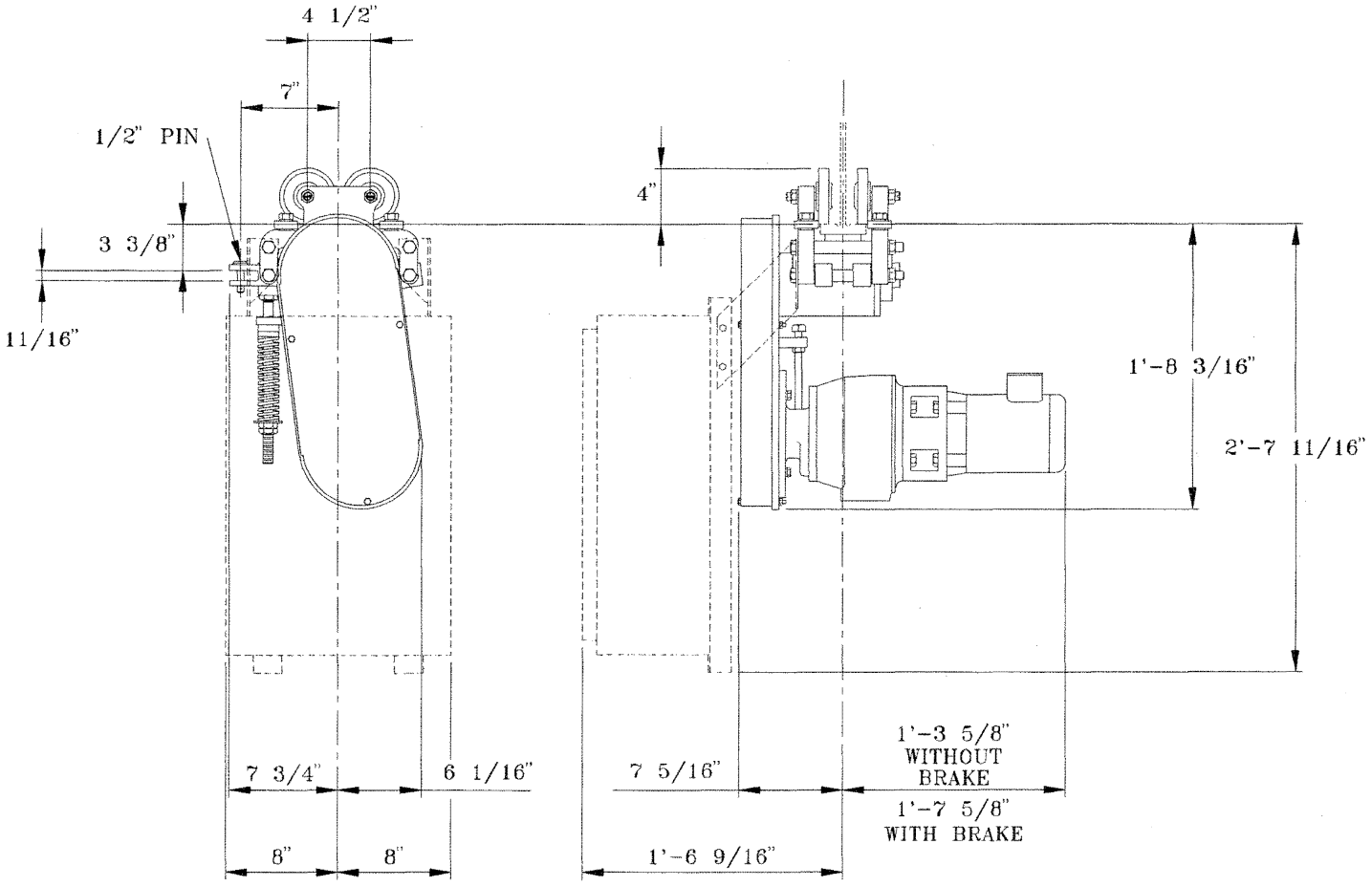
NO. 2409 TRACTOR DRIVE

No. 2409 tractor drives are powered by NEMA C face mounted motors driving through double reduction helical gear reducers and a roller chain final reduction to 6 in. diameter polyurethane drive wheels. Traction is obtained by the drive wheel bearing against the bottom of the track. Pressure is applied by a compression spring and is adjustable.

These drives are available with 1/2, 3/4, 1 and 1-1/2 horsepower motors. Nominal speeds are 100, 125, 150 and 200 FPM; slower speeds can be furnished. Drives with 1-1/2 HP motors are available for 150 and 200 FPM only. They are available with squirrel cage motors and single speed solid state or variable frequency control and multi-speed squirrel cage motors and 2-speed solid state control.

The drawing provides maximum clearance dimensions. The dotted lines indicate the single speed control panel location for single girder carriers. Consult factory for dimensions of variable frequency and 2-speed control panels.



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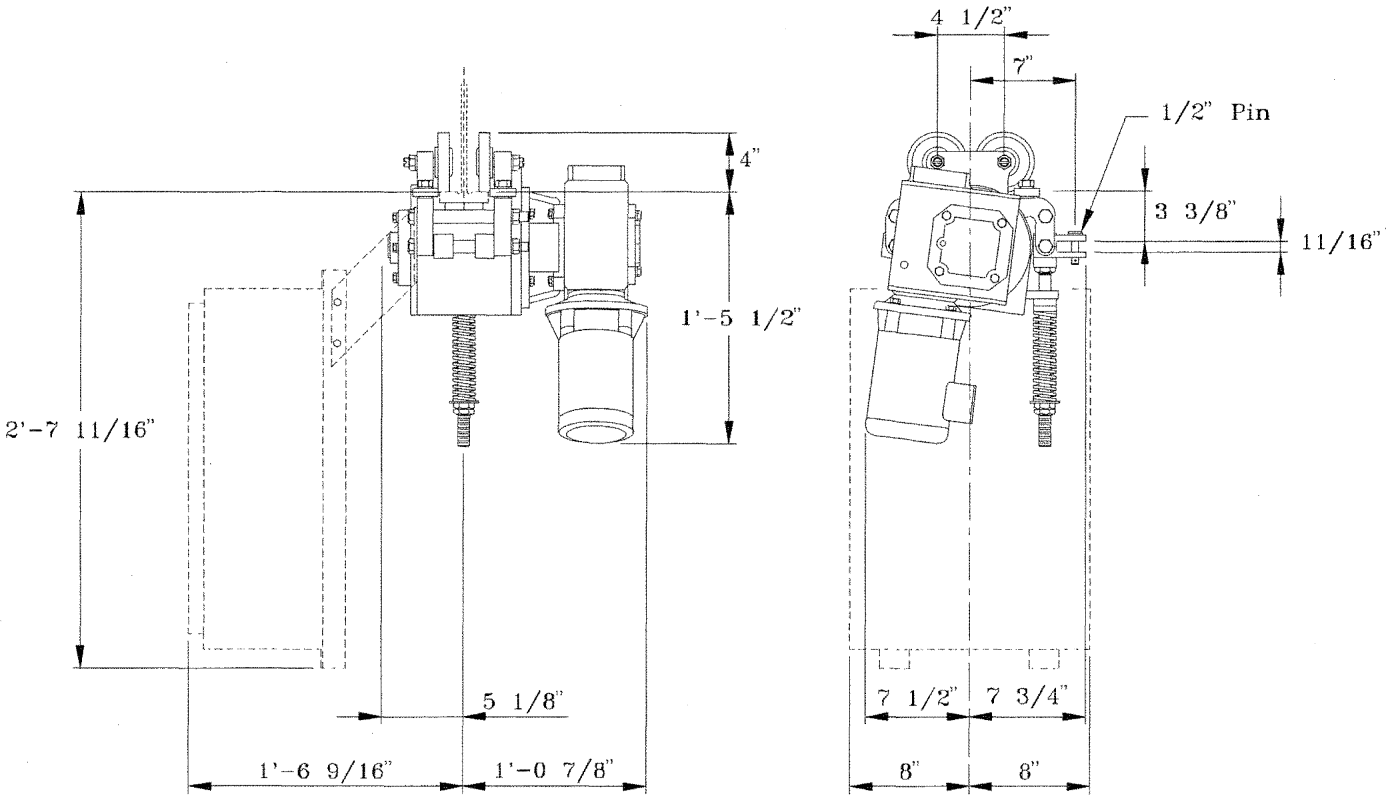
NO. 24010 TRACTOR DRIVE

No. 24010 tractor drives are powered by NEMA C face mounted motors driving through single reduction worm gear reducers to 6 in. diameter polyurethane drive wheels mounted on the output shaft of the reducers. Traction is obtained by the drive wheel bearing against the bottom of the track. Pressure is applied by compression spring and is adjustable.

These drives are available with 1/2, 3/4 and 1 horsepower motors. Nominal speeds are 55 and 90 FPM; slower speeds can be furnished. Drives with 1 HP motors are available for 90 FPM only. They are available with squirrel cage motors and single speed solid state or variable frequency control and multi-speed squirrel cage motors and 2-speed solid state control.

The drawing provides maximum clearance dimensions. The dotted lines indicate the single speed control panel location for single girder carriers. Consult factory for dimensions of variable frequency and 2-speed control panels.

IMPORTANT: *24010 drives cannot be used on monorails with switches due to interference between the worm gear reducer and switch frame.*



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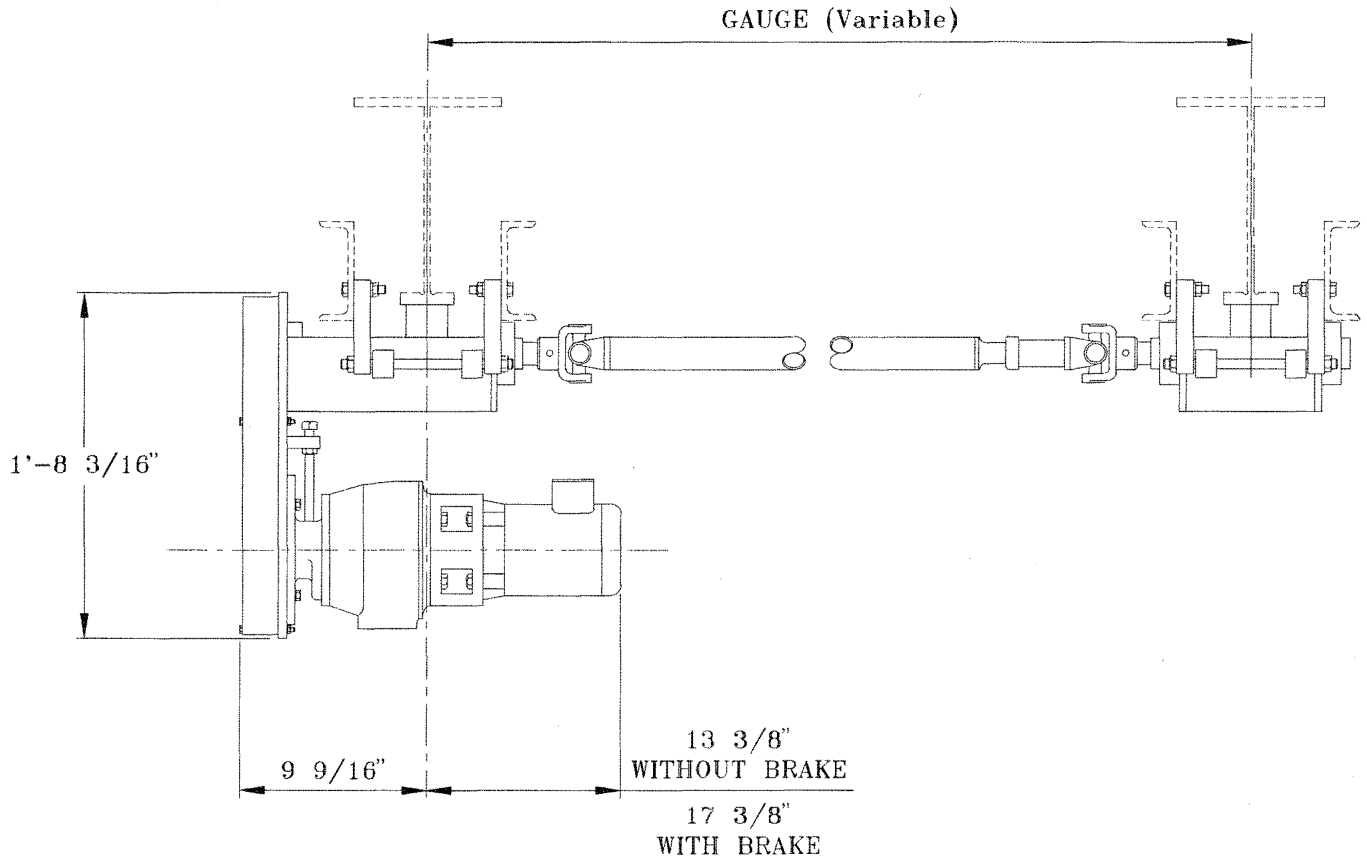
NO. 24011 DOUBLE GIRDER CARRIER DRIVE

No. 24011 drives propel double girder carriers with 4-wheel end trucks. They consist of a drive assembly mounted in one truck which is connected by a double universal joint assembly to an idler assembly in the other truck. The drive assembly is powered by a NEMA C face mounted motor driving through a double reduction gear reducer and a roller chain final reduction to a 6 in. diameter polyurethane drive wheel. Traction is obtained by the drive wheels bearing against the bottom of the girders. Pressure is applied by compression springs and is adjustable.

These drives are available with 1/2, 3/4, 1 and 1-1/2 horsepower motors. Nominal speeds are 100, 125, 150 and 200 FPM; slower speeds can be furnished. They are available with squirrel cage motors and single speed solid state or variable frequency control and multi-speed squirrel cage motors and 2-speed solid state control.



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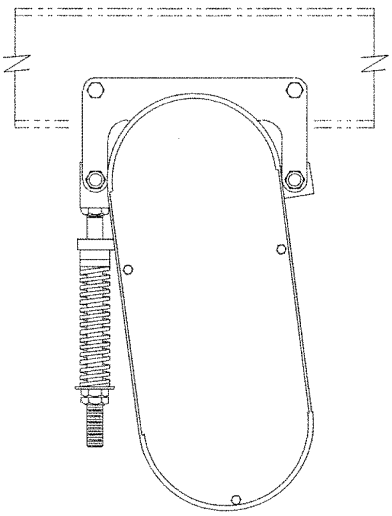
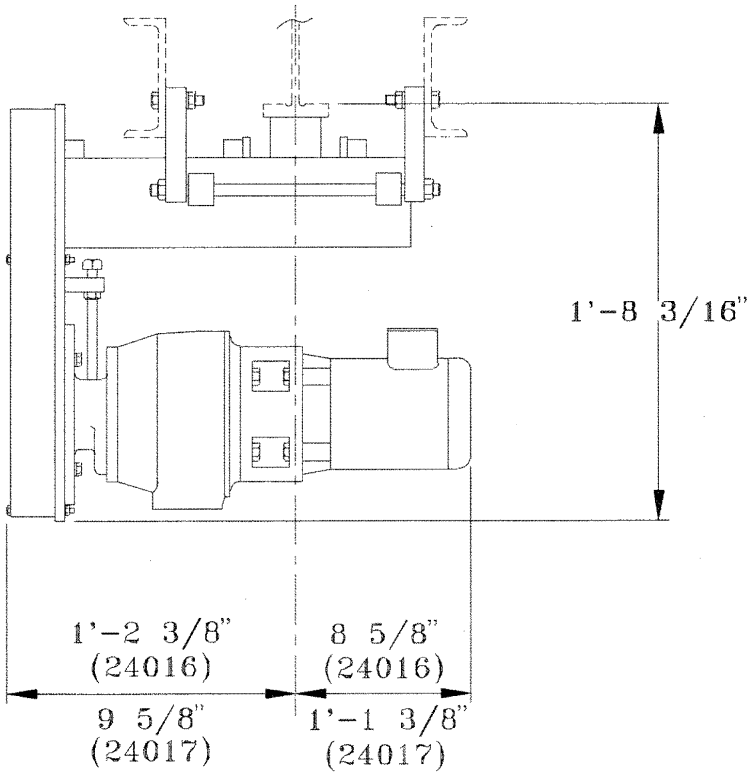
NO. 24016 AND NO. 24017 DOUBLE GIRDER CARRIER DRIVES

No. 24016 drives propel double girder carriers with eight 6-1/2 in. diameter wheel end trucks. No. 24017 drives propel double girder carriers with 4-wheel end trucks where horsepower requirements exceed the rating of No. 24011 drives. Two drives are used - one mounted in each end truck. Each drive is powered by a NEMA C face mounted motor driving through a double reduction helical gear reducer and a roller chain final reduction to a 6 in. diameter polyurethane drive wheel. Traction is obtained by the drive wheels bearing against the bottom of the girders. Pressure is applied by compression springs and is adjustable.

These drives are available with 1/2, 3/4, 1 and 1-1/2 horsepower motors. Nominal speeds are 100, 125, 150 and 200 FPM; slower speeds can be furnished.

Drives with 1-1/2 horsepower motors are available for 150 and 200 FPM only. They are available with squirrel cage motors and single speed solid state or variable frequency control and multi-speed squirrel cage motors and 2-speed solid state control.





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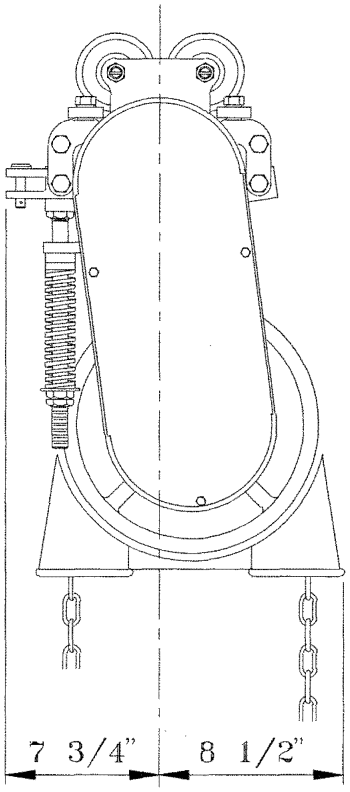
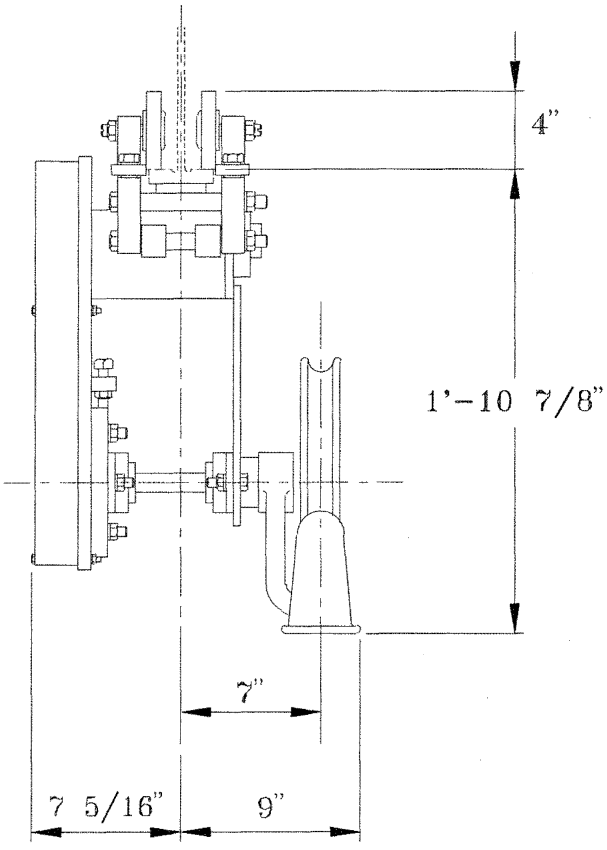
NO. 24012 HAND RACKED TRACTOR DRIVE

No. 24012 hand racked tractor drives are used when operation of a carrier is infrequent and travel distances are short. They are propelled by a hand chain and chain wheel; a roller chain reduction is provided between the chain wheel shaft and drive wheel shaft. These drives have 6 in. diameter polyurethane covered drive wheels. Traction is obtained by the drive wheel bearing against the bottom of the track. Pressure is applied by compression springs and is adjustable.





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HORSEPOWER REQUIREMENTS - SINGLE MOTOR DRIVES

The table lists the maximum total load that a single motor drive at a particular horsepower and speed is capable of moving. Nos. 24010, 2409 and 2408 drives are used for propelling single girder carriers; the No. 24011 drive is used for propelling double girder carriers. The efficiency of the drives has been considered in determining the horsepower.

The total load consists of the rated load and the weights of the hoist, carrier and accessory equipment (when used). The impact allowance is not considered in determining the total load. After determining the total load and knowing the carrier speed and the type of drive to be used, the motor horsepower of the drive is selected from the table. When the total load falls between those shown in the table, select the greater horsepower.

	Horsepower Required					
	1/2 HP	3/4 HP	1 HP	1-1/2 HP	2 HP	3 HP
Speed (FPM)	Maximum Load					
	No. 24010 Drive					
55	11,200	16,800	N. A.	N. A.	N. A.	N. A.
90	8,000	12,000	16,000	N. A.	N. A.	N. A.
No. 2409 Drive						
100	9,400	14,100	18,800	N. A.	N. A.	N. A.
125	7,500	11,300	15,000	N. A.	N. A.	N. A.
150	6,200	9,400	12,500	18,800	N. A.	N. A.
200	N. A.	7,000	9,400	14,100	N. A.	N. A.
No. 2408 Drive						
100	9,400	14,100	18,800	28,200	37,700	N. A.
150	6,200	9,400	12,500	18,800	25,100	37,700
200	N. A.	7,000	9,000	14,100	18,800	28,200
250	N. A.	N. A.	7,500	11,300	15,000	22,600
300	N. A.	N. A.	6,200	9,400	12,500	18,800
No. 24011 Drive						
100	9,400	14,100	18,800	28,200	N. A.	N. A.
125	7,500	11,300	15,000	22,600	N. A.	N. A.
150	6,200	9,400	12,500	18,800	N. A.	N. A.
200	N. A.	7,000	9,400	14,100	N. A.	N. A.

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HORSEPOWER REQUIREMENTS - DUAL MOTOR DRIVES

The table lists the maximum total load that a dual motor drive at a particular horsepower and speed is capable of moving. Nos. 24010, 2409 and 2408 drives are used for propelling single and double girder cranes; Nos. 24016 and 24017 drives are used for propelling double girder carriers. The efficiency of the drives has been considered in determining the horsepower.

The total load consists of the rated load and the weights of the hoist, carrier, crane and accessory equipment (when used). The impact allowance is not considered in determining the total load. After determining the total load and knowing the crane speed and the type of drive to be used, the motor horsepower of the drive is selected from the table. When the total load falls between those shown in the table, select the greater horsepower.

	Horsepower Required					
	2 @ 1/2 HP	2 @ 3/4 HP	2 @ 1 HP	2@ 1-1/2 HP	2 @ 2 HP	2 @ 3 HP
Speed (FPM)	Maximum Load					
	No. 24010 Drives					
55	22,400	33,600	N. A.	N. A.	N. A.	N. A.
90	16,000	24,000	32,000	N. A.	N. A.	N. A.
Nos. 2409, 24016 and 24017 Drives						
100	18,800	28,200	37,700	N. A.	N. A.	N. A.
125	15,000	22,600	30,100	N. A.	N. A.	N. A.
150	12,500	18,800	25,100	37,700	N. A.	N. A.
200	N. A.	14,100	18,800	28,200	N. A.	N. A.
No. 2408 Drives						
100	18,800	28,200	37,700	56,500	75,400	N. A.
150	12,500	18,800	25,100	37,700	50,200	75,400
200	N. A.	14,100	18,800	28,200	37,700	56,500
250	N. A.	N. A.	15,000	22,600	30,100	45,200
300	N. A.	N. A.	12,500	18,800	25,100	37,700

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CONTROL EQUIPMENT

Control equipment for motor driven Trambeam carriers and cranes consists of an operating station and a control system for the drive motors. The operating station may be a push button station for floor or remote controlled equipment, a transmitter for radio or infrared controlled equipment or master switches for cab controlled equipment. Many types of motor control systems are available with selection depending on type of service, weight and size of load, speeds and precision required in handling.

Three control systems have been designed specifically for Trambeam carriers and cranes - single speed solid state, 2-speed solid state and adjustable frequency. These systems are satisfactory for most applications. Other control systems for special applications are also available.

SINGLE SPEED SOLID STATE MOTOR CONTROL

Single speed motor controls use solid state components for electronic control of squirrel cage motors. It is the most frequently used control for Trambeam carriers and cranes and is recommended for speeds to 200 FPM.

The control supplies a balanced 3 phase, reduced voltage (initial torque) to the motor. The voltage is increased over a preset acceleration time thus gradually applying torque to the motor. The gradual increase of torque provides smooth acceleration which is repeatable under varying load conditions.

Adjustments are provided for setting the initial torque and the time it takes the control to pass full line voltage to the motor. Adjustments are simple to make requiring only a screwdriver.

2-SPEED SOLID STATE MOTOR CONTROL

2-Speed motor controls use solid state components for electronic control of multi-speed squirrel cage motors. It is used where precision spotting of heavier loads is required and is recommended for speeds to 250 FPM. The control is available with 2 to 1 and 3 to 1 ratios of the high to the low speeds.

The control supplies a balanced 3 phase, reduced voltage (initial torque) to either the low or high speed motor winding depending on which speed is selected by the operator. The voltage is increased over a preset acceleration time thus gradually applying torque to the motor. The gradual increase of torque provides smooth acceleration which is repeatable under varying load conditions.

The control switches to a deceleration mode when the motor is switched from high to low speed. In the deceleration mode, reduced voltage is applied to the low speed winding for approximately 2 seconds thereby reducing the motor countertorque. The voltage then increases to full voltage at the rate determined by the time adjustment setting. The deceleration mode provides smooth transition from high to low speed.

Adjustments are provided for setting the initial torque and the time it takes for the control to pass full line voltage. Time adjustments are provided for the acceleration and deceleration modes. Adjustments are simple to make requiring only a screwdriver.

ADJUSTABLE FREQUENCY MOTOR CONTROL

Adjustable frequency motor controls use solid state components for electronic control of squirrel cage motors. It is used to position delicate loads at precise creep speeds. The control provides a 12 to 1 ratio between the high and low speeds. It can be arranged for 1, 2 or 3 speeds; speeds can be changed at any time with a built-in potentiometer which allows any speed to be dialed in between 5 and 60 hertz. The control provides smooth acceleration and deceleration, electronic reversing and speed selection and electronic dynamic braking. Consult factory for additional information on specific applications.

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CONTROL EQUIPMENT

OSHA AND NEC ELECTRICAL STANDARDS

The electrical diagrams on Pages TD-12 and TD-13 illustrate the requirements of the Occupational Safety and Health Act (OSHA) and National Electric Code (NEC) standards. Control panels for Trambeam carriers and cranes comply with these standards.

CONTROL EQUIPMENT

Crane control panels include the following mandatory devices as standard equipment:

- Fused motor switch arranged to be locked in the OFF position.
- Mainline contactor operated from the crane operating station to open the power circuit to all motors.
- Branch circuit overcurrent protection for the crane motors.
- Thermal overloads in 3 phases for motor running over current protection.

Carrier control panels have branch circuit overcurrent protection for the carrier motor and thermal overloads in 3 phases for motor running overcurrent protection as standard. Most monorail carriers also require a motor circuit switch and a mainline contactor.

The National Electric Code requires that monorail carriers and hand propelled cranes with electric hoists be provided with a motor circuit switch. A mainline contactor is also required when the motor circuit switch is not readily accessible from the operating station. An exception to this requirement is allowed where the installation meets all of the following:

1. The unit is floor controlled.
2. The unit is within view of the power supply disconnecting means.
3. No fixed platform has been provided for servicing the unit.

Motor circuit switches can be provided on hand propelled carriers and cranes and on motor driven carriers where the installation does not meet the conditions stated above. A mainline contactor, when required, can be provided on motor driven carriers; but it is usually provided on the hoist.

CONTROL PANELS AND WIRING

NEMA 12 dust-tight enclosures are furnished as standard for carrier and crane control panels. Special enclosures are available for outdoor applications or where corrosive or explosive vapors or dust are present.

Internal wiring of crane control panels terminates at a terminal block to facilitate field maintenance.

All crane wiring is installed in rigid conduit except at the connections to the control panel and drive motors. At these connections, wiring is installed in flexible liquid-tight metal conduit. Junction boxes, conduit and flexible conduit are compatible with the NEMA 12 control panel.

CURRENT CHARACTERISTICS

Motor driven equipment is furnished for operation on 3 phase, 60 hertz, 230 or 460 volts alternating current with 115 volts in the control circuit. Equipment can be furnished to operate on alternating current with other characteristics or on direct current.

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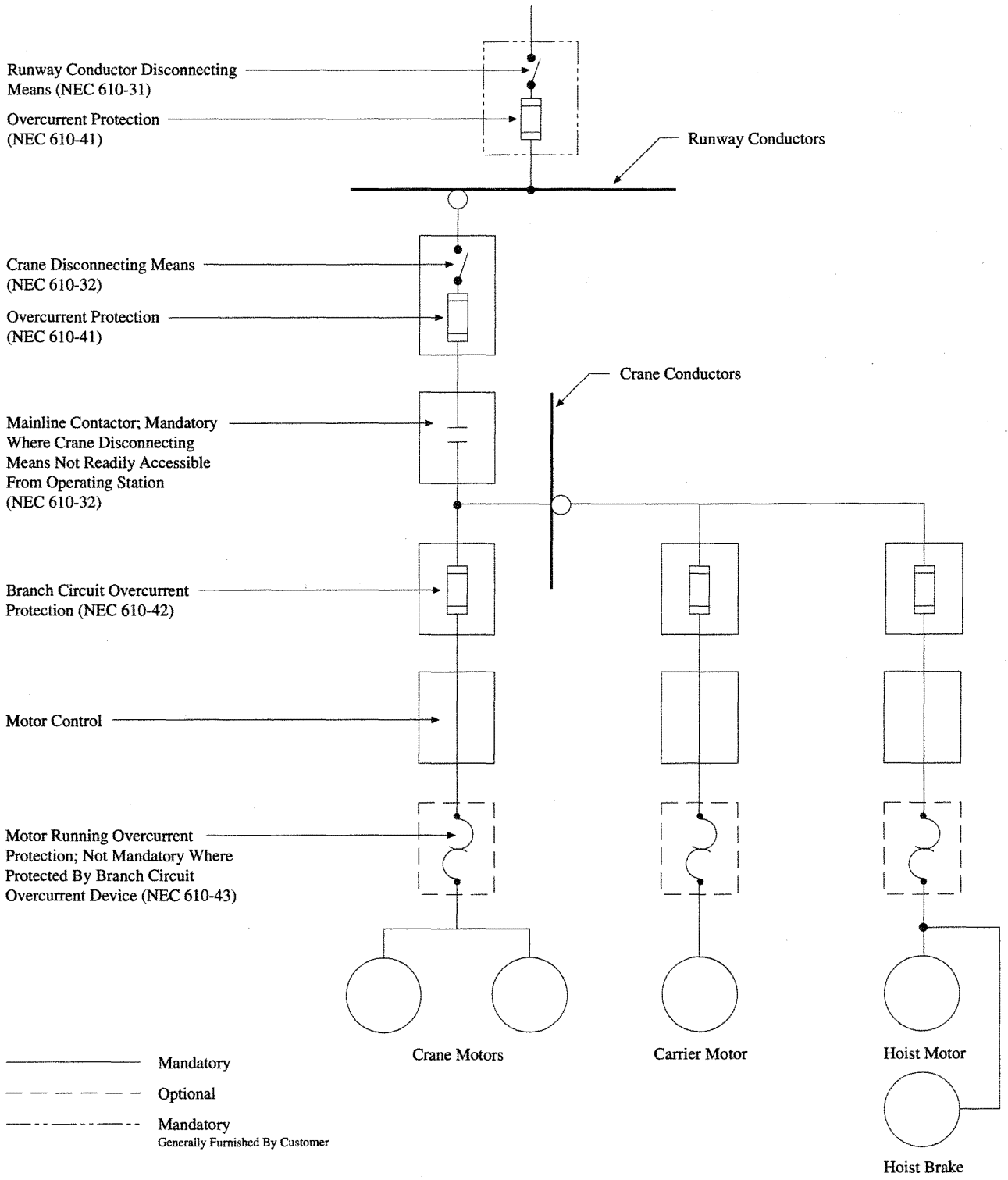
ELECTRICAL DIAGRAM - MOTOR DRIVEN CRANE



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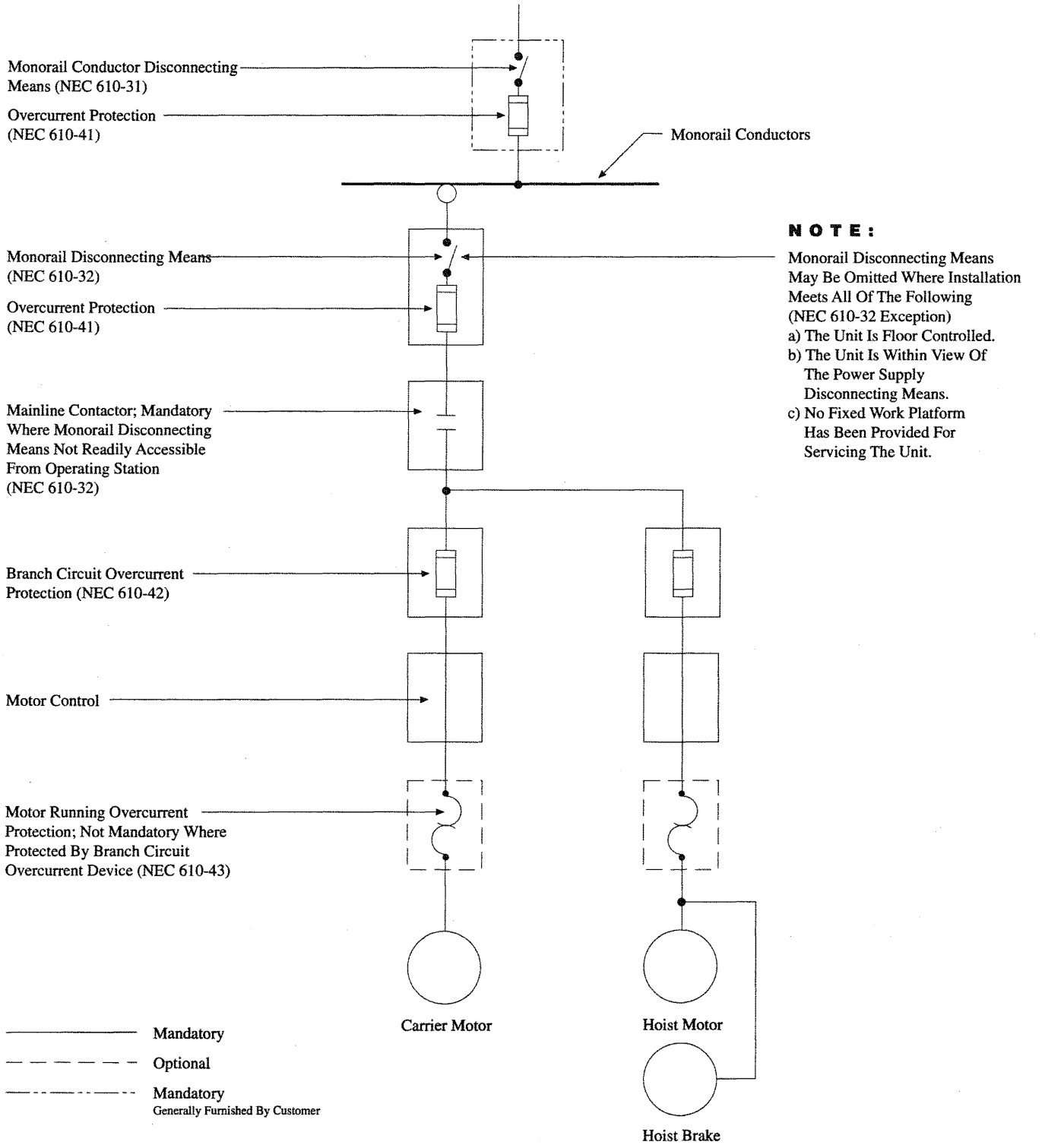
ELECTRICAL DIAGRAM - MOTOR DRIVEN MONORAIL CARRIER



NOTE:

Monorail Disconnecting Means May Be Omitted Where Installation Meets All Of The Following (NEC 610-32 Exception)

a) The Unit Is Floor Controlled.

b) The Unit Is Within View Of The Power Supply Disconnecting Means.

c) No Fixed Work Platform Has Been Provided For Servicing The Unit.

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GENERAL INFORMATION

The track system is an important factor in the success of underhung crane and monorail applications. It must be capable of supporting the load and also provide long life and the flexibility to meet facilities change. Trambeam track system meets these criteria.

Trambeam track is a composite section featuring:

- A rail section of high strength alloy steel in combination with top flange and web plates of mild steel. The rail and top flange plate are continuously and automatically welded to the web plate.
- The lower load carrying flange of the rail section is rolled to close tolerances and has a flat, raised running surface resulting in less friction and longer track and wheel life.
- A 3-1/4 in. uniform width of the load carrying flange is maintained regardless of the load or depth of track. This permits interchangeability of carriers and provides an efficient and economical overall system.

Trambeam tracks are manufactured using various thicknesses and widths of top flange and web plates and two rail sections. Light rail sections have a 7/16 in. thick load carrying flange. Heavy rail sections have an 11/16 in. thick load carrying flange.

Track and suspension fittings are selected from the data on Page TT-5.

STANDARD TRACK SECTIONS

Eighteen sizes of track are cataloged for runway and monorail tracks and bridge girders. They are satisfactory for most applications. The dimensions and properties for these sections are shown on Pages TT-2, TT-3 and TT-4. Rated load tables are on Pages TT-12, TT-13, TT-14 and TT-15.

OPTIMUM TRACK SECTIONS

Optimum track sections are those where the design criteria are at the allowable maximums and the design is balanced. In most applications standard track sections provide a balanced design; however, because they are cataloged for a wide range of spans, this is not always possible. Where standard track sections are not in balance and the quantity of track warrants an investigation, a computer program is available for optimizing track design.

The program designs the section by tailoring the top flange plate and track height for a specific load and span. It removes unnecessary steel resulting in a weight savings per foot of track and a more economical track system. The program is generally used to design heavy rail sections. It may also be used to design light rail sections for spans longer than cataloged when carrier head loads are relatively light. Consult factory for additional information on optimum track sections and for specific applications.

FLEXIBLE SUSPENSION

Flexible suspension is recommended for all track systems to provide longer track and wheel life and smoother operation. Two types are available. A gimbal suspension system is used for loads up to 40,000 pounds. A bushing system is used for loads in excess of 40,000 pounds.

The gimbal suspension system uses multiplane washers at each end of the hanger rod to provide a gimbal effect that allows free rod movement of 6 degrees in any direction. Hanger rods have rolled threads with the lower nut factory assembled to the rod. The upper nut is adjustable and allows for leveling of the track. A complete description of the gimbal system is provided on Page TT-18.

The bushing suspension system uses spherical thrust bushing at each end of the hanger rod to provide a free rod movement of 6 degrees in any direction. The bushings are basically a spherical ball and socket configuration and are ground, hardened and coated with a dry film lubricant. A complete description of the bushing suspension system is provided on Page TT-19.

Flexibly suspended track systems are laterally and longitudinally braced to limit sway of the hanger rods. Bracing is installed after the track has been aligned and leveled. Additional information on bracing is provided on Page TT-20.

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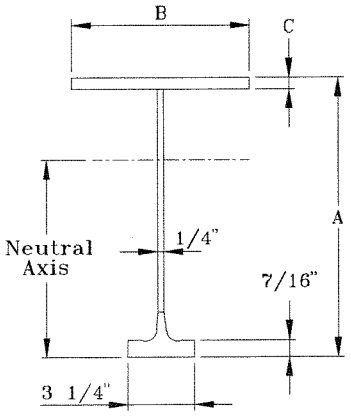
LIGHT RAIL SECTIONS

Nos. 34011 through 34031 light rail sections are used for runway and monorail tracks and bridge girders. Dimensions and section properties are shown in the tables.

Nos. 34011 and 34016 tracks are manufactured in stock lengths of 41 feet. All other light rail tracks are manufactured in stock lengths of 41, 50 and 60 feet. They are cut to length and fabricated in any length up to the maximum stock length.



Item Number	Nominal Size and Weight	A	B	C
34011	8 @ 17.0	8-1/16	5	5/16
34016	8-1/2 @ 19.4	8-9/16	5	7/16
34021	10 @ 22.2	10-1/16	6	7/16
34026	11-1/2 @ 26.3	11-9/16	7	1/2
34031	13 @ 29.3	13-1/16	8	1/2

Item Number	Maximum Wheel Dia.(In.)	Area (In.X2)	Section Modulus (In.X3)		Moment of Interia (In.X4)	Neutral Axis (In.)
			Tension	Compression		
34011	5	4.672	12.920	11.585	49.247	3.812
34016		5.703	14.857	18.254	70.133	4.720
34021		6.515	18.799	25.656	109.171	5.807
34026		7.750	23.298	37.568	166.270	7.137
34031		8.625	27.924	48.310	231.148	8.278

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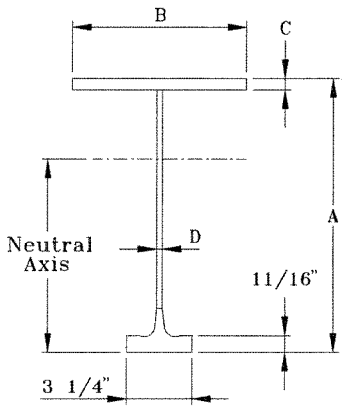
HEAVY RAIL SECTIONS

No. 34037 and Nos. 34041 through 34066 heavy rail sections are used for runway and monorail tracks and bridge girders. No. 34038 sections are used for monorail curves. Dimensions and section properties are shown in the tables.

No. 34037 and Nos. 34041 through 34056 tracks are manufactured in stock lengths of 41, 50 and 60 feet. Nos. 34061 and 34066 tracks are manufactured to order. They are cut to length and fabricated in any length up to 60 feet maximum.



Item Number	Nominal Size and Weight	A	B	C	D
34037	12-1/2 @ 33.6	12-9/16	8	1/2	5/16
*34038	12-1/2 @ 30.2	12-9/16	6	1/2	5/16
34041	14 @ 38.5	14-1/16	8	5/8	5/16
34046	16 @ 42.7	16-1/16	9	5/8	5/16
34051	18 @ 50.3	18-1/16	10	5/8	3/8
34056	20 @ 55.0	20-1/16	11	5/8	3/8
34061	22-1/2 @ 61.4	22-9/16	12-1/2	5/8	3/8
34066	25 @ 67.8	25-1/16	14	5/8	3/8

Item Number	Maximum Wheel Dia. (In.)	Area (In.X2)	Section Modulus (In.X3)		Moment of Inertia (In.X4)	Neutral Axis (In.)
			Tension	Compression		
34037	8	9.888	34.440	48.781	253.605	7.364
*34038		8.888	33.251	39.324	226.337	6.807
34041		11.318	40.939	65.239	353.731	8.460
34046		12.568	49.889	84.012	502.776	10.078
34051		14.802	62.307	106.516	710.066	11.396
34056		16.177	73.512	130.069	942.276	12.818
34061		18.052	88.875	165.152	1303.680	14.669
34066		19.927	105.539	204.237	1743.910	16.524

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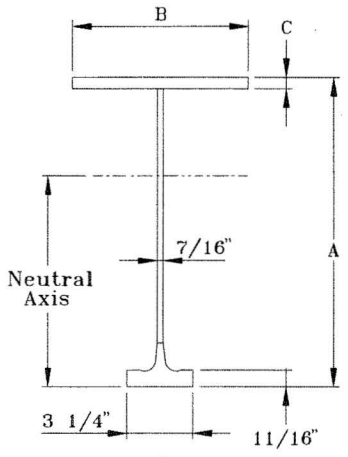
BRIDGE GIRDERS

Nos. 34071 through 34079 tracks are used primarily as bridge girders. They can be used for runway tracks but an optimum track section will generally be more economical.

Dimensions and section properties are shown in the tables.



Item Number	Nominal Size and Weight	A	B	C
34071	27-1/2 @ 82.8	27-9/16	14	3/4
34076	30 @ 92.0	30-1/16	16	3/4
34077	32 @ 108.6	32	16	1
34078	36 @ 122.1	36	18	1
34079	40 @ 135.6	40	20	1

Item Number	Maximum Wheel Dia. (In.)	Area (In.X2)	Section Modulus (In.X3)		Moment of Inertia (In.X4)	Neutral Axis (In.)
			Tension	Compression		
34071	8	24.138	132.223	264.167	2428.740	18.369
34076		26.732	154.279	324.844	3144.560	20.382
34077		31.470	175.353	429.040	3983.280	22.716
34078		35.220	215.352	542.478	5549.600	25.770
34079		38.970	259.307	668.980	7474.890	28.826

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TRACK AND HANGER ROD SELECTION

Trambeam track for monorail and runway applications is selected by converting the carrier or end truck load to an equivalent concentrated load (ECL) at the center of the span. The track size is then selected from the tables on Pages TT-12, TT-13, TT-14 and TT-15.

The carrier or end truck load is converted to an ECL by one of two methods. A simplified procedure is described on Page TT-6 and is used on applications where one carrier or crane is operating in a single span. The other procedure is to calculate the ECL by the formulae given on Page TT-8. The formulae are used for a more exact value of the ECL and on applications where two carriers or cranes are operating in a single span.

Two methods of calculating the hanger rod load (HRL) are used and are similar to those used for determining the ECL. A simplified procedure is provided on Page TT-6 and formulae on Page TT-10. After determining the HRL, suspension assemblies are selected from the table on Page TT-16.

The tables on Pages TT-12 through TT-15 list the rated loads for cataloged Trambeam track for specific spans. The rated load is listed as a single equivalent concentrated load (ECL) at the center of the span. Rated loads have been established by the following design criteria:

- Tension stress in the lower load carrying flange does not exceed 20% of the ultimate strength of the alloy steel T-rail.
- Compression stress in the top flange does not exceed the stress allowed by AISC Specifications.
- Deflection ratio does not exceed 1/450 of the span for spans of 46' or less. The ratio for spans in excess of 46' is reduced so that actual deflection does not exceed 1-1/4 in.. Consult factory for rated load when deflection ratio of less then 1/450 is specified.
- Ratio of span to top flange width does not exceed 60:1.
- Weight of track has been allowed for and need not be considered.
- The maximum carrier head loads of **5,000** pounds for the light rail sections and 10,000 pounds for the heavy rail sections are applicable to track with square cut ends. For angular cuts at switches, the carrier head load is reduced as noted in the Switch Section.

When determining the ECL and HRL, consideration should be given to the following:

- The carrier load includes hoist and carrier weights, rated load and an impact allowance, if applicable. The end truck load includes the distributed carrier load and one-half the crane weight.
- An impact allowance is included on systems using powered hoists. The impact allowance is 1/2% of the rated load for each foot per minute of hoisting speed with a minimum allowance of 15% and a maximum of 50%. For bucket and magnet applications, the impact allowance is 50% of the rated load.
- The number of carriers or cranes operating on the system should be considered. Unless otherwise specified, the ECL and HRL are calculated for one carrier or crane in a single span.
- The location of the carrier on the bridge girder should be considered in determining the end truck load. If the carrier center of gravity is located between the trucks, the carrier load will be distributed to the two end trucks. If the carrier center of gravity is located outside one truck, the carrier load will increase on the adjacent truck and reduce the load on the other truck. When the carrier center of gravity is located directly under one truck, there is no distribution of the carrier load.
- The combination of runway load and span for some cranes cataloged with standard wheelbase end trucks may be such that the use of extended wheelbase trucks will reduce the ECL sufficiently to permit the use of a smaller size track. Before deciding on extended wheelbase trucks, the cost reduction for the runway material should be compared with the additional cost for the extended wheelbase trucks and the most economical application selected.
- Monorail systems with switches and motor driven carriers may require that a heavy rail section be used throughout the system regardless of the size selected for the straight track. Carrier head loadings for switch applications are reduced because of the angular cuts on the curved tracks. See Switch Section for rated loads of carrier heads when operating through switches.

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SIMPLIFIED PROCEDURE FOR TRACK AND HANGER ROD SELECTION

The simplified procedure for selection of track and hanger rod assemblies is used for monorail and crane applications where one carrier or crane operates in a single span. The procedure is:

STEP 1
Determine the carrier load. For monorail applications, omit Steps 2 and 3 and proceed to Step 4.

STEP 2
Distribute the carrier load.

STEP 3
Determine the end truck load.

STEP 4
Determine the wheelbase (W) from the Carrier or Crane Section.

STEP 5
Determine the wheelbase to span ratio (W/L).

STEP 6
Select the K1 and K2 conversion factors from the table. When the value of W/L falls between those shown, use K1 and K2 factors from the column to the left.

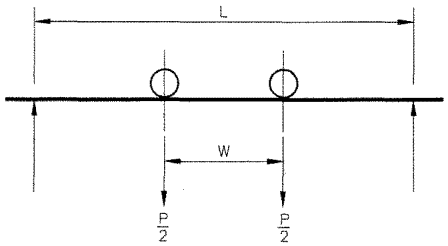
STEP 7
Calculate the ECL by multiplying the carrier or end truck load by the K1 factor.

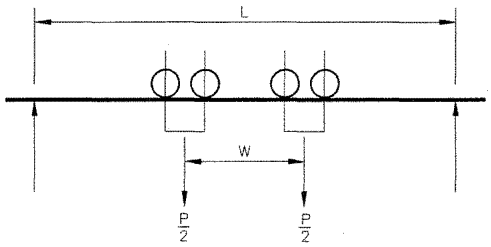
STEP 8
Select track size from tables on Pages TT-12 through TT-15.

STEP 9
Calculate the HRL by multiplying the carrier or end truck load by the K2 factor and add the track weight and, when used, the electrification weight.

STEP 10
Select hanger rod assemblies from the table on Page TT-16.

A sample calculation is given on Page TT-7.





W/L	.013	.025	.038	.050	.063	.075	.088	.100	.113	.125	.138	.150	.163	.175	.188
K1	.987	.975	.961	.951	.938	.927	.914	.903	.891	.879	.867	.856	.844	.833	.821
K2	.994	.988	.981	.975	.969	.963	.956	.950	.944	.938	.931	.925	.919	.913	.906
W/L	.200	.213	.225	.238	.250	.263	.275	.288	.300	.313	.325	.338	.350	.363	.375
K1	.810	.799	.788	.777	.766	.755	.744	.733	.723	.712	.701	.691	.681	.670	.660
K2	.900	.894	.888	.881	.875	.869	.863	.856	.850	.844	.838	.831	.825	.819	.813
W/L	.388	.400	.413	.425	.438	.450	.463	.475	.488	.500	.525	.550	.575	.600	.625
K1	.650	.640	.630	.620	.610	.601	.591	.581	.572	.562	.544	.526	.508	.500	.500
K2	.806	.800	.794	.788	.781	.775	.769	.763	.756	.750	.738	.725	.713	.700	.688
W/L	.650	.675	.700	.725	.750	.775	.800	.825	.850	.875	.900	.925	.950	.975	1.000
K1	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500	.500
K2	.675	.663	.650	.638	.625	.613	.600	.588	.575	.563	.550	.538	.525	.513	.500

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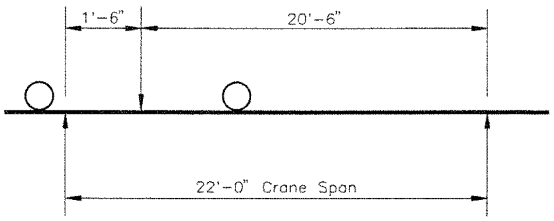
SAMPLE CALCULATION FOR SIMPLIFIED PROCEDURE

The sample calculation on this page shows how the simplified procedure for track and hanger rod selection is used. It assumes a MW37S212X24, 3 ton, 22 ft.-0 in. span crane operating on a runway with 20 ft.-0 in. suspension centers. The calculations required to size the runway track and hanger rod assemblies are:

STEP 1 - Determine carrier load.

Hoist Weight	800 lbs.
Carrier Weight	500 lbs.
Rated Load	6,000 lbs.
Impact Allowance (15%)	900 lbs.
Carrier Load	8,200 lbs.

STEP 2 - Distribute carrier load.



Distributed Carrier Load = $\frac{20.5}{22}$ x 8,200 = 7,640 lbs.

Distributed Carrier Load = 20.5/22 x 8,200

Distributed Carrier Load = 7,640 lbs.

STEP 3 - Determine End Truck Load (P).

Distributed Carrier Load	7,640 lbs.
One-Half Crane Weight	1,217 lbs.
	8,857 lbs.

STEP 4 - Determine wheelbase (W) from Crane Section

W = 4 ft.-8 in. or 56 in.

STEP 5 - Determine wheelbase to span ratio (W/L).

W/L = 56/240 = .233

STEP 6 - Select conversion factors from table on Page TT-6.

Use conversion factors for W/L = .225

K1 = .788
K2 = .888

STEP 7 - Calculate ECL.

ECL = K1 x P = .788 x 8,857 = 6,979 lbs.

STEP 8 - Select track from table on Page TT-12.

Use No. 34026 (11-1/2 in. @ 26.3 lbs.)

STEP 9 - Calculate HRL.

HRL = K2 x P + Track Weight + Electrification Weight

HRL = .888 x 8,857 + 26.3 x 20 + 4.5 x 20

HRL = 8,481 lbs.

Note: Insul-8-Bar electrification weighs 4.5 lbs./3-bar foot.

STEP 10 - Select suspension fittings from table on Page TT-16.

Use single 3/4 in. diameter hanger rods.

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FORMULAE FOR TRACK SELECTION

Formulae for 4-wheel, 8-wheel and 16-wheel carriers and end trucks are used to determine track size where two carriers or cranes operate in a single span. They also provide a more exact ECL than the simplified procedure. The 8-wheel formula may be used where two 4-wheel carriers or two cranes with 4-wheel trucks operate in a single span. The 16-wheel formula may be used where two 8-wheel carriers or two cranes with 8-wheel trucks operate in a single span.

Consideration must be given to the loading condition when using the formulae for double girder cranes with large girder gauges. The maximum ECL for some applications may occur when the wheels from one end of the truck are at the middle of the span rather than when the truck is centered on the span. Consult factory for assistance if there is a question on the maximum loading condition.

The procedure for using the formulae is:

STEP 1
Determine the carrier load. For monorail applications, omit Steps 2 and 3 and proceed to Step 4.

STEP 2
Distribute the carrier load.

STEP 3
Determine the end truck load.

STEP 4
Determine wheelbase dimensions from Carrier or Crane Section.

STEP 5
Determine load distribution.

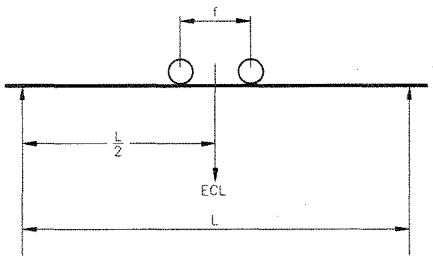
STEP 6
Calculate the ECL from appropriate formula.

STEP 7
Select track size from tables on Pages TT-12, TT-13, TT-14 and TT-15.

A sample calculation is given on Page TT-9.

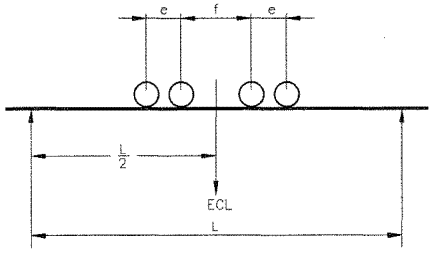
4-WHEEL FORMULA:

$$ECL = (1 - f/2L)^2 \times P$$



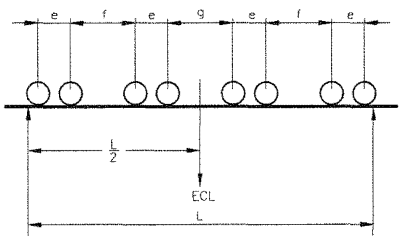
8-WHEEL FORMULA:

$$ECL = [(1 - f/2L)^2 - e/L] \times P$$



16-WHEEL FORMULA:

$$ECL = [(1 - g/2L)^2 - f/L - 2e/L] \times P$$



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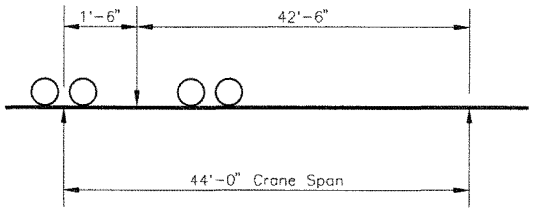
SAMPLE CALCULATION FOR FORMULAE

The sample calculation on this page shows how the formulae for track selection are applied. It assumes two MW71S218X46, 5 ton, 44 ft.-0 in. span cranes operating on a runway with 25 ft. - 0 in. suspension centers with No. 2409 crane drives toward center of runway. The calculations required to size the runway track are:

STEP 1 - Determine carrier load.

Hoist Weight	900 lbs.
Carrier Weight	600 lbs.
Rated Load	10,000 lbs.
Impact Allowance (15%)	1,500 lbs.
	13,000 lbs.

STEP 2 - Distribute carrier load.



Distributed Carrier Load = 42.5/44 x 13,000
= 12,557 lbs.

STEP 3 - Determine end truck load.

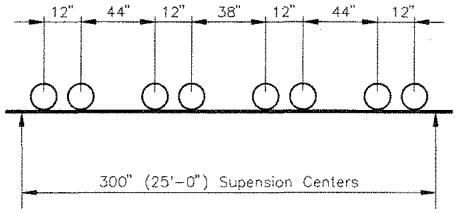
Distributed Carrier Load	12,557 lbs.
One-Half Crane Weight	2,833 lbs.
	15,390 lbs.

Note: With 2 cranes operating in a single span, P will be 2 x 15,390 lbs. or 30,780 lbs.

STEP 4 - Determine end truck wheelbase dimensions from Crane Section.

e = 1 ft.-0 in. or 12 in.
f = 3 ft.-8 in. or 44 in.
g = 3 ft.-2 in. or 38 in.

STEP 5 - Determine load distribution of two cranes in a single span.



STEP 6 - Calculate ECL.

$$ECL = [(1 - g/2L)^2 - f/L - 2e/L] \times P$$

$$ECL = [(1 - 38/2 \times 300)^2 - 44/300 - 2 \times 12/300] \times 30{,}780$$

ECL = 20,007 lbs.

STEP 7 - Select track size from table on Page TT-12.

Use No. 34056 (20 in. @ 55.0 lbs.)

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FORMULAE FOR HANGER ROD SELECTION

Formulae for 4-wheel, 8-wheel and 16-wheel carriers and end trucks are used to determine hanger rod size where two carriers or cranes operate in a single span. They also provide a more exact HRL than the simplified procedure. The 8-wheel formula may be used where two 4-wheel carriers or two cranes with 4-wheel trucks operate in a single span. The 16-wheel formula may be used where two 8-wheel carriers or two cranes with 8-wheel trucks operate in a single span.

The procedure for using the formulae is:

STEP 1
Determine the carrier load. For monorail applications, omit Steps 2 and 3 and proceed to Step 4.

STEP 2
Distribute the carrier load.

STEP 3
Determine the end truck load.

STEP 4
Determine wheelbase dimensions from Carrier or Crane Section.

STEP 5
Determine load distribution.

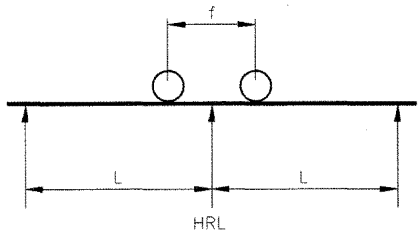
STEP 6
Calculate the HRL from appropriate formula and add the track weight and, when used, the electrification weight.

STEP 7
Select hanger rod assemblies from the table on Page TT-16.

A sample calculation is given on Page TT-11.

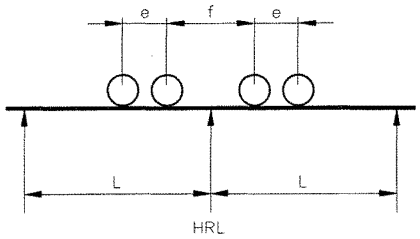
4-WHEEL FORMULA:

HRL = (1 - f/2L) x P + Track Weight + Electrification Weight



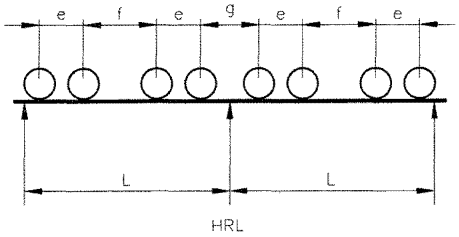
8-WHEEL FORMULA:

HRL = (1 - f/2L - e/2L) x P + Track Weight + Electrification Weight



16-WHEEL FORMULA:

HRL = (1 - g/2L - f/2L - e/L) x P + Track Weight + Electrification Weight



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SAMPLE CALCULATION FOR FORMULAE

The sample calculation on this page shows how the formulae for hanger rod selection are applied. It assumes the same system used in the sample calculation on Page TT-9. The calculations to size the hanger rods are:

STEP 1 - Determine carrier load.

Same as sample calculation on Page TT-9; carrier load is 13,000 lbs.

STEP 2 - Distribute carrier load.

Same as sample calculation on Page TT-9; distributed carrier load is 12,557 lbs.

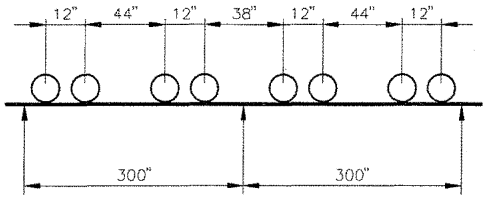
STEP 3 - Determine end truck load.

Same as sample calculation on Page TT-9; P is 30,780 lbs.

STEP 4 - Determine end truck wheelbase dimensions from Crane Section.

Same as sample calculation on Page TT-9;
e = 12 in., f = 44 in., and g = 38 in.

STEP 5 - Determine load distribution.



STEP 6 - Calculate HRL.

HRL = (1 - g/2L - f/2L - e/L) x P + Track Weight + Electrification Weight

HRL = (1 - 38/2 x 300 - 44/2 x 300 - 12/300) x 30,780 + 25 x 55.0 + 25 x 4.5

HRL = 26,850 lbs.

Note: Track weight of 55.0 lbs./ft. is for No. 34056 track selected in sample calculation on Page TT-9. Insul-8-Bar electrification weighs 4.5 lbs./3-bar foot.

STEP 7 - Select suspension fittings from table on Page TT-16.

Use double 1-1//8 in. diameter hanger rods.

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TRACK RATED LOADS - LIGHT RAIL SECTIONS

Maximum ECL at Center of Span (Pounds)					
Span (Feet)	No. 34011 8 @ 17.0	No. 34016 8-1/2 @ 19.4	No. 34021 10 @ 22.2	No. 34026 11-1/2 @ 26.3	No. 34031 13 @ 29.3
8	9,292 C	15,399 T			
9	7,320 C	13,669 T			
10	5,908 C	12,284 T	15,555 T		
11	4,861 C	11,149 T	14,120 T		
12	4,063 C	10,201 T	12,922 T	16,021 T	
13	3,440 C	8,789 D	11,907 T	14,763 T	
14	2,944 C	7,551 D	11,035 T	13,683 T	16,416 T
15	2,542 C	6,550 D	9,749 C	12,746 T	15,293 T
16	2,212 C	5,730 D	8,537 C	11,924 T	14,309 T
17	1,937 C	5,048 D	7,531 C	11,197 T	13,439 T
18	1,705 C	4,475 D	6,686 C	10,549 T	12,664 T
19	1,508 C	3,989 D	5,969 C	9,644 D	11,969 T
20	1,338 C	3,573 D	5,356 C	8,666 D	11,342 T
21	-------	3,213 D	4,826 C	7,823 D	10,773 T
22	-------	2,899 D	4,366 C	7,090 D	9,866 C
23	-------	2,625 D	3,963 C	6,449 D	8,984 C
24	-------	-------	3,607 C	5,885 D	8,209 C
25	-------	-------	3,293 C	5,385 D	7,523 C
26	-------	-------	3,012 C	4,941 D	6,913 C
27	-------	-------	2,761 C	4,544 D	6,368 C
28	-------	-------	-------	4,187 D	5,879 C
29	-------	-------	-------	3,865 D	5,438 C
30	-------	-------	-------	3,573 D	5,039 C
31	-------	-------	-------	3,308 D	4,677 C
32	-------	-------	-------	-------	4,346 C
33	-------	-------	-------	-------	4,044 C
34	-------	-------	-------	-------	3,767 C
35	-------	-------	-------	-------	3,512 C

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TRACK RATED LOADS - HEAVY RAIL SECTIONS

Maximum ECL at Center of Span (Pounds)							
Span (Feet)	No. 34037 12-1/2 @ 33.6	No. 34041 14 @ 38.5	No. 34046 16 @ 42.7	No. 34051 18 @ 50.3	No. 34056 20 @ 55.0	No. 34061 22-1/2 @ 61.4	No.34066 25 @ 67.8
12	23,715 T	28,199 T					
13	21,859 T	25,993 T					
14	20,265 T	24,099 T					
15	18,881 T	22,455 T	27,396 T				
16	17,669 T	21,015 T	25,642 T				
17	16,597 T	19,741 T	24,092 T				
18	15,642 T	18,607 T	22,712 T	28,393 T			
19	14,022 C	17,590 T	21,475 T	26,850 T			
20	12,607 C	16,673 T	20,360 T	25,458 T	30,080 T		
21	11,387 C	15,842 T	19,349 T	24,197 T	28,594 T		
22	10,327 C	15,084 T	18,427 T	23,048 T	27,240 T	32,990 T	
23	9,401 C	13,922 D	17,584 T	21,996 T	26,002 T	31,495 T	
24	8,585 C	12,730 D	16,513 C	20,725 C	24,865 T	30,123 T	
25	7,864 C	11,677 D	15,157 C	19,028 C	23,084 C	28,858 T	34,333 T
26	7,222 C	10,740 D	13,952 C	17,520 C	21,263 C	27,400 C	32,946 T
27	6,648 C	9,904 D	12,876 C	16,173 C	19,638 C	25,319 C	31,659 T
28	6,133 C	9,153 D	11,911 C	14,966 C	18,181 C	23,454 C	29,368 C
29	5,669 C	8,477 D	11,041 C	13,879 C	16,869 C	21,776 C	27,280 C
30	5,248 C	7,866 D	10,256 C	12,896 C	15,683 C	20,259 C	25,393 C
31	4,866 C	7,311 D	9,543 C	12,004 C	14,608 C	18,884 C	23,683 C
32	4,518 C	6,805 D	8,893 C	11,192 C	13,629 C	17,633 C	22,127 C
33	4,200 C	6,343 D	8,300 C	10,451 C	12,736 C	16,491 C	20,708 C
34	3,907 C	5,919 D	7,757 C	9,772 C	11,917 C	15,446 C	19,409 C
35	-------	5,530 D	7,258 C	9,148 C	11,166 C	14,487 C	18,217 C
36	-------	5,171 D	6,798 C	8,574 C	10,474 C	13,604 C	17,120 C
37	-------	4,839 D	6,373 C	8,043 C	9,835 C	12,789 C	16,108 C
38	-------	4,531 D	5,980 C	7,552 C	9,244 C	12,035 C	15,173 C
39	-------	-------	5,614 C	7,096 C	8,696 C	11,336 C	14,306 C
40	-------	-------	5,275 C	6,672 C	8,186 C	10,686 C	13,500 C
41	-------	-------	4,958 C	6,277 C	7,711 C	10,081 C	12,750 C
42	-------	-------	4,662 C	5,908 C	7,268 C	9,517 C	12,051 C
43	-------	-------	4,385 C	5,562 C	6,853 C	8,990 C	11,398 C
44	-------	-------	-------	5,239 C	6,464 C	8,496 C	10,786 C
45	-------	-------	-------	4,935 C	6,099 C	8,032 C	10,213 C
46	-------	-------	-------	4,649 C	5,756 C	7,597 C	9,674 C
47	-------	-------	-------	-------	5,433 C	7,187 C	9,168 C
48	-------	-------	-------	-------	5,128 C	6,800 C	8,690 C
49	-------	-------	-------	-------	4,840 C	6,435 C	8,239 C
50	-------	-------	-------	-------	4,568 C	6,090 C	7,814 C
51	-------	-------	-------	-------	4,310 C	5,764 C	7,410 C
52	-------	-------	-------	-------	4,065 C	5,454 C	7,029 C
53	-------	-------	-------	-------	3,832 C	5,160 C	6,666 C
54	-------	-------	-------	-------	3,610 C	4,880 C	6,322 C
55	-------	-------	-------	-------	-------	4,614 C	5,994 C

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TRACK RATED LOADS - BRIDGE GIRDERS

Maximum ECL at Center of Span (Pounds)					
Span (Feet)	No. 34071 27-1/2 @ 82.8	No. 34076 30 @ 92.0	No. 34077 32 @ 108.6	No. 34078 36 @ 122.1	No. 34079 40 @ 135.6
30	35,498 T				
31	33,634 C				
32	31,446 C				
33	29,449 C				
34	27,623 C				
35	25,947 C	33,693 C			
36	24,406 C	31,715 C			
37	22,985 C	29,891 C			
38	21,671 C	28,206 C			
39	20,454 C	26,645 C			
40	19,324 C	25,196 C	34,392 T		
41	18,273 C	23,849 C	33,447 T		
42	17,293 C	22,594 C	32,545 T		
43	16,378 C	21,422 C	31,683 T		
44	15,521 C	20,326 C	30,857 T		
45	14,719 C	19,300 C	30.065 T		
46	13,965 C	18,336 C	29,306 T	36,259 T	
47	13,257 C	17,431 C	28,576 T	35,369 T	
48	12,590 C	16,578 C	27,875 T	34,514 T	
49	11,961 C	15,775 C	27,161 C	33,691 T	
50	11,366 C	15,017 C	25,928 C	32,898 T	39,905 T
51	10,804 C	14,300 C	24,764 C	31,707 C	38,992 T
52	10,272 C	13,622 C	23,663 C	30,323 C	37,789 C
53	9,767 C	12,979 C	22,621 C	29,014 C	36,181 C
54	9,288 C	12,369 C	21,633 C	27,773 C	34,659 C
55	8,832 C	11,789 C	20,696 C	26,596 C	33,215 C
56	8,399 C	11,238 C	19,806 C	25,478 C	31,844 C
57	7,986 C	10,713 C	18,959 C	24,415 C	30,541 C
58	7,592 C	10,213 C	18,154 C	23,404 C	29,302 C
59	7,216 C	9,736 C	17,386 C	22,441 C	28,121 C
60	6,856 C	9,280 C	16,653 C	21,522 C	26,996 C
61	6,512 C	8,844 C	15,954 C	20,646 C	25,923 C
62	6,182 C	8,427 C	15,285 C	19,808 C	24,898 C
63	5,867 C	8,027 C	14,646 C	19,008 C	23,918 C
64	5,564 C	7,644 C	14,034 C	18,242 C	22,981 C
65	5,272 C	7,276 C	13,447 C	17,508 C	22,084 C
66	4,993 C	6,923 C	12,885 C	16,804 C	21,224 C
67	4,723 C	6,584 C	12,345 C	16,130 C	20,399 C
68	4,464 C	6,257 C	11,826 C	15,482 C	19,608 C
69	4,214 C	5,943 C	11,328 C	14,859 C	18,848 C
70	3,974 C	5,640 C	10,848 C	14,260 C	18,117 C

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TRACK RATED LOADS - BRIDGE GIRDERS

Maximum ECL at Center of Span (Pounds)					
Span (Feet)	No. 34071 27-1/2 @ 82.8	No. 34076 30 @ 92.0	No. 34077 32 @ 108.6	No. 34078 36 @ 122.1	No. 34079 40 @ 135.6
71	--------	5,348 C	10,387 C	13,685 C	17,414 C
72	--------	5,066 C	9,942 C	13,130 C	16,738 C
73	--------	4,793 C	9,513 C	12,595 C	16,086 C
74	--------	4,530 C	9,099 C	12,080 C	15,459 C
75	--------	4,276 C	8,700 C	11,583 C	14,853 C
76	--------	4,029 C	8,314 C	11,103 C	14,269 C
77	--------	3,791 C	7,941 C	10,639 C	13,704 C
78	--------	3,560 C	7,580 C	10,191 C	13,159 C
79	--------	3,336 C	7,231 C	9,757 C	12,632 C
80	--------	3,118 C	6,893 C	9,337 C	12,121 C
81	--------	--------	--------	8,931 C	11,628 C
82	--------	--------	--------	8,537 C	11,150 C
83	--------	--------	--------	8,155 C	10,686 C
84	--------	--------	--------	7,784 C	10,237 C
85	--------	--------	--------	7,425 C	9,801 C
86	--------	--------	--------	7,075 C	9,378 C
87	--------	--------	--------	6,736 C	8,967 C
88	--------	--------	--------	6,406 C	8,568 C
89	--------	--------	--------	6,086 C	8,180 C
90	--------	--------	--------	5,773 C	7,803 C
91	--------	--------	--------	--------	7,436 C
92	--------	--------	--------	--------	7,078 C
93	--------	--------	--------	--------	6,730 C
94	--------	--------	--------	--------	6,391 C
95	--------	--------	--------	--------	6,061 C
96	--------	--------	--------	--------	5,738 C
97	--------	--------	--------	--------	5,424 C
98	--------	--------	--------	--------	5,117 C
99	--------	--------	--------	--------	4,817 C
100	--------	--------	--------	--------	4,525 C

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RECOMMENDED SUSPENSION FITTINGS

The table lists the recommended suspension fittings. Track couplings and top splice plates for various combinations of hanger rod loads (HRL) and track size. The more common upper fittings are listed; consult factory for recommendations if these are not suitable for an application.

Consult factory for recommendations when track size is larger than No. 34066 (25 in.).

Hanger Rod Load (HRL)	Hanger Rod		Track Size	Track Coupling	Top Splice Plate	Track Fitting	Upper Fitting
	No.	Size					
8,500 lbs. or less	1	3/4 in. diameter (340108)	34011 34016 34021, 34026, 34031 34037, 34041, 34046	340130 340130 340131 340132	340112 340113 340113 340113	340110 340111 340111 340111	340101 340102 340103 or 340104
17,000 lbs. or less	2	3/4 in. diameter (340108)	34021, 34026, 34031 34037, 34041, 34046 34051, 34056, 34061, 34066	340131 340132 340133	*	340111	340105 340106 or 340107
20,000 lbs. or less	1	1-1/8 in. diameter (340121)	34021, 34026, 34031 34037, 34041, 34046 34051, 34056, 34061, 34066	340131 340132 340133	340124	340123	340116 or 340117
40,000 lbs. or less	2	1-1/8 in. diameter (340121)	34037, 34041, 34046 34051, 34056, 34061, 34066	340132 340133	**	340123	340118 340119 or 340120
64,000 lbs. or less	2	1-1/2 in. diameter		Consult Factory			
80,000 lbs. or less	2	1-3/4 in. diameter		Consult Factory			

*USE: 340113 when rod centers are 7 in.
340114 when rod centers are more than 7 in. but less than 12 in.
340115 when rod centers are 12 in. or more

**USE: 340124 when rod centers are 7 in.
340125 when rod centers are more than 7 in. but less than 12 in.
340126 when rod centers are 12 in. or more

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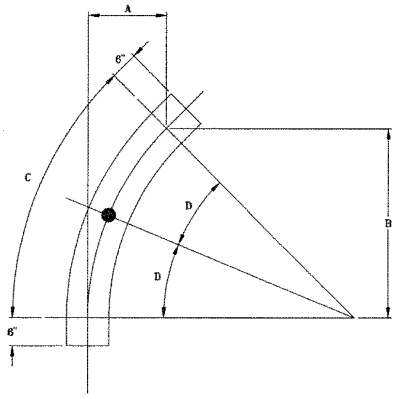
TRAMBEAM CURVES

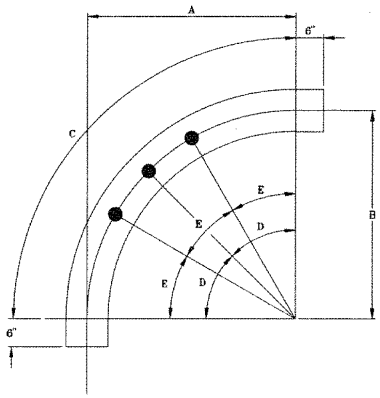
Curves for monorail systems are made from four sizes of track: Nos. 34011 (8 in.), 34016 (8-1/2 in.), 34021 (10 in.) and 34038 (12-1/2 in.). They are manufactured with 3 ft.-6 in. minimum radius for No. 34011 track and 4 ft.-0 in. minimum radius for Nos. 34016, 34021 and 34038 tracks. The tables indicate the standard radii and degree of curvature. Curves with special radii and degree of curvature and reverse curves are also available.

Dimensions and recommended hanger rod spacings are indicated in the tables for 45, 60 and 90 degree curves. Consult factory for dimensions and rod spacings for curve radii and degree of curvature not shown.

Curves are furnished with 6 in. overhangs as standard. Shorter overhangs can be furnished. Longer overhangs can be furnished but should be held to a minimum due to difficulties in handling and shipping. Curves can be furnished with switch preparations at one or both ends as required.

No. 34011 curves have 340500 series numbers; No. 34016 curves have 340800 series numbers; No. 34021 curves have 340600 series numbers; and No. 34038 curves have 340700 series numbers. The tables indicate item numbers for No. 34011 curves. To determine the item number for Nos. 34016, 34021 or 34038 curves, use the appropriate series number, and the last two digits from the item number, i.e., the item number for a 6 ft.-0 in. radius, 90 degree No. 34038 curve is 340706.





45 Degree Curve						
Radius	Item Number	A	B	C	D	E
3'-6	340522	1'-0-5/16	2'-5-11/16	2'-9	22-1/2 Deg.	-
4'-0	340523	1'-2-1/16	2'-9-15/16	3'-1-11/16	22-1/2 Deg.	-
6'-0	340526	1'-9-1/16	4'-2-15/16	4'-8-9/16	22-1/2 Deg.	-
8'-0	340527	2'-4-1/8	5'-7-7/8	6'-3-3/8	22-1/2 Deg.	-
10'-0	340528	2'-11-1/8	7'-0-7/8	7'-10-1/4	22-1/2 Deg.	-
60 Degree Curve						
Radius	Item Number	A	B	C	D	E
3'-6	340512	1'-9	3'-0-3/8	3'-8	30 Deg.	-
4'-0	340513	2'-0	3'-5-9/16	4'-2-1/4	30 Deg.	-
6'-0	340516	3'-0	5'-2-3/8	6'-3-3/8	30 Deg.	-
8'-0	340517	4'-0	6'-11-1/8	8'-4-1/2	30 Deg.	-
10'-0	340518	5'-0	8'-7-15/16	10'-5-11/16	30 Deg.	-
90 Degree Curve						
Radius	Item Number	A	B	C	D	E
3'-6	340502	3'-6	3'-6	5'-6	45 Deg.	-
4'-0	340503	4'-0	4'-0	6'-3-3/8	45 Deg.	-
6'-0	340506	6'-0	6'-0	9'-5-1/8	45 Deg.	-
8'-0	340507	8'-0	8'-0	12'-6-13/16	-	30 Deg.
10'-0	340508	10'-0	10'-0	15'-8-1/2	-	30 Deg.

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GIMBAL SUSPENSION SYSTEM

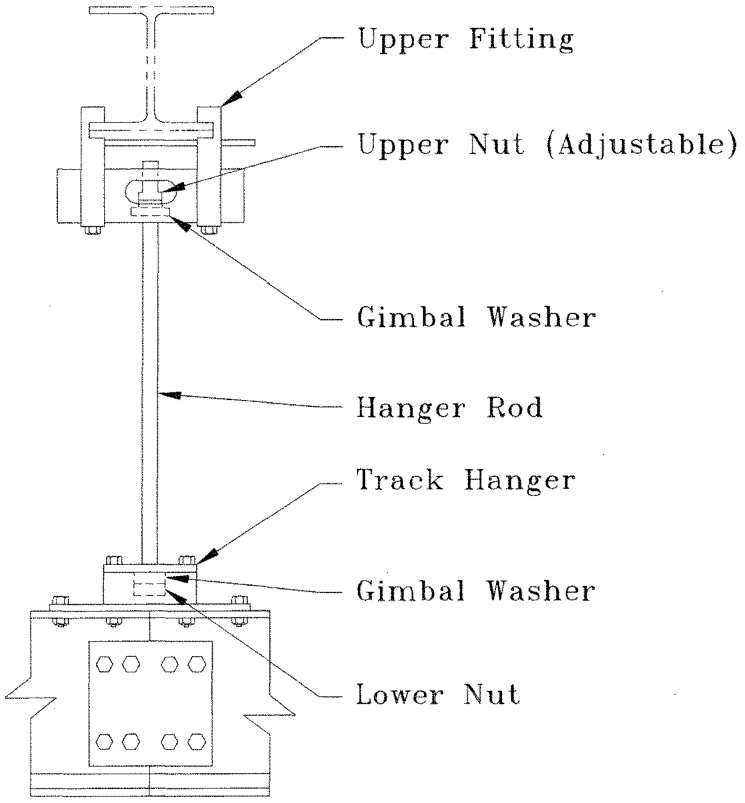
The gimbal suspension system uses multiplane washers at each end of the hanger rod to provide a gimbal assembly. The tapered planes on the top surface of the washers are positioned at right angles to the tapered planes on the bottom surface. This allows free rod movement of 6 degrees in any direction.

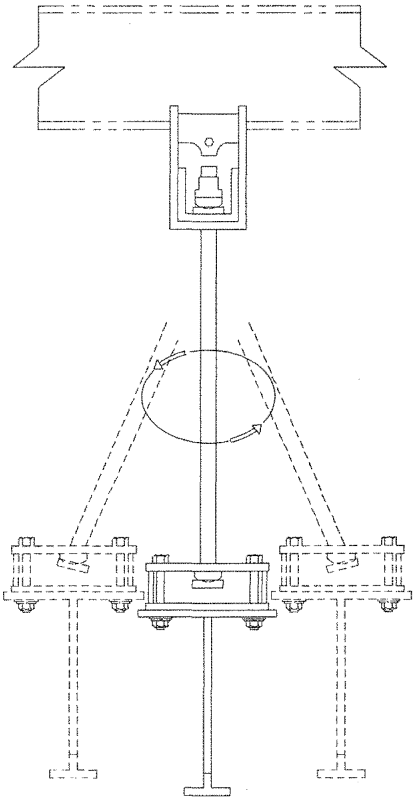
Two sizes of rods are available - 3/4 inch diameter rated at 8,500 pounds per rod and 1-1/8 inch diameter rated at 20,000 pounds per rod. Single and double rod suspensions are used for hanger rod loads up to 40,000 pounds.

The suspension system components consist of:

- UPPER FITTING with hardened bearing washer.
- ADJUSTABLE UPPER NUT secured by set screw.
- GIMBAL WASHERS at each end of the rod.
- HANGER ROD of high strength steel with lower nut factory assembled to the rod by a roll pin.
- TRACK HANGER.

Detailed information on the components and methods for determining rod lengths and centers are on subsequent pages.





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BUSHING SUSPENSION SYSTEM

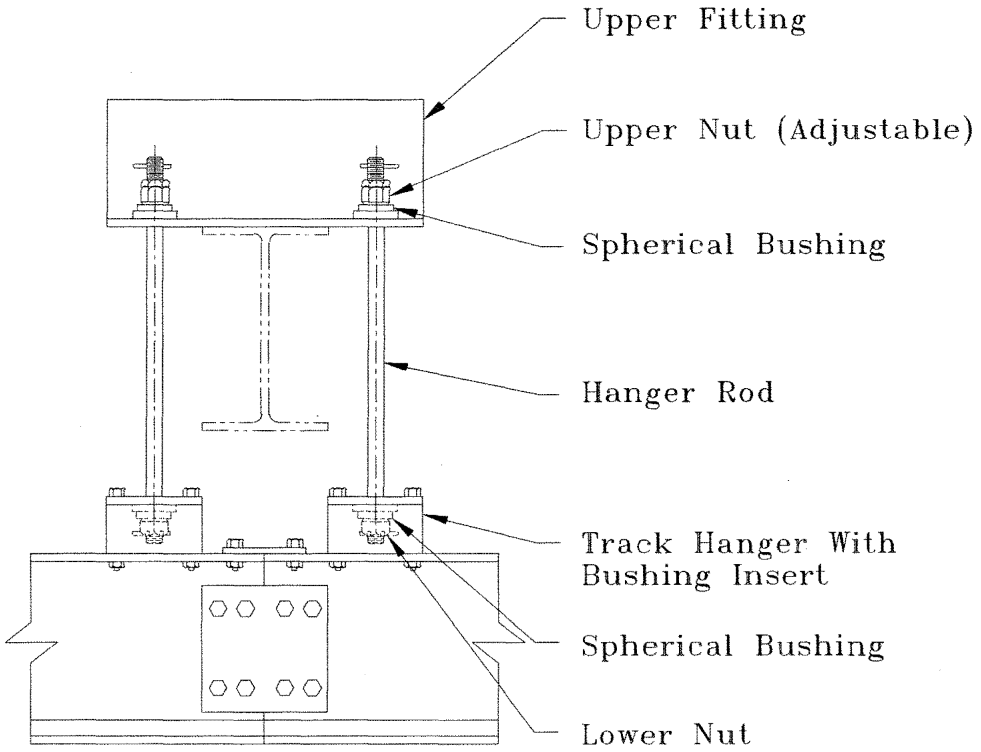
The bushing suspension system uses spherical thrust bushings at each end of the hanger rod. The bushings have a spherical ball and socket configuration and allow free rod movement of 6 degrees in any direction. The bushings are ground, hardened and coated with a dry film lubricant.

Two sizes of rods are available - 1-1/2 inch diameter rated at 32,000 pounds per rod and 1-3/4 inch diameter rated at 40,000 pounds per rod. Single and double rod suspensions are used for rod loads up to 80,000 pounds.

The bushing suspension system components consist of:

- UPPER FITTING with bushing insert.
- ADJUSTABLE UPPER NUT secured by jam nut.
- SPHERICAL BUSHINGS at each end of the rod.
- HANGER ROD of high strength steel with cut threads.
- TRACK HANGER with bushing insert.
- LOWER NUT field assembled to rod and secured by cotter pin.

The drawing shows a typical double rod bushing suspension assembly. Top splice plates and track couplings can be bolted to the track as shown or welded. Consult factory for detailed information on specific applications.



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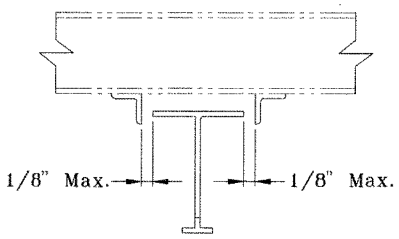
TRACK BRACING

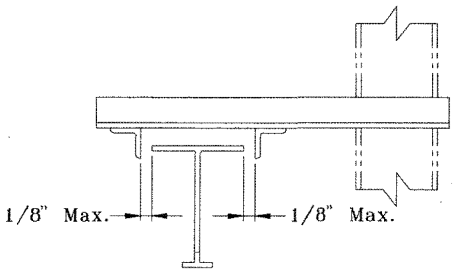
Bracing of flexibly suspended tracks is required to limit hanger rod sway. It is installed to restrict both lateral and longitudinal movement and always after the system has been aligned and leveled.

On two track runway systems, one track is laterally braced and the other is allowed to float. Both tracks are longitudinally braced. Lateral bracing is usually installed at each support point; longitudinal bracing at each end of each track. On three track runway systems, the center track is laterally braced and the outer tracks are allowed to float. All three tracks are longitudinally braced.

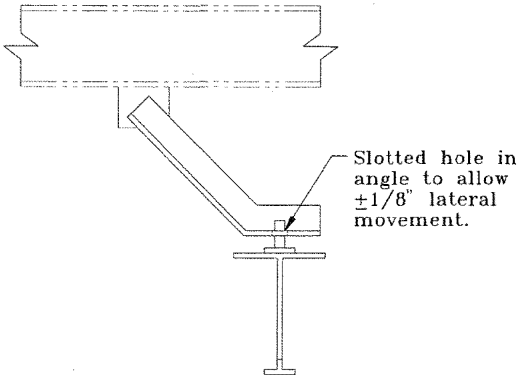
Bracing is designed and installed to limit the movement of the track system. It is not designed to carry any of the load supported by the hanger rods or to restrict the normal expansion or contraction of the track system. Typical bracing arrangements are shown in the illustrations.



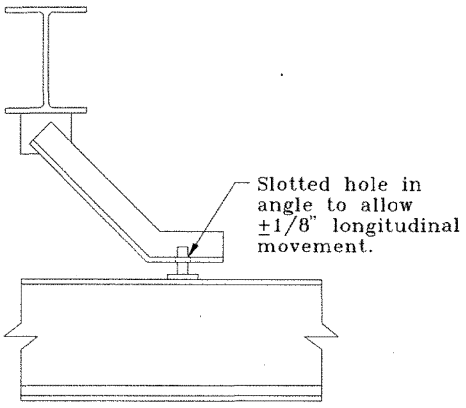
Lateral bracing using steel angles welded to the supporting structure when track is close to the structure.



Lateral bracing using steel angles bracketed from building column when track is adjacent to column.



Lateral bracing using a steel pin engaging a slotted hole in a steel angle when track is not close to the supporting structure or building column.



Longitudinal bracing using a steel pin engaging a slotted hole in a steel angle.

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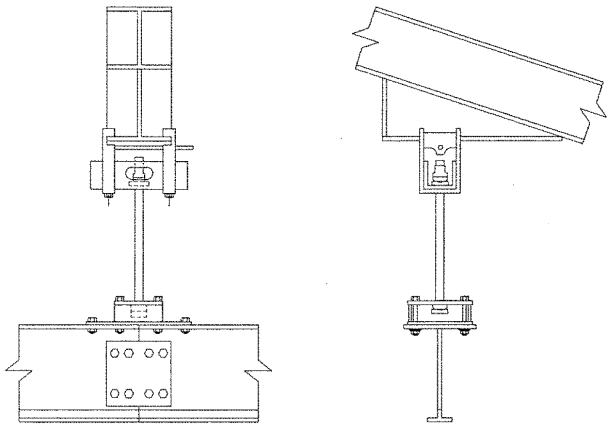
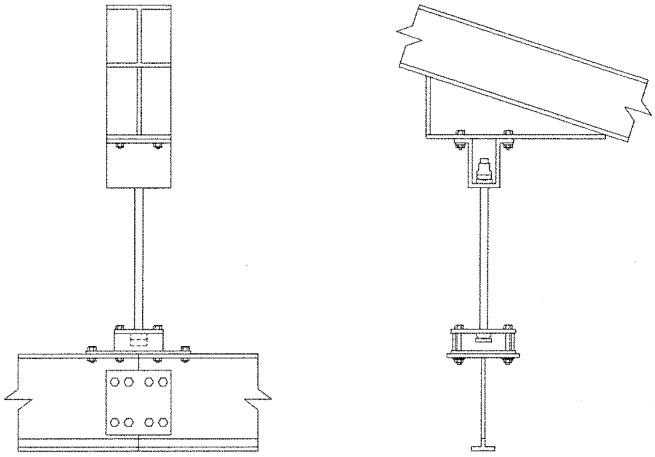
SUSPENSIONS FROM RIGID FRAME BUILDINGS

Pre-engineered, rigid frame buildings can generally be designed for the loads imposed by Trambeam crane systems. They are particularly suitable for installation of Trambeam runways because major modifications to the building are not necessary.

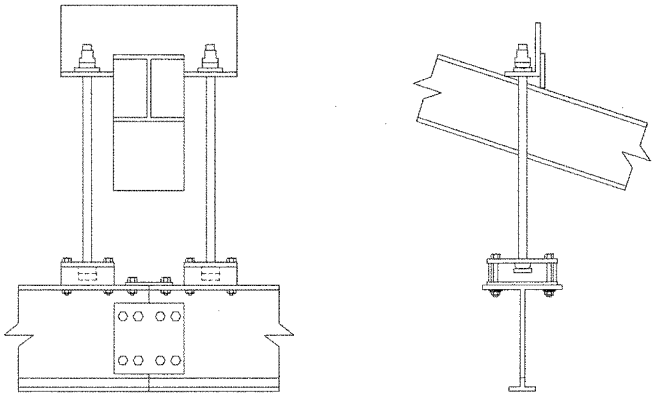
Standard upper fittings can usually be utilized for single rod suspension of the runway tracks by minor modification to the building. Double rod suspensions usually require special upper suspension fittings. Typical suspensions are shown in the illustrations.



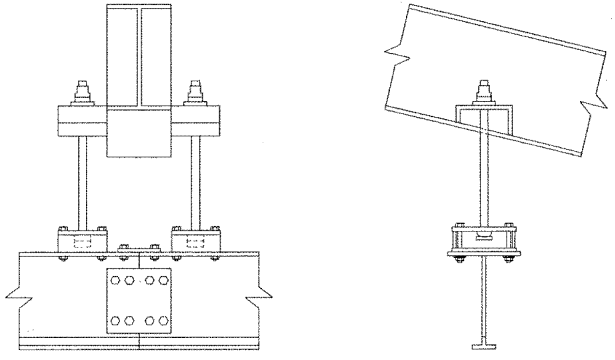
Single rod suspension using a beam clamp clamped to a horizontal bracket supplied with the rigid frame.



Single rod suspension using a beam cleat bolted to a horizontal bracket supplied with the rigid frame.



Double rod suspension using a special beam saddle welded to the top flange of the rigid frame.



Double rod suspension using a special beam saddle welded to the lower flange and web of the rigid frame.

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SINGLE 3/4" DIAMETER ROD SUSPENSIONS

Single 3/4 in. hanger rod suspension assemblies are shown in the illustrations. Dimensions for these assemblies are listed in the table. Hanger rod lengths and clearance dimensions for the track system can be readily determined from this information.

Hanger rods are stocked in lengths of 6 in. to 20 in. in 2 in. increments. Dimension 'B' in the table is the distance from the top of the track to the supporting structure with 6 in., 8 in., 10 in. and 12 in. long rods. Dimension 'B' for stock rods not listed can be determined by adjusting dimension 'B' for the 12 in. rod by the difference in rod lengths. On applications where dimension 'B' is specified and is between the values listed in the table, the variation can be taken care of in the track adjustment or special length rods can be furnished.

Dimension 'B' for the 6 in. long rod is the minimum. Double rod suspensions are used where dimension 'B' must be less than that listed.

FIGURE NO.1

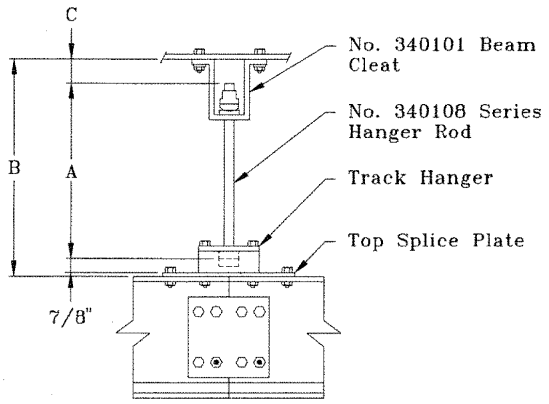
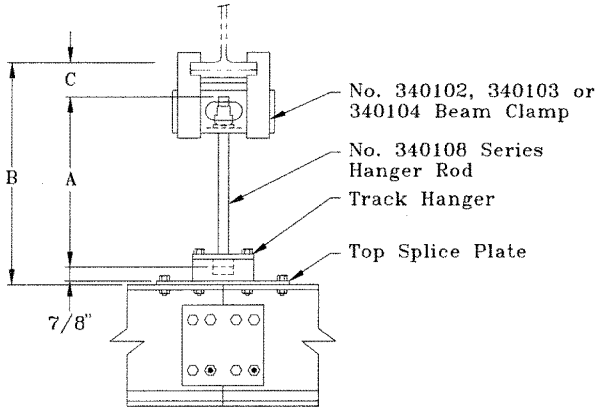


FIGURE NO.2



Track Size	Fig. No.	Upper Fitting	Track Hanger	Top Splice Plate	A	B Without Top Splice Plate	B With Top Splice Plate	C	Track Adjustment Total	Up	Down
34011 (8) Only	1	340101	340110	340112	6	8-1/8	8-3/8	1-1/4	2-1/8	3/4	1-3/8
					8	10-1/4	10-1/2	1-3/8	2-1/2	1-1/4	1-1/4
					10	12-1/4	12-1/2				
					12	14-1/4	14-1/2				
	2	340102 340103 or 349104	340110	340112	6	10-1/4	10-1/2	3-3/8	1-1/2	3/4	3/4
					8	11-3/4	12	2-7/8	2-3/8	1-1/8	1-1/4
					10	13-3/4	14				
					12	15-3/4	16				
34016 (8-1/2) and Larger	1	340101	340111	340113	6	8-1/8	8-1/2	1-1/4	2-1/8	3/4	1-3/8
					8	10-1/4	10-5/8	1-3/8	2-1/2	1-1/4	1-1/4
					10	12-1/4	12-5/8				
					12	14-1/4	14-5/8				
	2	340102 340103 or 340104	340111	340113	6	10-1/4	10-5/8	3-3/8	1-1/2	3/4	3/4
					8	11-3/4	12-1/8	2-7/8	2-3/8	1-1/8	1-1/4
					10	13-3/4	14-1/8				
					12	15-3/4	16-1/8				

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SINGLE 1-1/8" DIAMETER ROD SUSPENSIONS

Single 1-1/8 in. hanger rod suspension assemblies are shown in the illustrations. Dimensions for these assemblies are shown in the table. Hanger rod lengths and clearance dimensions for the track system can be readily determined from this information.

Hanger rods are stocked in lengths of 6 in. to 20 in. in 2 in. increments. Dimension 'B' in the table is the distance from the top of the track to the supporting structure. It is listed for 6 in., 8 in., 10 in. and 12 in. long rods for No. 340116 beam cleat and for 8 in., 10 in. and 12 in. long rods for No. 340117 beam clamp. The 6 in. rod cannot be used with the No. 340117 clamp. Dimension 'B' for stock rods not listed can be determined by adjusting dimension 'B' for the 12 in. rod by the difference in rod lengths. On applications where dimension 'B' is specified and is between the values listed in the table, the variation may be taken care of in the track adjustment or special length rods can furnished.

Dimension 'B' for the 6 in. long rod with No. 340116 cleat and the 8 in. long rod with No. 340117 clamp are minimums. Double rod suspensions are used where dimension 'B' must be less than that listed.

FIGURE NO.1

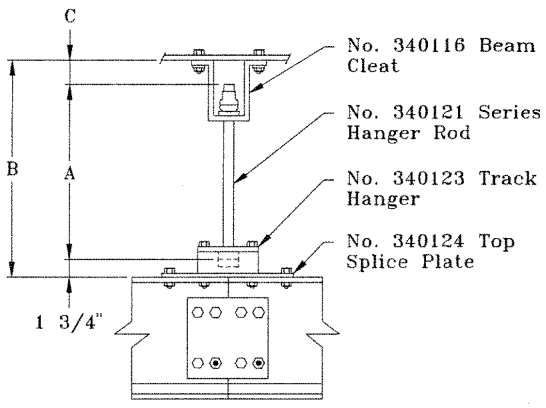

FIGURE NO.2

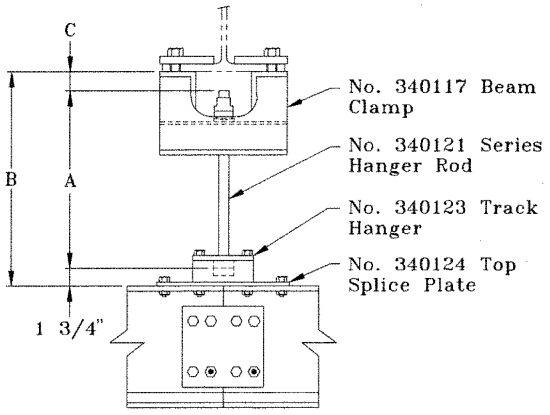

Figure Number	Upper Fitting	Track Hanger	A	B		C	Track Adjustment		
				Without Top Splice Plate	With Top Splice Plate		Total	Up	Down
1	340116	340123	6	9-3/8	9-7/8	2-1/8	1	1/2	1/2
			8	10-5/8	11-1/8	1-3/8	2-1/2	1-1/4	1-1/4
			10	12-5/8	13-1/8				
			12	14-5/8	15-1/8				
2	340117	340123	8	10-1/2	11	1-1/4	2-1/4	1-1/8	1-1/8
			10	12-1/2	13				
			12	14-1/2	15				

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DOUBLE 3/4" DIAMETER ROD SUSPENSIONS

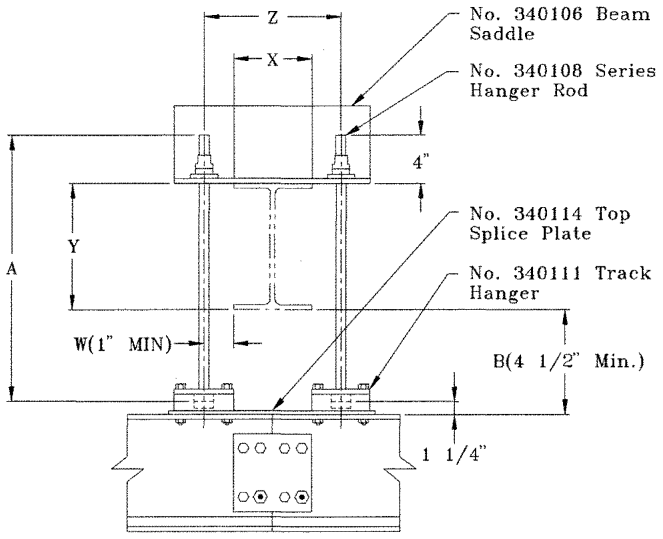
Double 3/4 in. hanger rod suspension assemblies are shown on this page and Page TT-25. Methods for determining hanger rod centers and lengths are provided for all of the cataloged upper fittings.

The dimensions from the support structure to the top of the track and to the top of the rod allow for a total track adjustment of 3 in. - 1-1/2 in. up and 1-1/2 in. down.

Hanger rods are stocked in lengths of 6 in. to 20 in. in 2 in. increments. The calculated rod length will seldom be a stock length. However, the length generally can be increased to a stock length because 8 in. and longer rods have 6 in. of thread. Using a stock rod will increase the down track adjustment by the difference in the calculated and stock rod lengths.

Many times the hanger rod centers will calculate to a fraction of an inch. When this occurs, increase rod centers to the next larger 1/2 in. increment to simplify track detailing and fabrication, i.e., 10-1/8 in. calculated rod centers are increased to 10-1/2 in.

Top splice plates are used at all track splices. No. 340113 plates are used for 7 in. rod centers. No. 340114 plates are used for rod centers greater than 7 in. and less than 12 in. No. 340115 plates are used for rod centers of 12 in. or more.



TO DETERMINE ROD CENTERS (Z):

(1) Determine dimension W
W = 3/8" + 1/16" per inch of Y
(2) Determine rod centers Z
Z = X + 2W

TO DETERMINE ROD LENGTH (A):

A = Y + B + 2-3/4"

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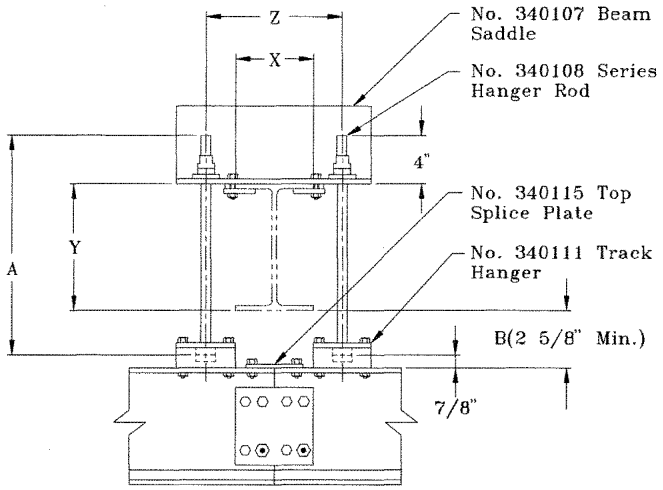
DOUBLE 3/4" DIAMETER ROD SUSPENSIONS

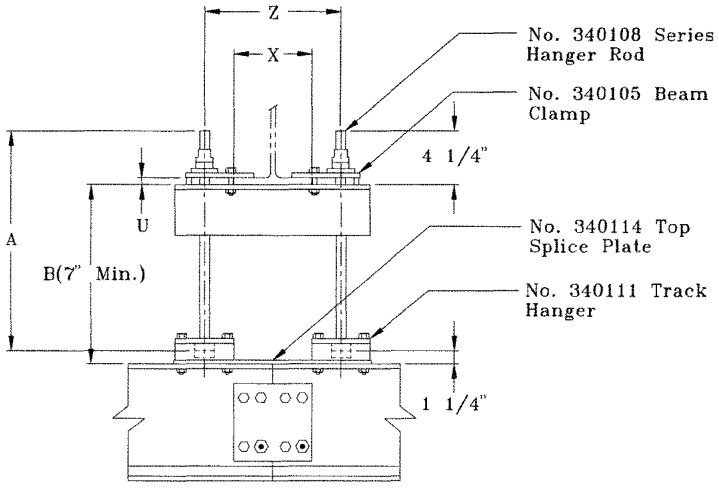


TO DETERMINE ROD CENTERS (Z):

Z = X + 7"

TO DETERMINE ROD LENGTH (A):

A = Y + B + 3-1/8"



TO DETERMINE ROD CENTERS (Z):

Z = X + 2-1/2"

TO DETERMINE ROD LENGTH (A):

A = U + B + 3"

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DOUBLE 1-1/8" DIAMETER ROD SUSPENSIONS

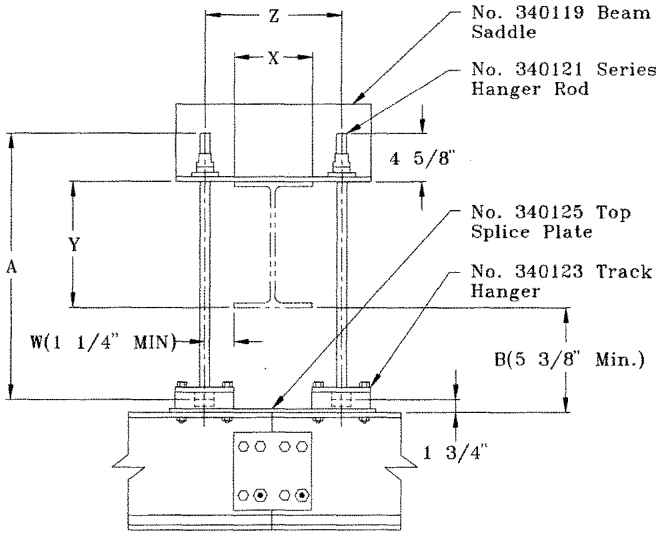
Double 1-1/8 in. hanger rod suspension assemblies are shown on this page and Page TT-27. Methods for determining rod centers and lengths are provided for all of the cataloged upper fittings.

The dimensions from the support structure to the top of the track and to the top of the rod allow for a total track adjustment of 3 in. - 1-1/2 in. up and 1-1/2 in. down.

Hanger rods are stocked in lengths of 6 in. to 20 in. in 2 in. increments. The calculated hanger rod length will seldom be a stock length. However, the length generally can be increased to a stock length because 8 in. and longer rods have 6 in. of thread. Using a stock rod will increase the down track adjustment by the difference in the calculated and stock rod lengths.

Many times the hanger rod centers will calculate to a fraction of an inch. When this occurs, increase rod centers to next larger 1/2 in. increment to simplify track detailing and fabrication, i.e., 10-1/8 in. rod centers are increased to 10-1/2 in.

Top splice plates are used at all track splices. No. 340124 plates are used for 7 in. rod centers. No. 340125 plates are used for rod centers greater than 7 in. and less than 12 in. No. 340126 plates are used for rod centers of 12 in. or more.



TO DETERMINE ROD CENTERS (Z):

(1) Determine dimension W
W = 5/8" + 1/16" per inch of Y
(2) Determine rod centers Z
Z = X + 2W

TO DETERMINE ROD LENGTH (A):

A = Y + B + 2-7/8"

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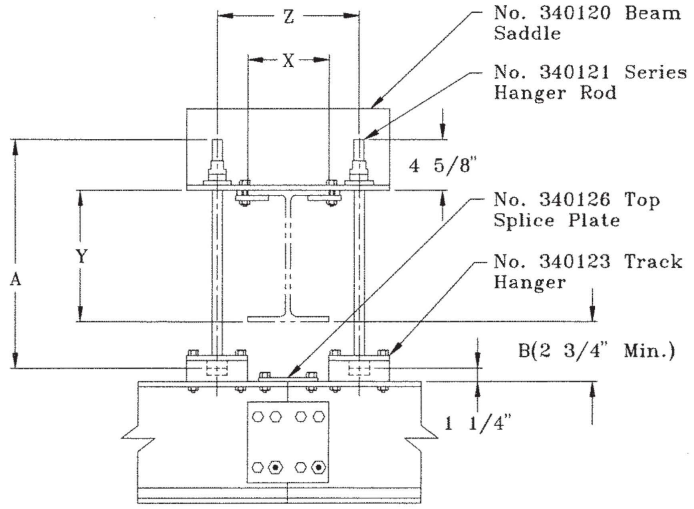
DOUBLE 1-1/8" DIAMETER ROD SUSPENSIONS

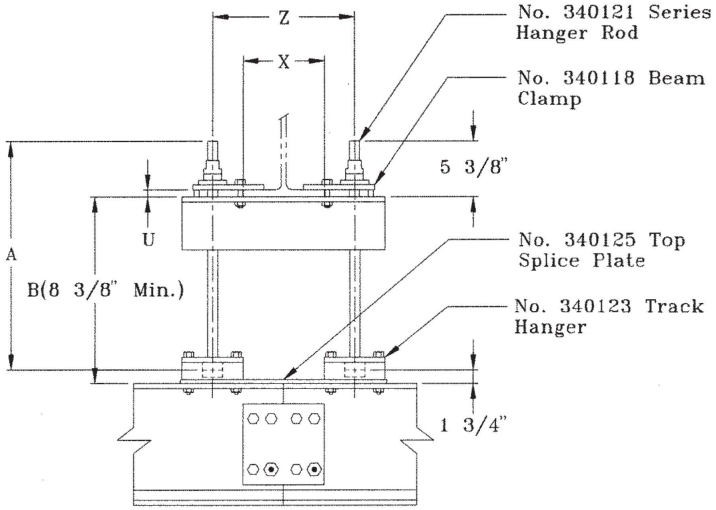


TO DETERMINE ROD CENTERS (Z):

Z = X + 7"

TO DETERMINE ROD LENGTH (A):

A = Y + B + 3-3/8"



TO DETERMINE ROD CENTERS (Z):

Z = X + 3"

TO DETERMINE ROD LENGTH (A):

A = U + B + 3-5/8"

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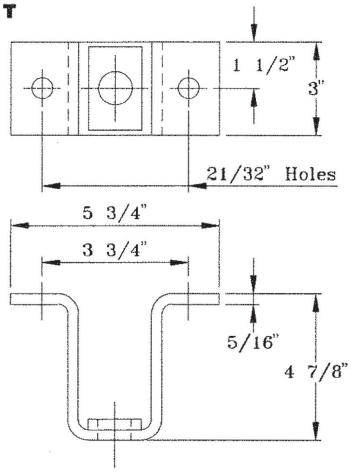
SUSPENSION FITTINGS

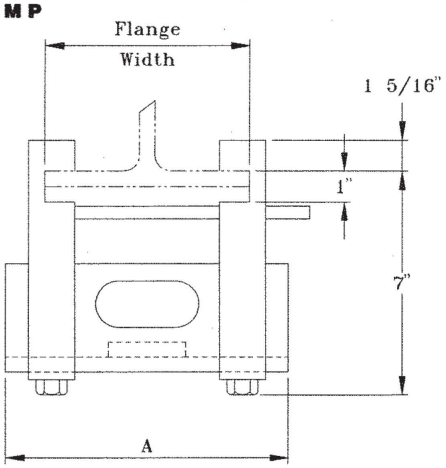
BEAM CLEAT



NO. 340101 BEAM CLEAT - 8,500 LBS. RATED LOAD

This upper fitting connects a 3/4" diameter hanger rod assembly to the support structure. Fitting includes the hardened bearing washer and two 5/8" x 2-1/2" heat treated capscrews, nuts and lock washers for bolting cleat to the support structure.

BEAM CLAMP

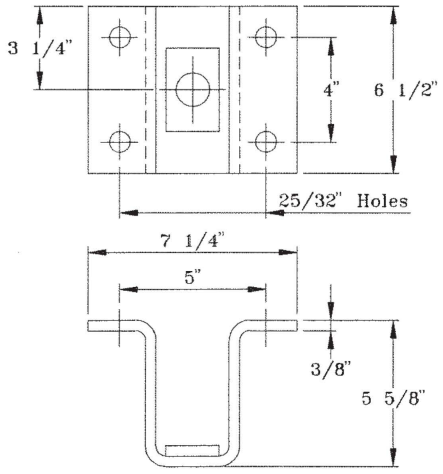


NO. 340102 BEAM CLAMP - 8,500 LBS. RATED LOAD
NO. 340103 BEAM CLAMP - 8,500 LBS. RATED LOAD
NO. 340104 BEAM CLAMP - 8,500 LBS. RATED LOAD

These upper fittings connect 3/4" diameter hanger rod assemblies to the support structure by clamping to the lower flange. Fittings include the hardened bearing washer. Clamps are adjustable for flange widths from 3-1/2" to 12-1/2" as noted in the table. Flange thickness of support structure is limited to 1" maximum. Consult factory when flange thickness exceeds 1" or flange width exceeds 12-1/2".

Clamp Cat. No.	Flange Width	A
340102	9,292 C	9-1/2"
340103	7,320 C	12-1/2"
340104	5,908 C	15"

BEAM CLEAT



NO. 340116 BEAM CLEAT - 20,000 LBS. RATED LOAD

This upper fitting connects a 1-1/8" diameter hanger rod assembly to the support structure. Fitting includes the hardened bearing washer and four 3/4" x 2-1/2" heat treated capscrews, nuts and lock washers for bolting cleat to the support structure.

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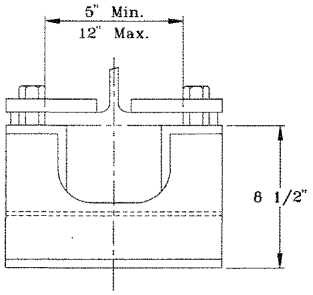
SUSPENSION FITTINGS

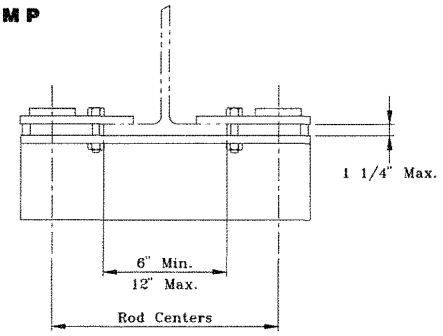
BEAM CLAMP



NO. 340117 BEAM CLAMP - 20,000 LBS. RATED LOAD

This upper fitting connects a 1-1/8" diameter hanger rod assembly to the support structure by clamping to the lower flange. Fitting includes the hardened bearing washer and attaching hardware. Flange width of support structure is limited to 5" minimum and 12" maximum.

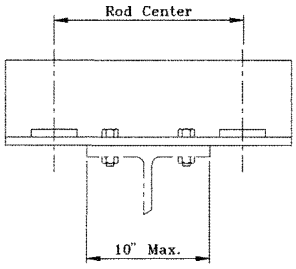
BEAM CLAMP



NO. 340105 BEAM CLAMP - 17,000 LBS. RATED LOAD
NO. 340118 BEAM CLAMP - 40,000 LBS. RATED LOAD

These upper fittings connect double hanger rod assemblies to the support structure. Fittings include hardened bearing washers and hardware for clamping fitting to the lower flange of the support structure. Hanger rod centers are determined from data on Page TT-25 for the No. 340105 clamp and Page TT-27 for the No. 340118 clamp.

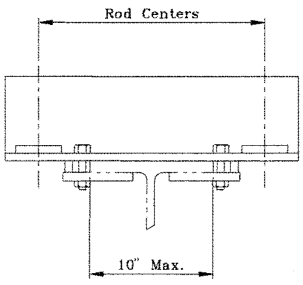
BEAM SADDLE



NO. 340106 BEAM SADDLE - 17,000 LBS. RATED LOAD
NO. 340119 BEAM SADDLE - 40,000 LBS. RATED LOAD

These upper fittings connect double hanger rod assemblies to the support structure. Fittings include hardened bearing washers and hardware for bolting fitting to the lower flange of the support structure. Hanger rod centers are determined from data on Page TT-24 for the No. 340106 saddle and Page TT-26 for the No. 340119 saddle.

BEAM SADDLE



NO. 340107 BEAM SADDLE - 17,000 LBS. RATED LOAD
NO. 340120 BEAM SADDLE - 40,000 LBS. RATED LOAD

These upper fittings connect double hanger rod assemblies to the support structure. Fittings include hardened bearing washers and hardware for clamping fitting to the lower flange of the support structure. Hanger rod centers are determined from data on Page TT-25 for the No. 340107 saddle and Page TT-27 for the No. 340120 saddle.

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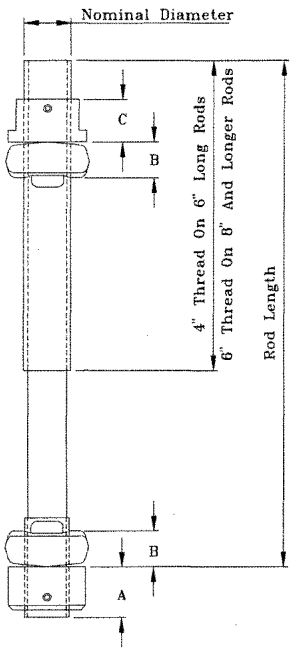
SUSPENSION FITTINGS

HANGER ROD



NO. 340108 3/4" DIAMETER HANGER ROD - 8,500 LBS. RATED LOAD
NO. 340121 1-1/8" DIAMETER HANGER ROD - 20,000 LBS. RATED LOAD

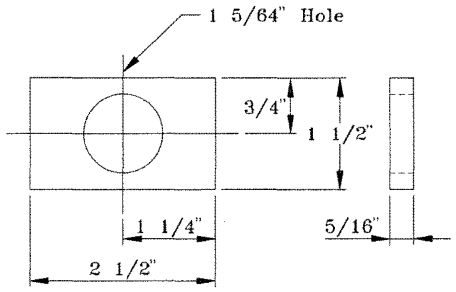
The hanger rod assembly consists of a high strength steel rod, an adjustable upper nut secured by a set screw, two gimbal washers and a lower nut factory assembled to the rod by a roll pin. The upper nut and gimbal washers are packaged separately as a kit. Rods are stocked in lengths of 6" to 20" in 2" increments. Longer rods up to 238" are available.

Rods have rolled, unified national threads. The 6" long rods have 4" thread lengths; rods 8" and longer have 6" thread lengths. The threads are protected for shipment by a plastic coating.

The hanger rod item number consists of the series number (340108 or 340121) and a suffix number indicating rod length, i.e., a 3/4" diameter rod 10" long is designated No. 340108010.

Nominal Diameter	Hanger Rod Cat. No.	Hanger Rod Kit Cat. No.	A	B	C
3/4"	340108	340109	13/16"	5/8"	3/4"
1-1/8"	340121	340122	1-1/8"	7/8"	1-1/8"

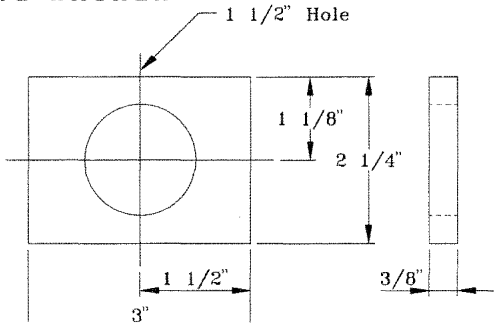
BEARING WASHER



NO. 3401011 BEARING WASHER

Bearing washers provide the hardened seat for gimbal washers when 3/4" diameter hanger rods are suspended directly through holes in the building structure. Holes in the building structure are 1-5/64" diameter. Bearing washers are always welded to the building structure; washer must be flat after welding and holes in the washer and structure concentric.

BEARING WASHER



NO. 3401015 BEARING WASHER

Bearing washers provide the hardened seat for gimbal washers when 1-1/8" diameter hanger rods are suspended directly through holes in the building structure. Holes in the building structure are 1-1/2" diameter. Bearing washers are always welded to the building structure; washer must be flat after welding and holes in the washer and structure concentric.

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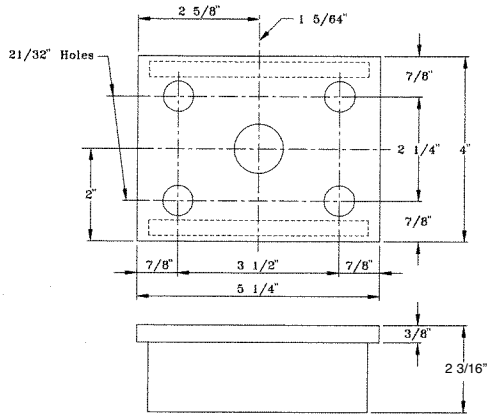
SUSPENSION FITTINGS

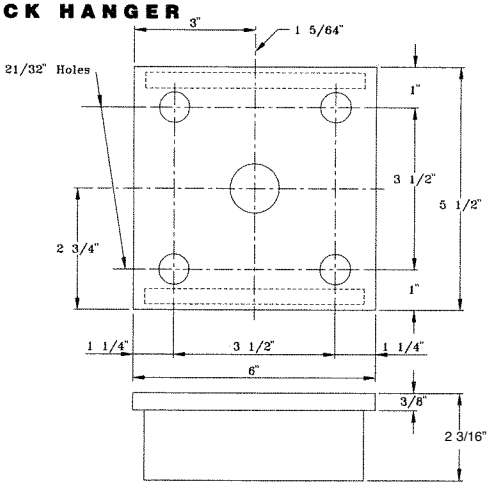
TRACK HANGER



NO. 340110 TRACK HANGER - 8,500 LBS. RATED LOAD

This fitting connects a 3/4" diameter hanger rod assembly to No. 34011 (8") track. Top plate of fitting is high carbon steel and provides a hardened bearing surface for the gimbal washer. Four 5/8" x 3-1/2" heat treated cap-screws, nuts, cut washers and lock washers are furnished for bolting the hanger to the track.

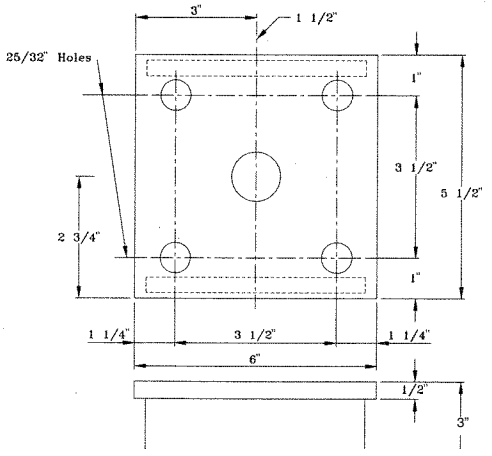
TRACK HANGER



NO. 340111 TRACK HANGER - 8,500 LBS. RATED LOAD

This fitting connects a 3/4" diameter hanger rod assembly to all sizes of track except No. 34011 (8"). Top plate of fitting is high carbon steel and provides a hardened bearing surface for the gimbal washer. Four 5/8" x 4" heat treated capscrews, nuts, cut washers and lock washers are furnished for bolting the hanger to the track.

TRACK HANGER



NO. 340123 TRACK HANGER - 20,000 LBS. RATED LOAD

This fitting connects a 1-1/8" diameter hanger rod assembly to all sizes of track except No. 34011 (8"). Top plate of fitting is high carbon steel and provides a hardened bearing surface for the gimbal washer. Four 3/4" x 5" heat treated capscrews, nuts, cut washers and lock washers are furnished for bolting hanger to the track.

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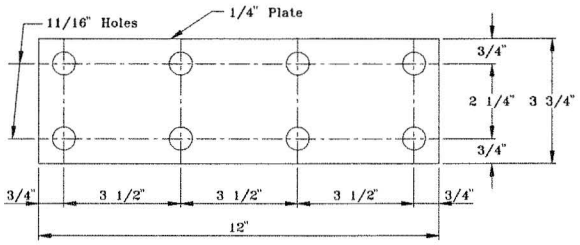
TOP SPLICE PLATES

Top splice plates stiffen the top flange of the track at splices. Bolted or welded splice plates can be furnished; however, they are generally bolted to the top flanges.

Dimensions and application of the bolted top splice plates are indicated below. Plates are bolted to the top flanges using the hardware furnished with track hangers; additional hardware, if required to complete the splice, is furnished with the plates.

Consult factory for recommendations on welded top splice plates.

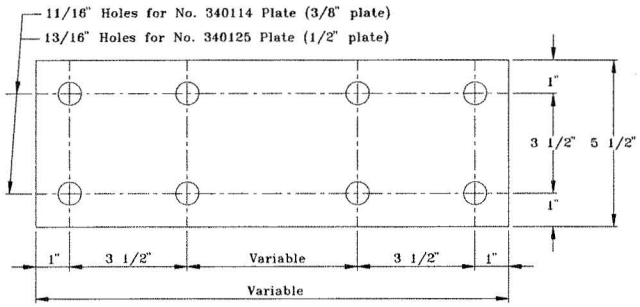
TOP SPLICE PLATE



No. 340112 3/4" ROD SUSPENSIONS

Use on No. 34011 (8") track only and for single rod suspensions.

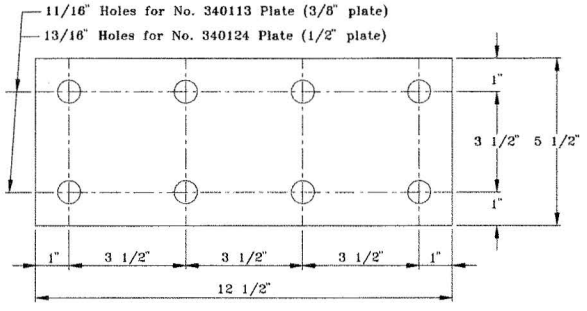
TOP SPLICE PLATE



NO. 340114 3/4" ROD SUSPENSIONS
NO. 340125 1-1/8" ROD SUSPENSIONS

Use on all track sizes except No. 34011 (8") and for double rod suspensions with rod centers greater than 7" and less than 12".

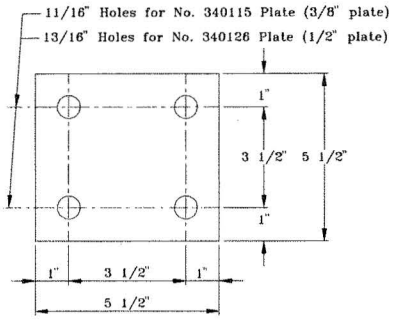
TOP SPLICE PLATE



NO. 340113 3/4" ROD SUSPENSIONS
NO. 340124 1-1/8" ROD SUSPENSIONS

Use on all track sizes except No. 34011 (8") and for single rod suspensions or double rod suspensions with rods on 7" centers.

TOP SPLICE PLATE



NO. 340115 3/4" ROD SUSPENSIONS
NO. 340126 1-1/8" ROD SUSPENSIONS

Use on all track sizes except No. 34011 (8") and for double rod suspensions with rod centers 12" or greater.

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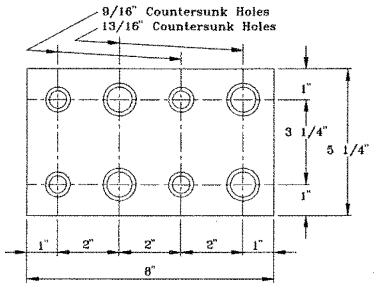
TRACK COUPLINGS

Track couplings maintain web and rail alignment at track splices. Bolted or welded couplings can be furnished. Bolted couplings provide flexibility to meet facility changes. Welded couplings are generally used on systems with high service factors.

Bolted couplings are stocked in four sizes for use with track sizes through No. 34066 (25 in.). Special socket head screws and flat head nuts are used near the rail for wheel clearance. Screws have a nylon insert to secure the nut. Standard bolts, nuts and lock washers are used in the area above the wheels. Two 3/16 in. thick plates are furnished for each coupling.

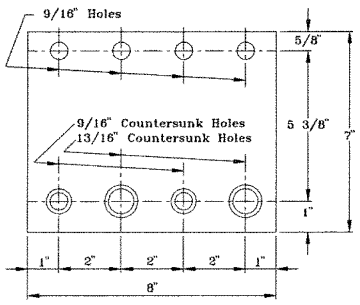
Welded couplings are made to order for each installation. Holes are provided for make-up bolts to help in aligning and leveling the tracks. Couplings are welded after tracks are aligned; make-up bolts are removed after welding. Two 3/16 in. thick plates are furnished for each coupling.

340130 TRACK COUPLING



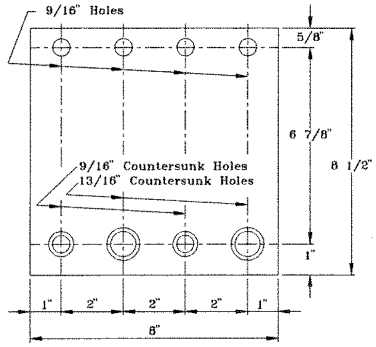
Use for coupling Nos. 34011 (8") and 34016 (8-1/2").

340131 TRACK COUPLING



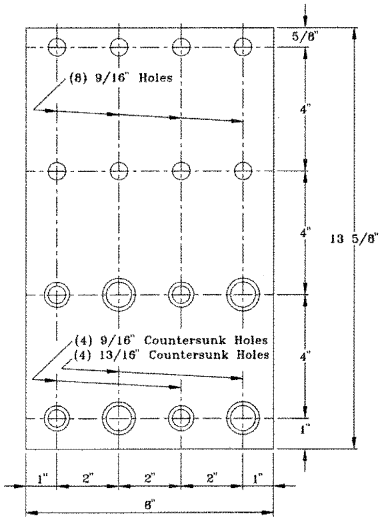
Use for coupling Nos. 34021 (10"), 34026 (11-1/2") and 34031 (13").

340132 TRACK COUPLING



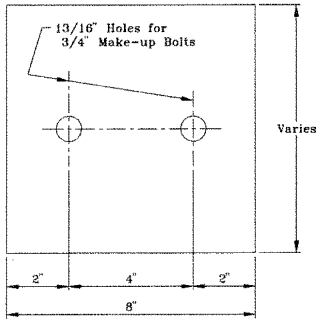
Use for coupling Nos. 34037 (12-1/2"), 34041 (14") and 34046 (16").

340133 TRACK COUPLING



Use for coupling Nos. 34051 (18"), 34056 (20"), 34061 (22-1/2") and

WELDED TRACK COUPLING



Use for coupling all sizes of track.

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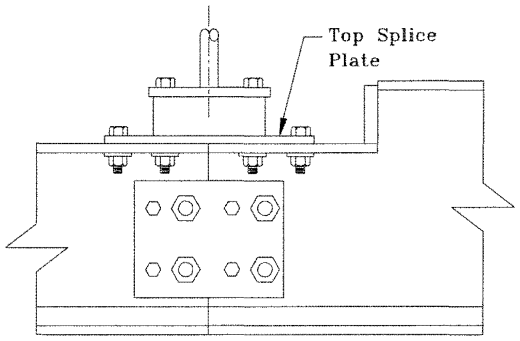
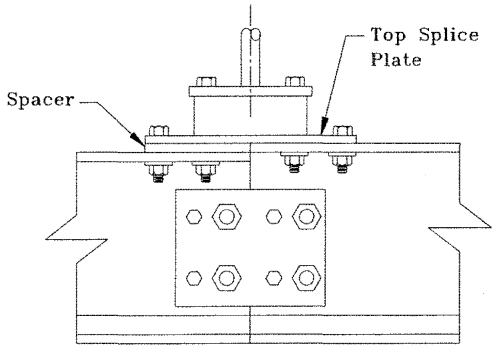
COUPLING DIFFERENT SIZE TRACKS

Different sizes of track can be used in a system. This occurs when the support track centers are not the same for the entire system. It frequently occurs in monorail systems because curves are only manufactured in four track sizes.

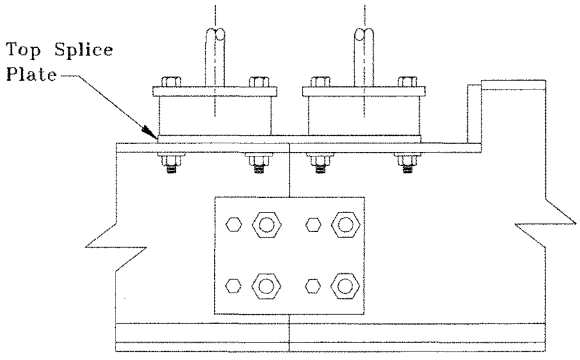
Several methods are used for coupling different size tracks: (1) the larger track can be coped to the depth of the smaller track; or (2) a spacer can be used to build up the smaller track. Typical coupling arrangements are shown in the illustrations.



Coupling arrangement with single hanger rod suspension and larger track coped to the depth of the smaller track. This arrangement is used where the difference in track depths is more than 1-1/2".



Coupling arrangement with single hanger rod suspension and smaller track spaced to the depth of the larger track. This arrangement is generally used where the difference in track depths is 1-1/2" or less.



Coupling arrangement with double hanger rod suspension and larger track coped to the depth of the smaller track. This arrangement is generally used where the difference in track depths is 4" or less; consult factory for recommendations when difference is greater than 4".

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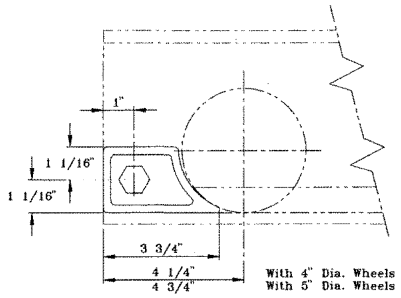
END STOPS

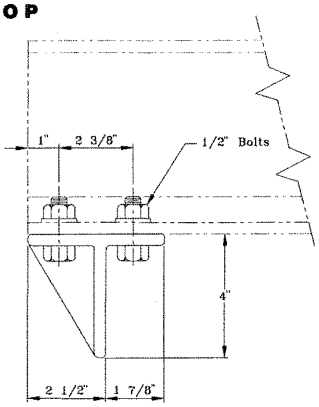
End stops are required at the ends of travel for all carriers and cranes. The cataloged stops are satisfactory for many applications. Energy absorbing stops are available for carriers and cranes rated for heavier loads and/or traveling at higher speeds and for carriers and cranes with 8 in. diameter wheels. Consult factory for recommendations on these applications.

340136 END STOP



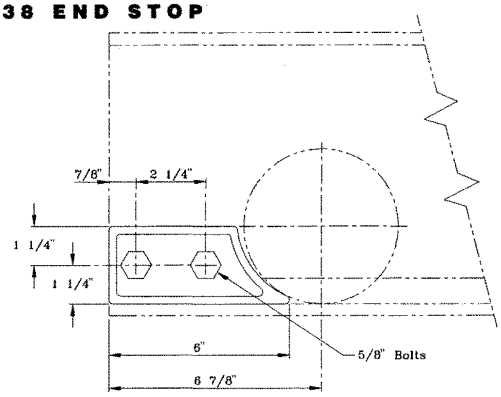
Use for hand propelled carriers and cranes with 4" or 5" diameter wheels.

340137 END STOP



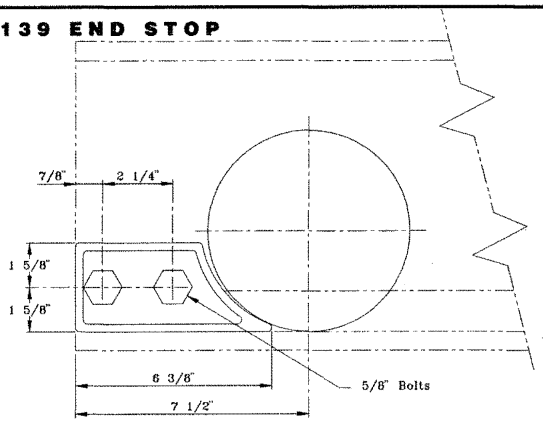
Use for hand propelled or motor driven carriers and cranes with 6-1/2" diameter wheels.

340138 END STOP



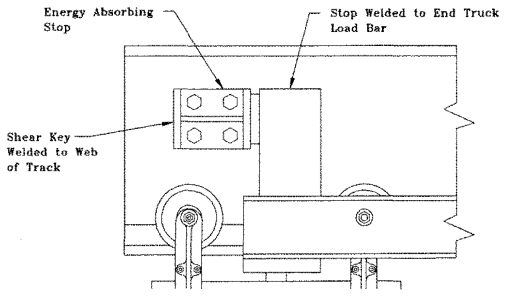
Use for hand propelled or motor driven carriers and cranes with 5" diameter wheels.

340139 END STOP



Use for hand propelled or motor driven carriers and cranes with 6-1/2" diameter wheels.

ENERGY ABSORBING STOP



The stop illustrated is one of several available. Energy is absorbed by a rubber pad bonded to the stop. Polyurethane and spring stops are also available. Consult factory for recommendations on applications requiring energy absorbing stops.

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TRAMBEAM FABRICATION

Trambeam track is generally fabricated at the factory and is ready for installation when shipped. Standard punching and drilling patterns have been established to simplify preparation of fabrication drawings.

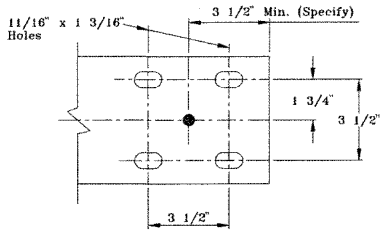
Letter designations have been assigned to the patterns and indicate the type of fabrication:

- D PATTERNS indicate top flange punchings or drillings for track hangers, guide rollers, etc.
- DC PATTERNS indicate top flange drillings for curve track suspension.
- E PATTERNS indicate end preparations for tracks and curves entering switches.
- S PATTERNS indicate end stop drillings.
- W PATTERNS indicate web punchings or drillings for track couplings, interlocks and discharge points and conductor bar supports and fabrication of web for interlocks, discharge points and conductor bar at switches.

TOP FLANGE DRILLINGS AND PUNCHING PATTERNS

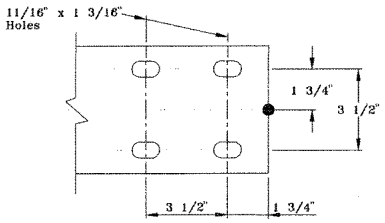
Top flange drillings and punchings are indicated by open holes. Black dots indicate the center of the hanger rod. Patterns having slotted holes will have round holes when applied to curves. Patterns for track hangers are dimensioned to the center of the hanger rod and from one end using an end with a coupling preparation as the starting point.

D-101



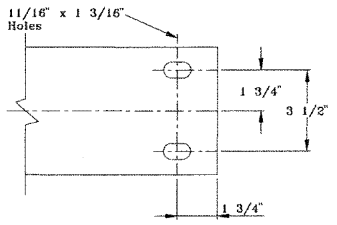
The D-101 pattern is for the No. 340111 track hanger and No. 340114 top splice plate. It is used at end or intermediate support points for single 3/4" rod suspensions and at all support points for double 3/4" rod suspensions with rod centers greater than 7" and less than 12".

D-102



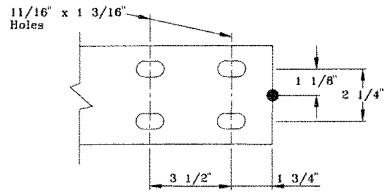
D-102 pattern is for the No. 340111 track hanger and No. 340113 top splice plate. It is used at coupling support points for single 3/4" rod suspensions and double 3/4" rod suspensions with 7" rod centers.

D-103



The D-103 pattern is for the No. 340115 top splice plate. It is used at coupling support points for double 3/4" rod suspensions with rod centers of 12" or more.

D-104



The D-104 pattern is for the No. 340110 track hanger and No. 340112 top splice plate. It is used at coupling support points for single 3/4" rod suspensions of No. 34011 (8") track.

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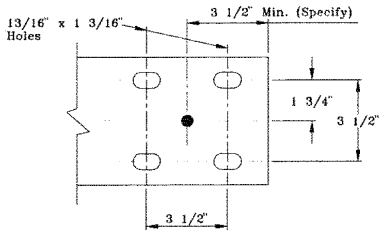
TRAMBEAM FABRICATION

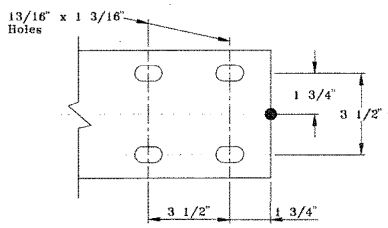
TOP FLANGE DRILLING AND PUNCHING PATTERNS

D-105



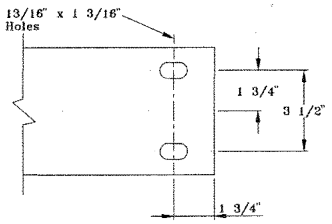
The D-105 pattern is for the No. 340123 track hanger and No. 340125 top splice plate. It is used at end or intermediate support points for single 1-1/8" rod suspensions and at all support points for double 1-1/8" rod suspensions with rod centers greater than 7" and less than 12".

D-106



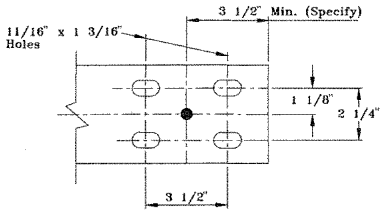
The D-106 pattern is for the No. 340123 track hanger and No. 340124 top splice plate. It is used at coupling support points for single 1-1/8" rod suspensions and double 1-1/8" rod suspensions with 7" rod centers.

D-107



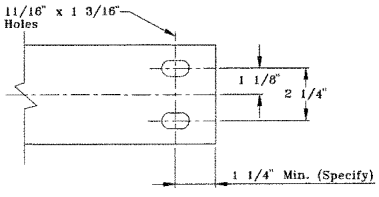
The D-107 pattern is for the No. 340126 top splice plate. It is used at coupling support points for double 1-1/8" rod suspensions with rod centers of 12" or more.

D-108



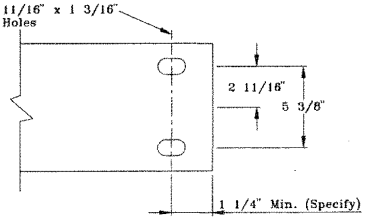
The D-108 pattern is for the No. 340110 track hanger. It is used at end or intermediate support points for single 3/4" rod suspension of No. 34011 (8") track.

D-60



The D-60 pattern is used at all support points of light rail tracks for bolted or flush clamped track suspensions.

D-61



The D-61 pattern is used at all support points of heavy rail tracks for bolted or flush clamped track suspensions.

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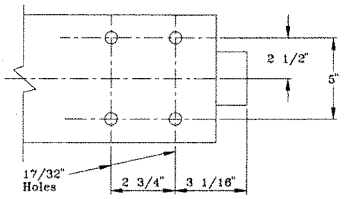
TRAMBEAM FABRICATION

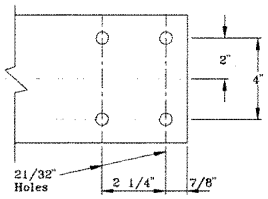
TOP FLANGE DRILLING AND PUNCHING PATTERNS

D-38



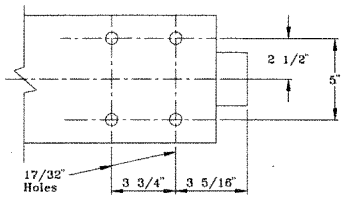
The D-38 pattern is for the No. 4501007 guide roller guide and is used at track ends having a discharge point.

D-50



The D-50 pattern is for the No. 4504 guide roller and is used at track ends having an interlock.

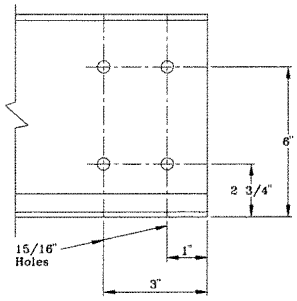
D-68



The D-68 pattern is for the No. 4501005 lower guide and is used at track ends having a discharge point.

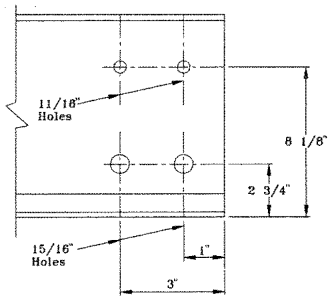
WEB PREPARATIONS AND DRILLING PATTERNS

W-30



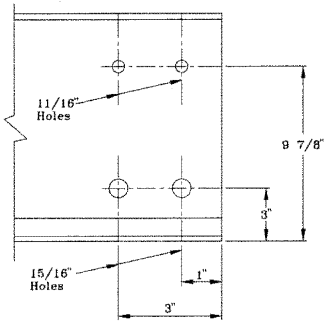
The W-30 preparation is for the No. 340130 track coupling. It is used for coupling Nos. 34011 and 34016 track.

W-31



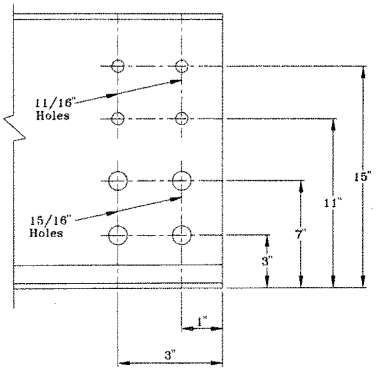
The W-31 preparation is for the No. 340131 track coupling. It is used for coupling Nos. 34021, 34026 and 34031 track.

W-32



The W-32 preparation is for the No. 340132 track coupling. It is used for coupling Nos. 34037, 34041 and 34046 track.

W-33



The W-33 preparation is for the No. 340133 track coupling. It is used for coupling Nos. 34051, 34056, 34061 and 34066 track.

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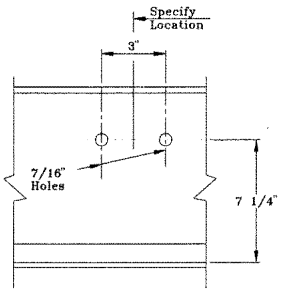
TRAMBEAM FABRICATION

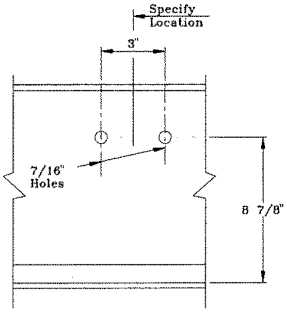
WEB PREPARATIONS AND DRILLING PATTERNS

W-55



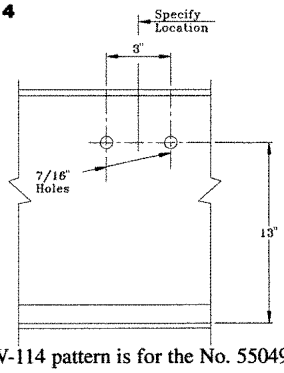
The W-55 pattern is for the No. 550341 conductor bar support. It is used on Nos. 34051 through 34079 track when carriers or cranes have 4" or 5" diameter wheels and bottom of conductor is 6-1/8" above tread.

W-56



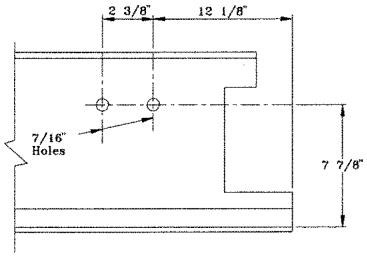
The W-56 pattern is for the No. 550341 conductor bar support. It is used on Nos. 34051 through 34079 track when carriers or cranes have 6-1/2" diameter wheels and bottom of conductor is 7-3/4" above tread.

W-114



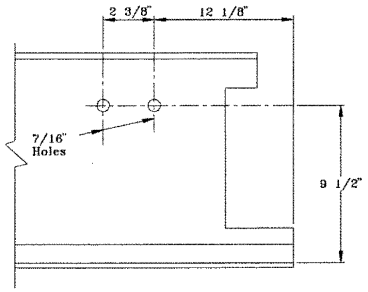
The W-114 pattern is for the No. 550496 conductor bar support. It is used on Nos. 34061 through 34079 track when carriers or cranes have 5", 6-1/2" or 8" diameter wheels and bottom of conductor is 11-7/8" above tread.

W-72



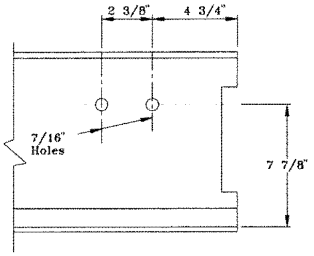
The W-72 pattern is for the No. 550311 conductor bar support. It is used when Type L discharge points are electrified and bottom of conductor is 6-1/8" above tread.

W-73



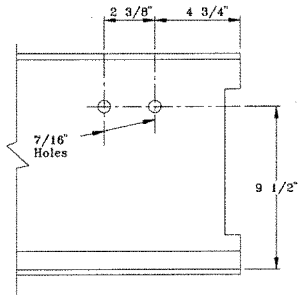
The W-73 pattern is for the No. 550311 conductor bar support. It is used when Type H discharge points are electrified and bottom of conductor is 7-3/4" above tread.

W-74



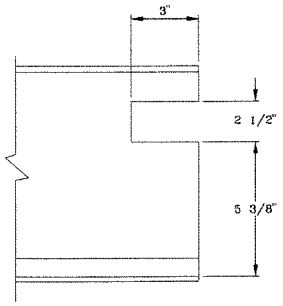
The W-74 pattern is for the No. 550315 conductor bar support. It is used when Type L interlocks are electrified and bottom of conductor is 6-1/8" above tread.

W-75



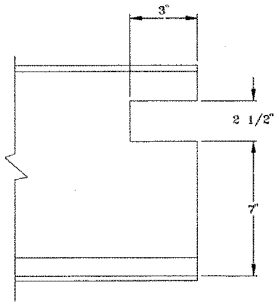
The W-75 pattern is for the No. 550315 conductor bar support. It is used when Type H interlocks are electrified and bottom of conductor is 7-3/4" above tread.

W-90



The W-90 preparation is used on the ends of all straight and curve tracks incoming to Types 4 and 5 electrified switches when bottom of conductor is 6-1/8" above tread.

W-91



The W-91 preparation is used on the ends of all straight and curve tracks incoming to Types 4 and 5 electrified switches when bottom of conductor is 7-3/4" above tread.

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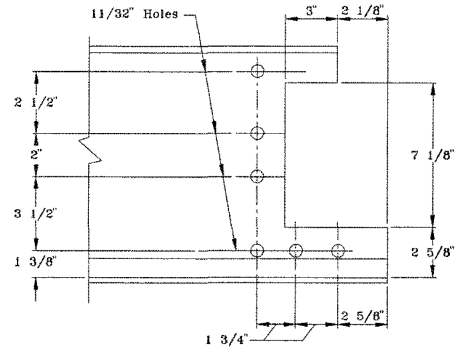
TRAMBEAM FABRICATION

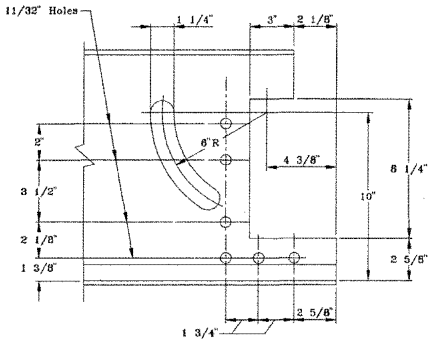
WEB PREPARATIONS AND DRILLING PATTERNS

W - 7 0



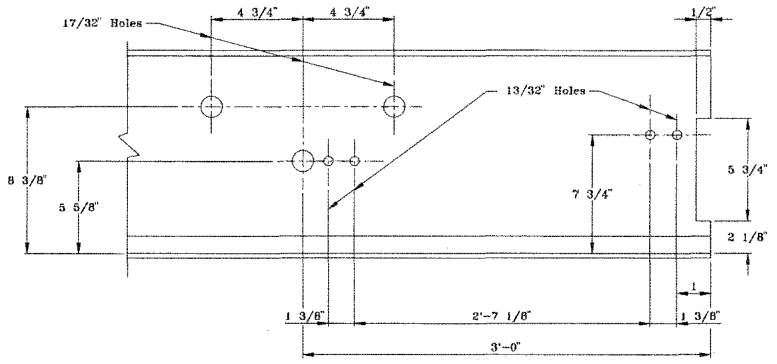
The W-70 preparation is for the Type L discharge point. It is used on all track sizes. Nos. 34011, 34016 and 34021 must be built up to 11-1/2" depth to accommodate this preparation.

W - 7 1



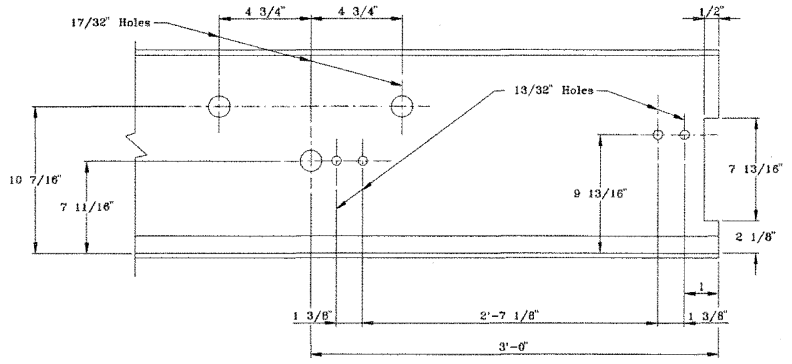
The W-71 preparation is for the Type H discharge point. It is used on Nos. 34037 through 34079 tracks.

W - 7 8



The W-78 preparation is for the Type L interlock. It is used on Nos. 34021 through 34079 tracks.

W - 7 9



The W-79 preparation is for the Type H interlock. It is used on Nos. 34037 through 34079 tracks.

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TRAMBEAM FABRICATION

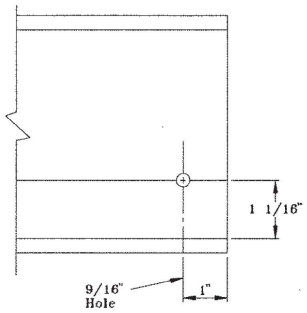
END PREPARATION PATTERNS FOR SWITCHES

The ends of all straight and curve tracks incoming to switches are prepared for each switch in the system. The end preparation consists of: (1) a straight or angular cut on the end of the track; (2) coping or shimming the end to match the depth of the track in the switch; and (3) drilling holes for attaching track to the stationary frame of the switch. Hardware for attaching track to switch frame is also included. When detailing curve or straight tracks for switches, use the appropriate end preparation indicated in the table.

Type of Switch	Inlet Preparation	Outlet Preparation		
		Left Hand	Straight	Right Hand
Type 2	E-5	E-6	E-5	E-7
Type 3 with 11 in. throw and Type 3 2-way "Y" with 14 in, throw	E-8	E-9	E-8	E-10
Type 3 2-way right and left and 3-way with 14" throw	E-11	E-12	E-11	E-13
Type 4 and 5	E-14	E-15	E-14	E-16
Type 7 Crossover and Type 8 Turntable	E-20			

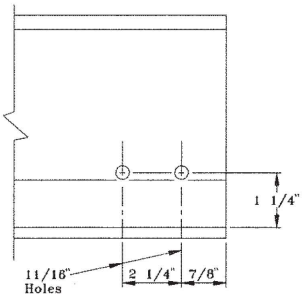
END STOP DRILLING PATTERNS

S - 1



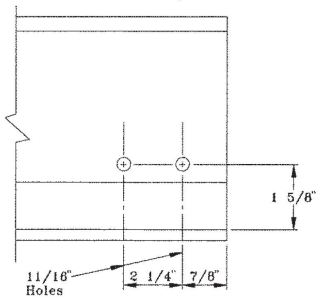
The S-1 pattern is for the No. 340136 end stop.

S - 2



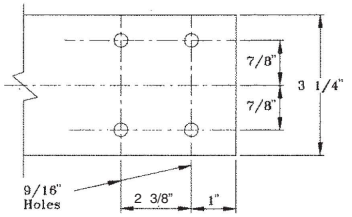
The S-2 pattern is for the No. 340138 end stop.

S - 3



The S-3 pattern is for the No. 340139 end stop.

S - 4



The S-4 pattern is for the No. 340137 end stop.

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GENERAL INFORMATION

Trambeam switches increase the flexibility of monorail systems by: (1) connecting parallel tracks which permit carriers to transfer from one track to another; (2) providing spur tracks from the mainline; (3) dividing a single track into two or three secondary tracks; or (4) providing bypasses for the mainline.

Trambeam crossovers and turntables further increase the flexibility of a monorail system by allowing two tracks operating at the same elevation to cross - usually at right angles. Lift and drop sections allow a section of track to be raised or lowered. Track openers are available to allow a monorail to operate through doorways.

PLANNING CONSIDERATIONS

The function, location and rated load of the switch are important considerations in selecting switches for a monorail application. Switches are available for 2-way right or left hand, 2-way Y and 3-way operation. The function of the switch is determined by the monorail layout.

Most monorail systems will require additional superstructure to support the switch and the tracks incoming to the switch. Direct bolting of switches to the superstructure is recommended to prevent switch movement as carriers travel through the switch and when the switch is thrown. When supporting from hanger rods, switches must be braced laterally and longitudinally to prevent switch movement. Thus building construction and the space available for supporting the switch are important considerations in locating the switch.

Phase reversals should be avoided when planning an electrified system. This usually can be done by turning the switch 180 degrees in the system layout. If phase reversal cannot be avoided, special considerations must be given to the system electrification and equipment operating on the monorail.

Rated loads for switches are based on the carrier load and the load on the switch frames. The angular cuts on the curve tracks reduce the carrier head load allowed on track with square cut ends. Rated loads for each switch are listed on subsequent pages.

SWITCH CONSTRUCTION

All Trambeam switches are glide type and are available in four sizes - Type 2, 3, 4 and 5. They are made up of two assemblies - the sliding frame and the stationary frame. The sliding frame has a straight track, one or two curve tracks, stops and a latching mechanism. The stationary frame provides the support for the sliding frame. Holes are provided in the stationary frame for switch suspension and for attaching the incoming tracks.

Trambeam switches feature:

- Short radius curve tracks for close grouping of switches
- Spring loaded latches to maintain track alignment as carriers move through the switches.
- Stops to protect the open end of incoming tracks when the switch is set against the tracks.
- Guards to prevent a carrier from running off the switch tracks in the event a switch is thrown with a carrier on the switch.

One crossover (Type 7) and one turntable (Type 8) are cataloged. These units are similar in construction and are made up of a rotating frame and a stationary frame. The crossover has stops to protect the open end of the incoming tracks when the crossover is set against these tracks. The turntable has guards on the stationary frame to allow rotation of the unit with carriers on the turntable track.

Switches, crossovers and turntables can be arranged for manual, air or electric motor operation. Manual switches are operated from pull ropes located on either side of the stationary frame. The control ropes can be mounted on outriggers when the hoist or load is of such proportions as to interfere with the ropes. The ropes can also be located for remote operation when cab controlled carriers operate on the system. Air and electric motor operated switches are controlled from push button stations.

ELECTRIFIED SWITCHES

Type 3, 4 and 5 switches, Type 7 crossovers and Type 8 turntables can be electrified with two, three or four power conductors of Insul-8-Bar electrification. Two conductors are used for direct current applications and for 3 phase alternating current when the monorail track is used as a conductor

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GENERAL INFORMATION

(see Grounded Rail Systems in the Electrification Section for conditions that allow the track to be used as a conductor). Three conductors are used for 3 phase alternating current applications. Four conductors are used for 3 phase alternating current where a separate ground conductor is desired.

Standard conductor spacing and elevation as shown in the Electrification Section are used for 2-bar and 3-bar switches. Special spacing of the conductors is required for 4-bar switches.

Electrified switches are furnished with 11 inch throw for 2-bar systems and 14 inch throw for 3-bar and 4-bar systems. A wiring harness is furnished on electrified switches to provide power to the conductors on the switch. The harness also serves as a jumper to provide power to the conductors on the incoming tracks.

ACCESSORIES

Optional accessories for switches, crossovers and turntables include:

- Electric baffles to prevent a carrier from contacting the switch when the switch is set against the carrier. Electric baffles are recommended for systems with cab controlled carriers or automatic dispatch carriers.
- Air or electric motor operation.
- Signal lights to indicate position of switch.
- Hoods for protection against dirt and weather.
- Outriggers for control ropes.
- Sheaves for remote location of control ropes.

Consult factory for more detailed information on switch accessories.

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TYPE 2 SWITCHES

Type 2 switches are satisfactory for Class A or B service. They can be used with any of the light rail tracks (Nos. 34011 through 34031) and with hand propelled carriers having 4 inch or 5 inch diameter wheels.

Type 2 switches are available for 2-way right or left hand, 2-way Y or 3-way operation. They have 45 degree outlets on the curve tracks and 6 inch throw. These switches cannot be electrified.

Rated loads for Type 2 switches are:

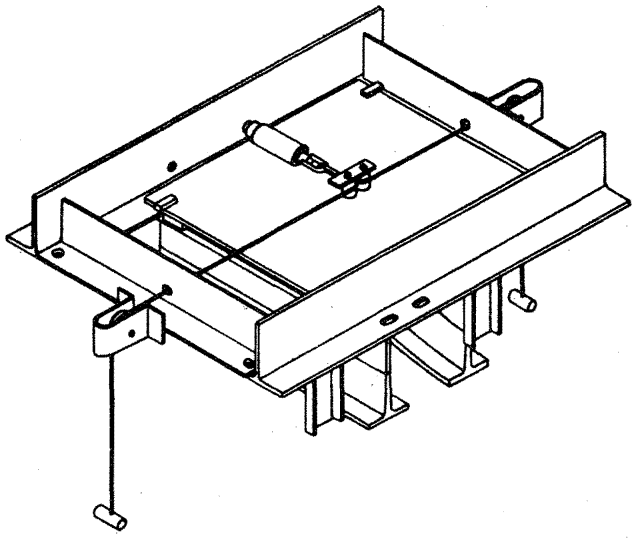
- 1,500 pounds per carrier head.
- 3,000 pounds on the sliding frame and at the outlets of the stationary frame.

The sliding frame is a welded assembly consisting of a steel plate and straight and curve tracks. A stop is provided on the frame to protect the open end of the incoming track when the switch is set against the track. A spring loaded latch holds the switch tracks in alignment with the incoming tracks as the carrier moves through the switch.

The stationary frame is a welded assembly consisting of structural tees and angles. The structural tees serve as ways for the sliding frame and are lubricated through grease fittings in the sliding frame. Guards are provided on the frame to prevent a carrier from running off the open ends of switch tracks in the event a switch is thrown with a carrier on the sliding frame. Tapped holes are provided in the frame for suspension of the switch. Slotted holes are provided for attaching the incoming tracks.

Type 2 switches are suspended by bolting direct to the superstructure using four 3/4 inch bolts (recommended method) or by four 3/4 inch hanger rods. To determine bolt or hanger rod lengths, allow 5-3/4 inch from the top of the stationary frame to the bottom of the bolt or hanger rod. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment. Suspension hardware is not included with the switch and is ordered separately.

Incoming tracks are bolted to the stationary frame using two 5/8 inch heat treated capscrews, nuts and lock washers. Slotted holes in the frame help in aligning the system by providing adjustment for the incoming tracks. Hardware is included with the switch end preparations for the incoming tracks.



Type 2 switch drawings and dimensional data are shown on Pages SW-4, SW-5 and SW-6. Switch suspension holes are indicated by black dots. The drawing and dimensions for the 2-way right hand and left hand switches on Page SW-4 indicate the dimension for Item No. 41051 2-way right hand switch. Dimensions for Item No. 41052 2-way left hand switch are identical; however, the layout is opposite from that shown and the dimensions are reversed about the centerline of the incoming straight tracks.

Suspension points for the incoming straight tracks are established so that the load on the stationary frame does not exceed its rated load of 3,000 pounds. Preferably, the first suspension point should be as close as possible to the stationary frame. The incoming curve tracks should be supported as recommended in the Track & Fittings Section with a minimum of one suspension point on the curve.

Operating handles on the control ropes are located approximately 8 feet below the track. Additional rope can be furnished as required.

Typical switching arrangements and minimum grouping dimensions for Type 2 switches are provided on Page SW-7.

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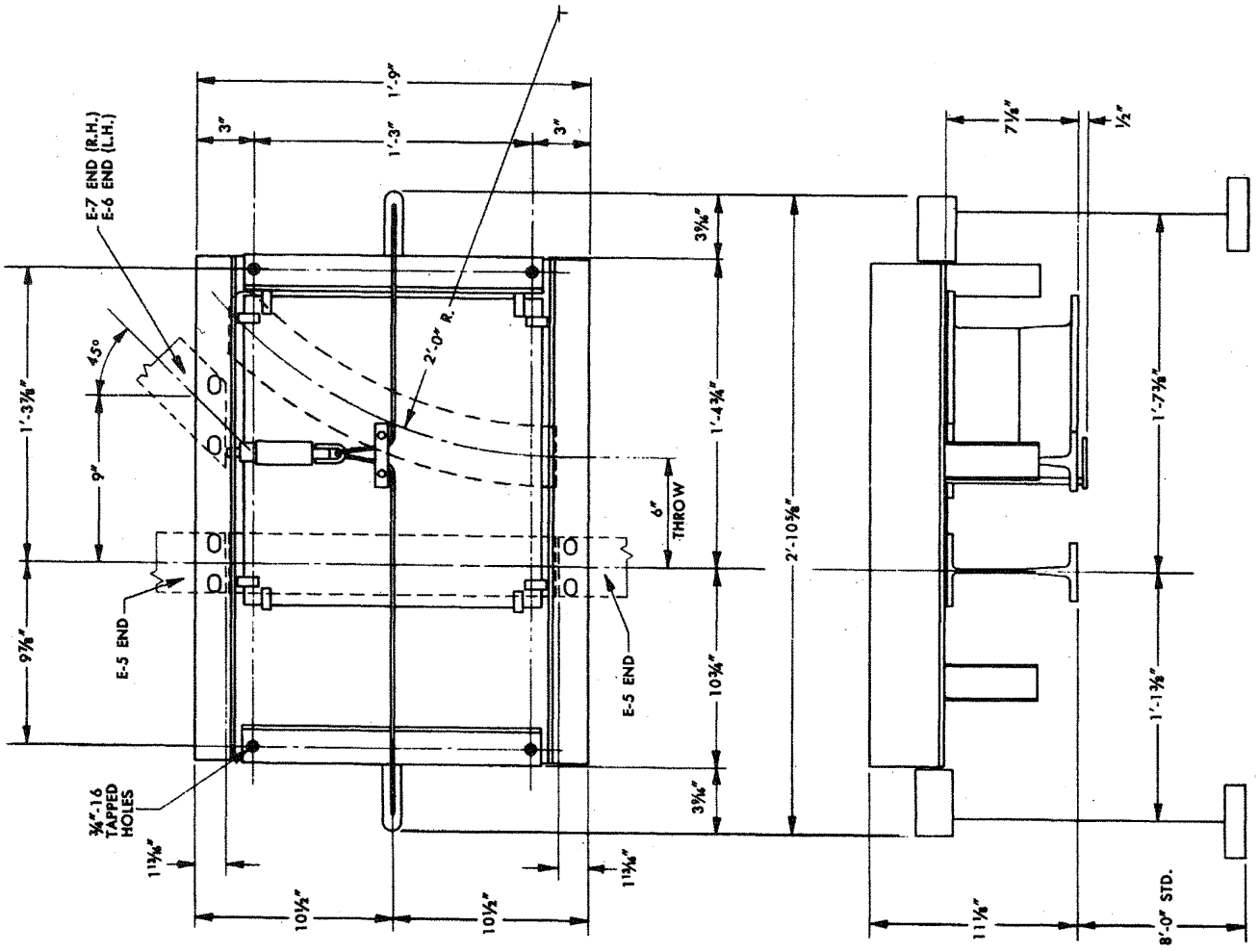
TYPE 2 SWITCHES

OUTLINE DRAWING OF CAT. No. 41051 2-WAY RIGHT HAND SWITCH
OUTLINE DRAWING OF CAT. No. 41052 2-WAY LEFT HAND SWITCH

The drawing shows the layout and dimensions for the Cat. No. 41051 2-way right hand switch. Dimensions for the Cat. No. 41052 left hand switch are identical but the layout is opposite from that shown. (Left hand switch dimensions are reversed about the centerline of the incoming straight tracks.)

The black dots indicate 3/4"-16UNF tapped holes for switch suspension. Four 3/4" diameter hanger rods or bolts are required to support the switch. To determine rod or bolt lengths, allow 5-3/4" from the top of the stationary frame to the bottom of the rod or bolt.



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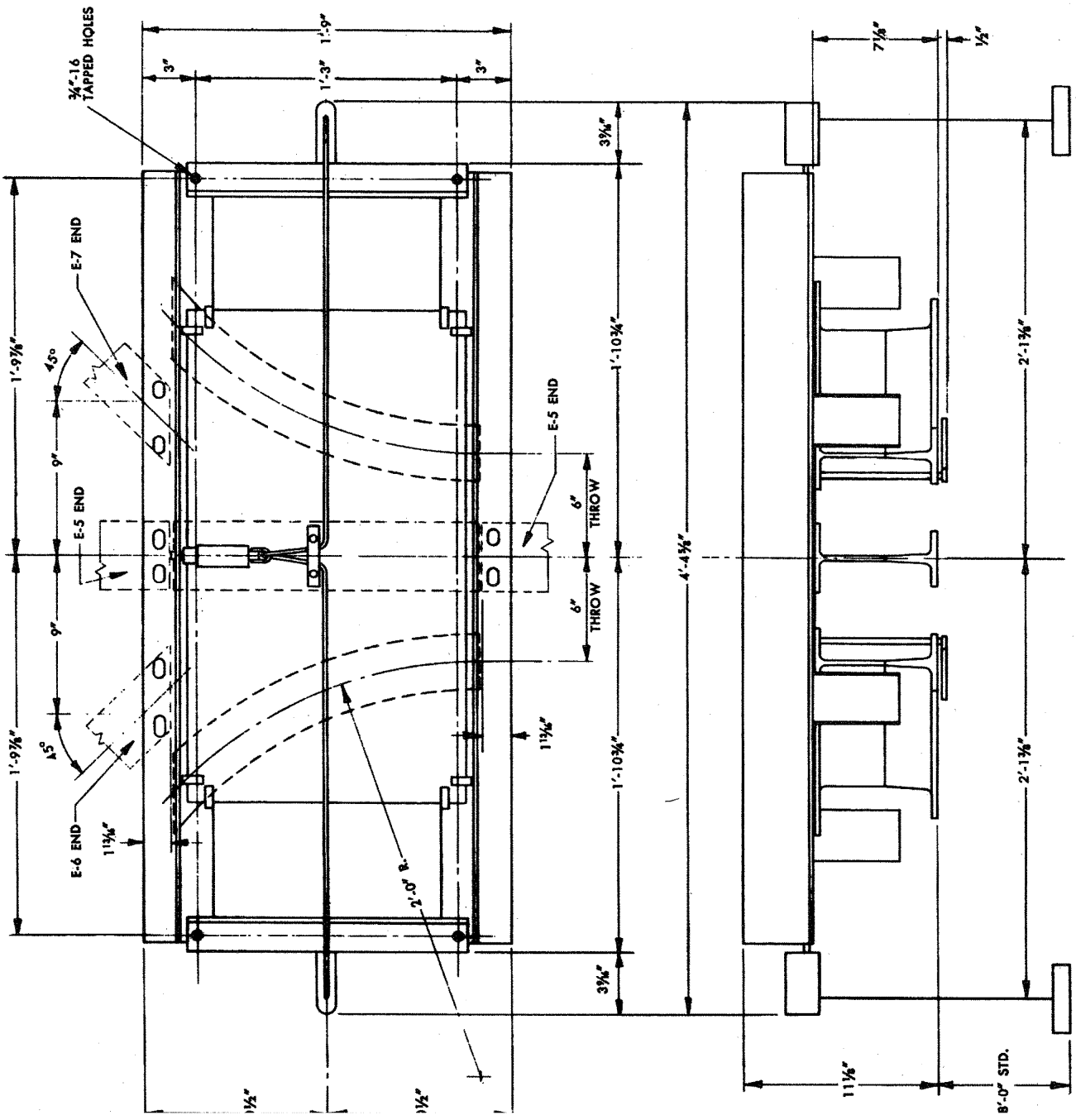
TYPE 2 SWITCHES

OUTLINE DRAWING OF CAT. NO. 41053 3-WAY SWITCH

The drawing shows the layout and dimensions for the Cat. No. 41053 3-way switch. The black dots indicate 3/4"-16UNF tapped holes for switch suspension. Four 3/4" diameter hanger rods or bolts are required to support the switch. To determine rod or bolt length, allow 5-3/4" from the top of the stationary frame to the bottom of the rod or bolt.



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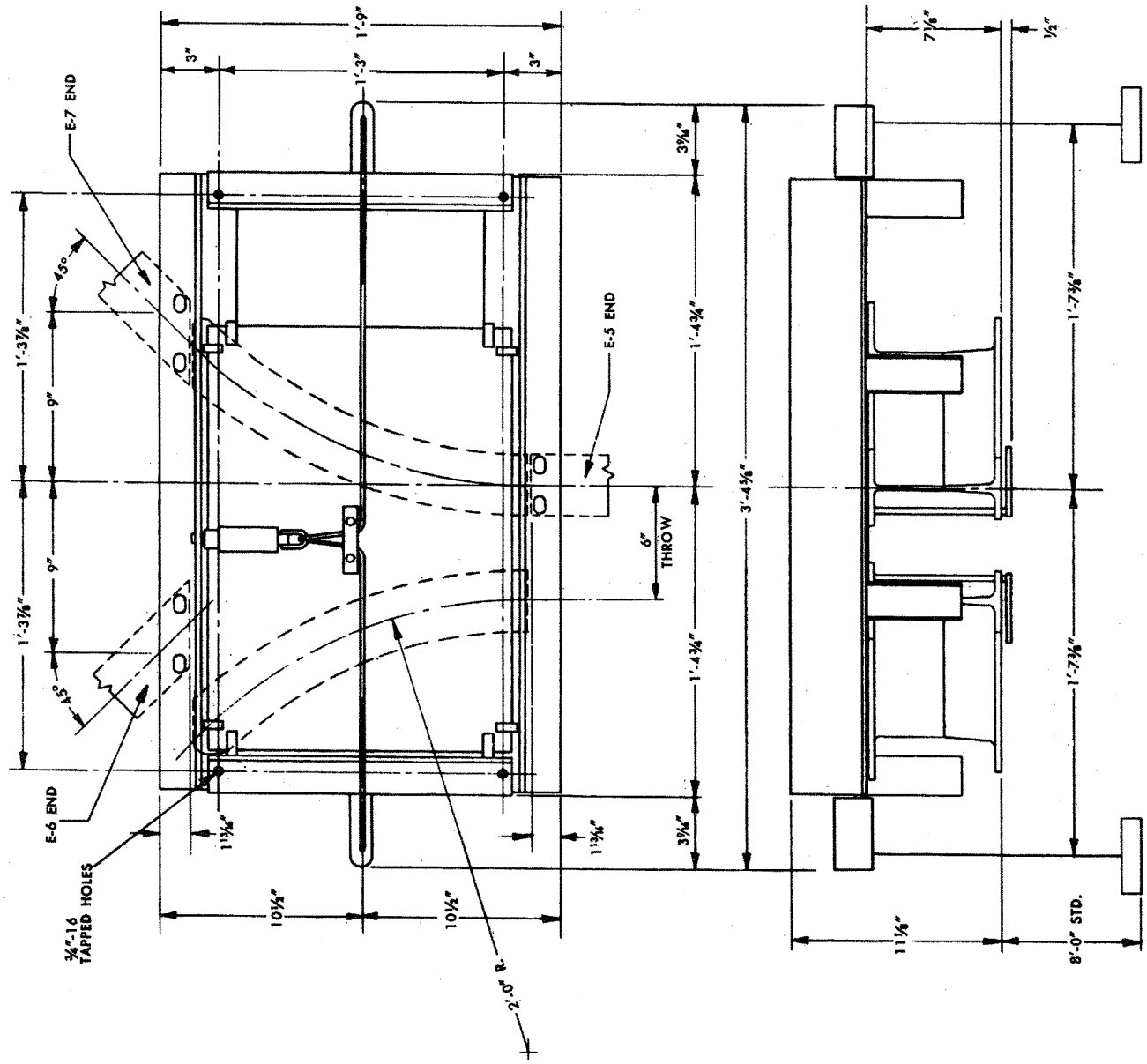
TYPE 2 SWITCHES

OUTLINE DRAWING OF CAT. NO. 41054 2-WAY SWITCH

The drawing shows the layout and dimensions for the Cat. No. 41054 2-way Y switch. The black dots indicate 3/4"-16UNF tapped holes for switch suspension. Four 3/4" diameter hanger rods or bolts are required to support the switch. To determine rod or bolt length, allow 5-3/4" from the top of the stationary frame to the bottom of the rod or bolt.



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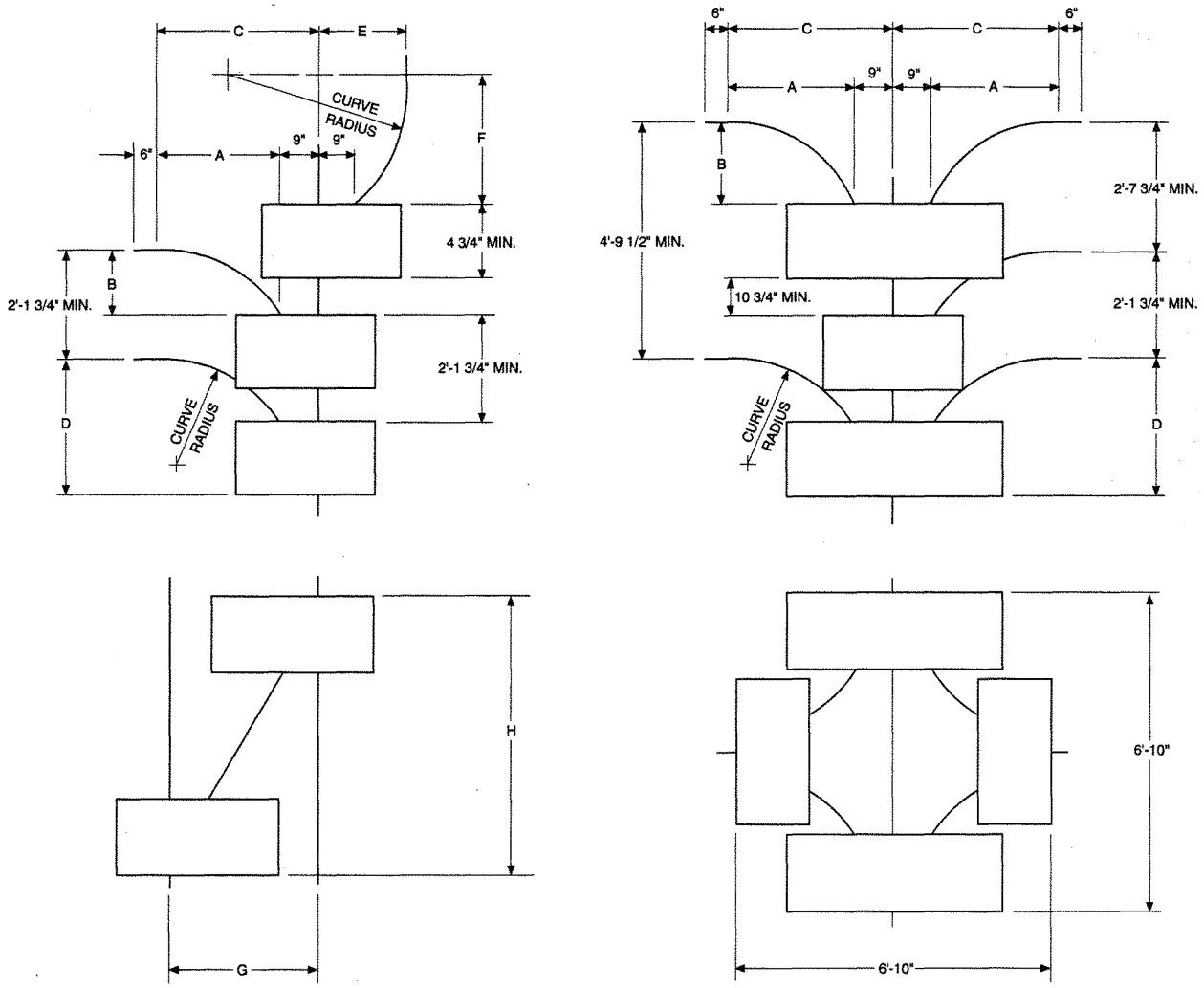
TYPE 2 SWITCHES

TYPICAL SWITCHING ARRANGEMENTS

The layouts illustrate some of the more frequently used switching arrangements and provide minimum grouping dimensions. The table lists dimensions for the more commonly used curve radii.

Close grouping of switches may require outriggers for remote operation of the control ropes to avoid interference between the ropes on one switch and a carrier leaving an adjacent switch. Consult factory for information on outriggers and remote operation.



Curve Radius	A	B	C	D	E	F	G	H
3'-6	2'-5-11/16	1'-0-5/16	3'-2-11/16	2'-9-5/16	1'-9-5/16	2'-5-11/16	2'-0	4'-0
4'-0	2'-9-15/16	1'-2-1/16	3'-6-15/16	2'-11-1/16	1'-11-1/16	2'-9-15/16	3'-0	5'-0
6'-0	4'-2-15/16	1'-9-1/16	4'-11-15/16	3'-6-1/16	2'-6-1/16	4'-2-15/16	4'-0	6'-0
8'-0	5'-7-7/8	2'-4-1/8	6'-4-7/8	4'-1-1/8	3'-1-1/8	5'-7-7/8	5'-0	7'-0
10'-0	7'-0-7/8	2'-11-1/8	7'-9-7/8	4'-8-1/8	3'-8-1/8	7'-0-7/8	6'-0	8'-0

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TYPE 3 SWITCHES

Type 3 switches are satisfactory for Class A, B or C service. They can be used with any of the light rail tracks (Nos. 34011 through 34031) and with hand propelled or motor driven carriers having 4 inch or 5 inch diameter wheels.

Type 3 switches are available for 2-way right or left hand, 2-way Y or 3-way operation. They have 30 degree outlets on the curve tracks. These switches are provided with 11 inch throw for non-electrified and 2-bar electrified systems and 14 inch throw for 3-bar and 4-bar electrified systems.

Rated loads for Type 3 switches are:

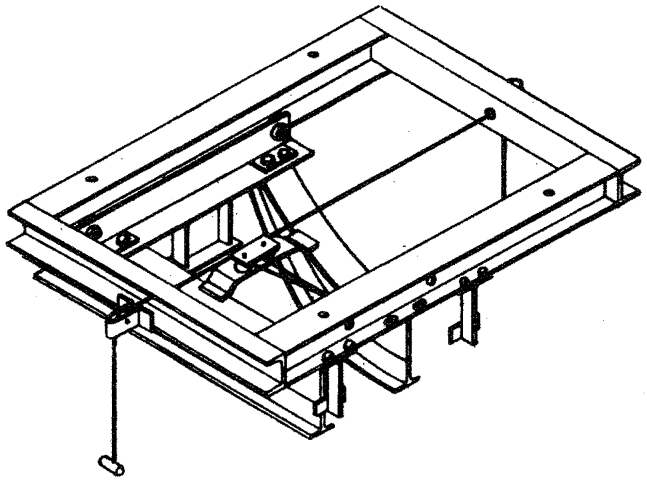
- 2,000 pounds per carrier head.
- 4,000 pounds on the sliding frame and at the outlets of the stationary frame.

Type 3 switches may be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Standard conductor spacing as indicated in the Electrification Section is used for 2-bar and 3-bar switches; special spacing of conductors is required for 4-bar switches. Elevation of conductors is 6-1/8 inch above the track tread for all Type 3 electrified switches. A wiring harness is furnished on electrified switches to provide power to the conductors in the switch. The harness also serves as a jumper to provide power to the conductors on the incoming tracks.

The sliding frame is a welded assembly consisting of structural angles and straight and curve tracks. The frame is supported on four 3 inch diameter wheels. A stop is provided on the frame to protect the open end of the incoming track when the switch is set against the track. A spring loaded latch holds the switch tracks in alignment with the incoming tracks as the carrier moves through the switch.

The stationary frame is a welded assembly consisting of structural beams and channels. The structural beams serve as runways for the wheels on the sliding frame. Guards are provided on the frame to prevent a carrier from running off the open ends of switch tracks in the event a switch is thrown with a carrier on the sliding frame. Holes are provided in the frame for suspension of the switch. Slotted holes are provided for attaching the incoming tracks.

Type 3 switches are suspended by bolting direct to the superstructure using four 3/4 inch bolts (recommended method) or by four 3/4 inch hanger rods. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment. Suspension hardware is not included with the switch and is ordered separately.



Incoming tracks are bolted to the stationary frame using two 5/8 inch heat treated capscrews, nuts and lockwashers. Slotted holes in the frame help in aligning the system by providing adjustment for the incoming tracks. Hardware is included with the switch end preparations for the incoming tracks.

Type 3 switch drawings and dimensional data are shown on Pages SW-9, SW-10 and SW-11. Switch suspension holes are indicated by the black dots. The drawings illustrate non-electrified switches; electrified switches have the same dimensions and outlines as shown for the non-electrified switches. The drawing and dimensional data for the 2-way right hand and left hand switches on Page SW-9 indicate the dimensions for 2-way right hand switches with 11 inch and 14 inch throw. Dimensions for left hand switches are identical; however, the layout is opposite from that shown and the dimensions are reversed about the centerline of the incoming straight tracks.

Suspension points for the incoming straight tracks are established so that the load on the stationary frame does not exceed its rated load of 4,000 pounds. Preferably, the first suspension point should be as close as possible to the stationary frame. The incoming curve tracks are supported as recommended in the Track & Fittings Section with a minimum of one suspension point on the curve.

Operating handles on the control ropes are located approximately 8 feet below the track. Additional rope can be furnished as required.

Typical switching arrangements and minimum grouping dimensions for Type 3 switches are provided on Pages SW-12 and SW-13.

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TYPE 3 SWITCHES

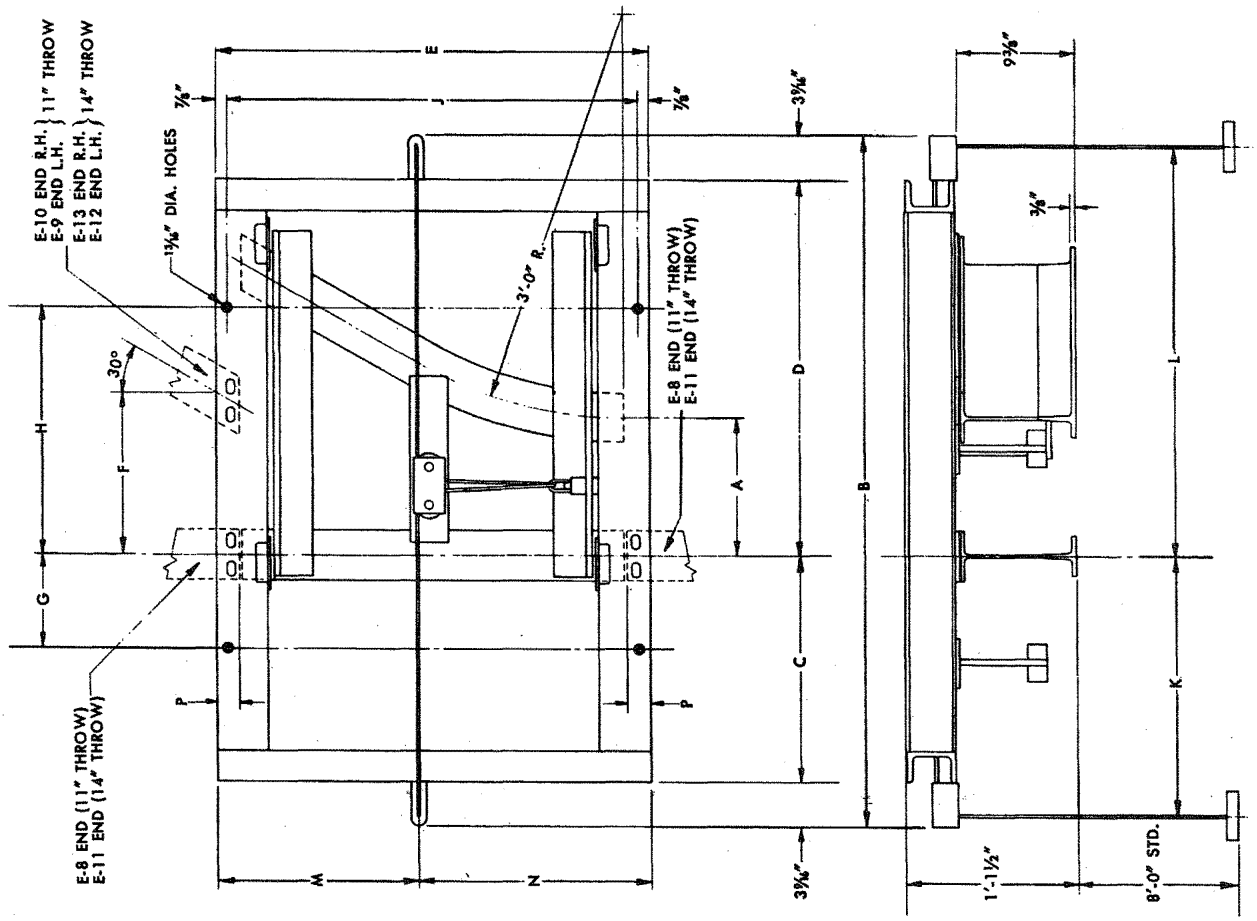
OUTLINE DRAWING OF 2-WAY RIGHT AND LEFT HAND SWITCHES

The drawing and table indicate the dimensions for 2-way right hand switches with 11" and 14" throw. Dimensions for left hand switches are identical, but the layout is opposite from that shown. (Left hand switch dimensions are reversed about the centerline of the incoming straight tracks.)

The drawing illustrates the non-electrified switch.

Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Four 3/4" diameter bolts or hanger rods are required to support the switch. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number		Type of	A													
Right Hand	Left Hand	Electrification	(Throw)	B	C	D	E	F	G	H	J	K	L	M	N	P
41042	41043	Non-Electrified	11 in.	4'-7-1/8	1'-6	2'-6	2'-10	1'-0-7/8	7-3/8	1'-7-3/4	2'-8-1/4	1'-8-5/6	2'-8-5/8	1'-3-3/8	1'-6-5/8	1-13/16
410342	410343	2-Bar Insul-8														
41056	41057	Non-Electrified	14 in.	5'-4-7/8	1'-8-1/2	3'-1-1/4	3'-6-1/4	1'-5-1/8	10-3/8	2'-3-1/8	3'-4-1/2	1'-11-1/8	3'-3-7/8	1'-7-1/4	1'-11	2'-5/8
410356	410357	3-Bar Insul-8														

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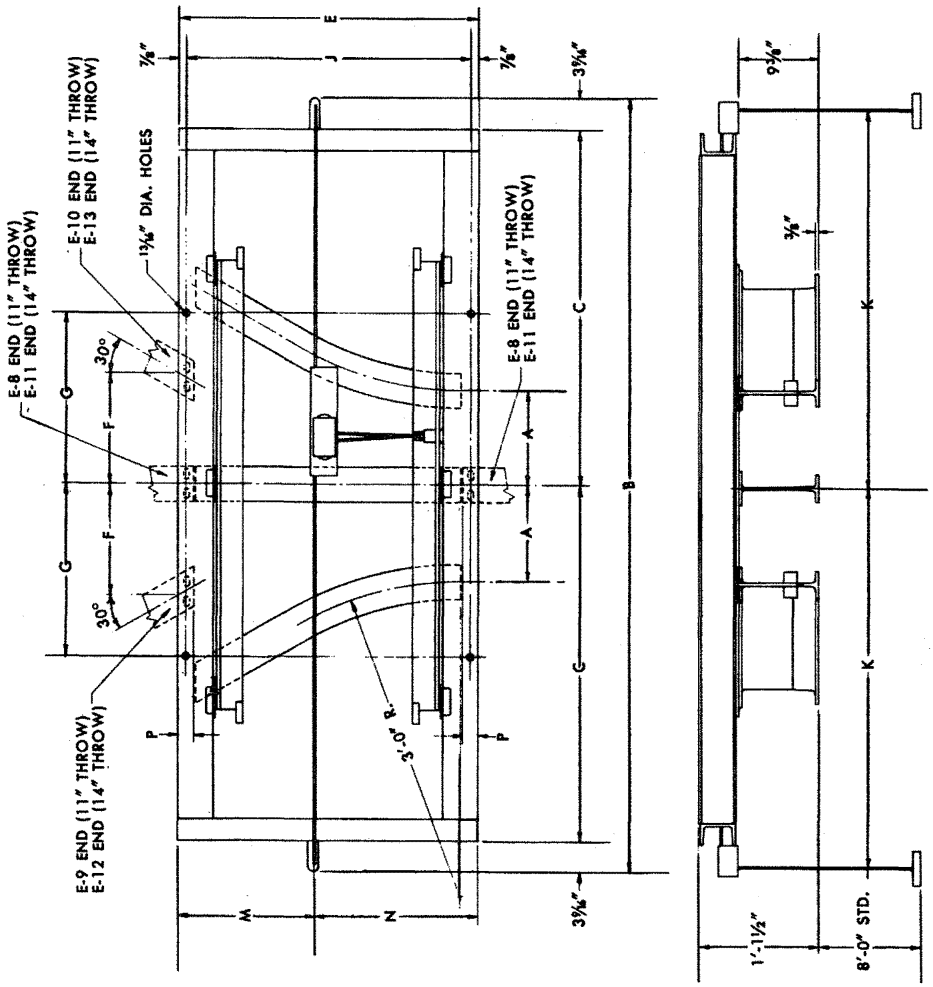
TYPE 3 SWITCHES

OUTLINE DRAWING OF 3-WAY SWITCH

The drawing and table idicate the dimensions for 3-way switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Four 3/4" diameter bolts or hanger rods are required to support the switch. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	E	F	G	J	K	M	N	P
41044	Non-Electrified	11 in.	7'-4-7/8	3'-4-7/8	2'-10	1'-0-7/8	1'-7-3/4	2'-8-1/4	3'-7-1/2	1'-3-3/8	1'-6-5/8	1-13/16
410344	2-Bar Insul-8											
41058	Non-Electrified	14 in.	9'-1-5/8	4'-3-1/4	3'-6-1/4	1'-5-1/8	1'-7-3/4	3'-4-1/2	4'-5-7/8	1'-7-1/4	1'-11	2-5/8
410358	3-Bar Insul-8											

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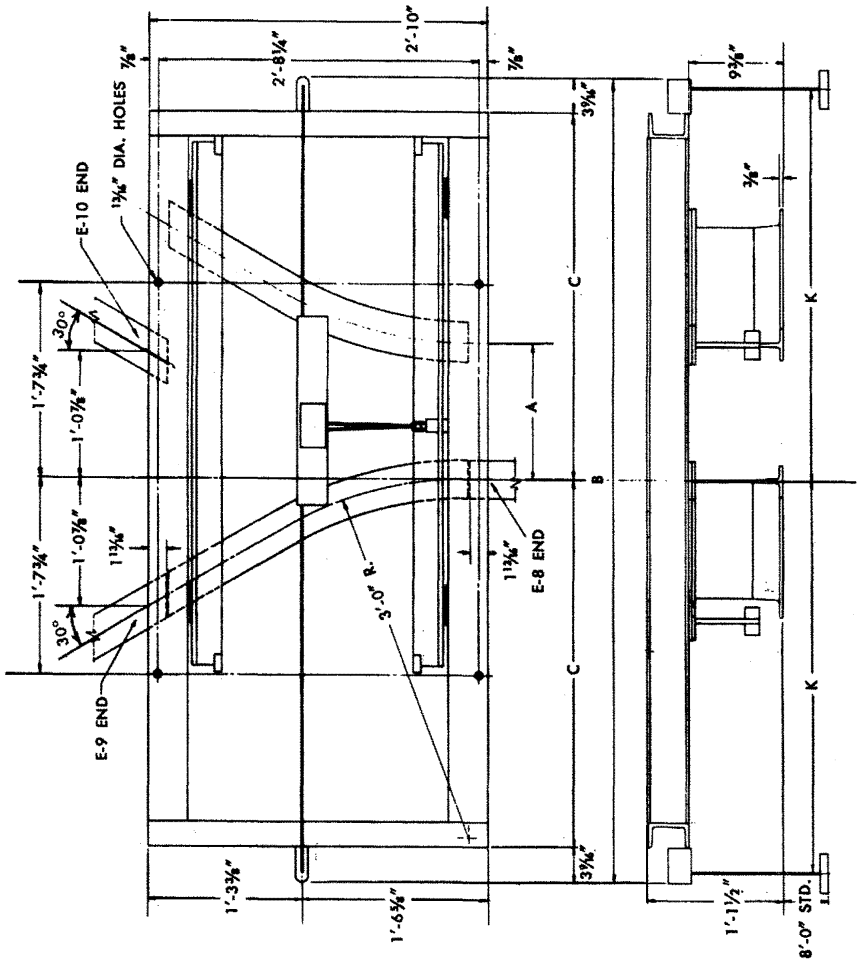
TYPE 3 SWITCHES

OUTLINE DRAWING OF 2-WAY Y SWITCH

The drawing and table indicate the dimensions for 2-way Y switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Four 3/4" diameter bolts or hanger rods are required to support the switch. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	K
41045	Non-Electrified	11 in.	5'-6-7/8	2'-5-7/8	2'-8-3/8
410345	2-Bar Insul-8				
41059	Non-Electrified	14 in.	6'-9-1/8	3'-1	3'-3-1/2
410359	3-Bar Insul-8				

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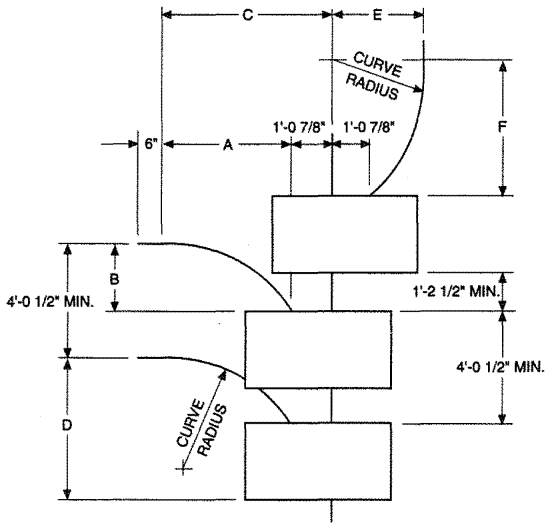
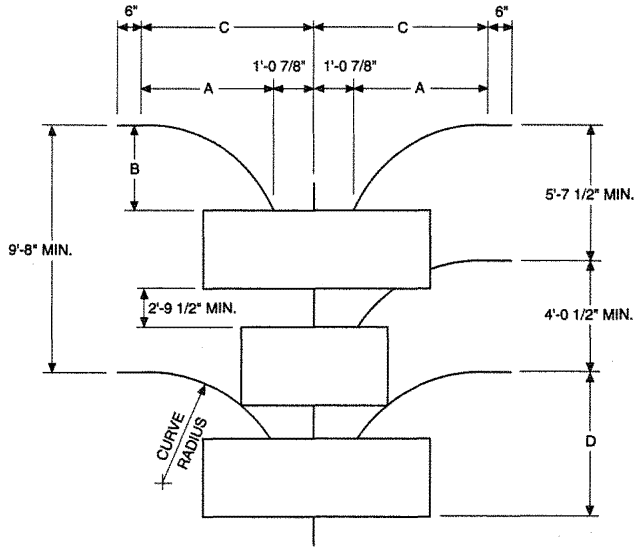
TYPE 3 SWITCHES

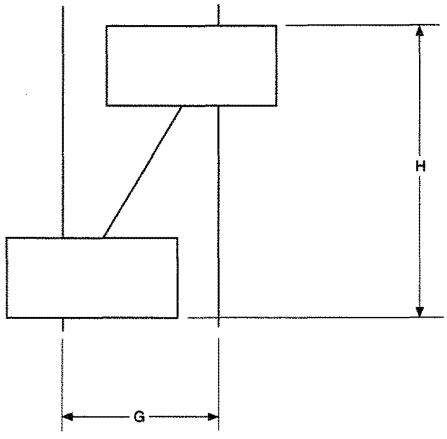
TYPICAL SWITCHING ARRANGEMENTS-11" THROW SWITCHES

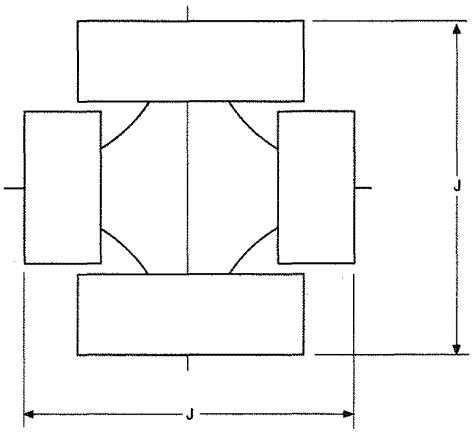
The layouts illustrate some of the more frequently used switching arrangements and provide minimum grouping dimensions for the 11 inch throw switches. The table lists dimensions for the more commonly used curve radii.

Close grouping of switches may require outriggers for remote operation of the control ropes to avoid interference between the ropes on one switch and a carrier leaving an adjacent switch. Consult factory for information on outriggers and remote operation.









Curve Radius	A	B	C	D	E	F	G	H	J
3'-6	3'-0-3/8	1'-9	4'-1-1/4	4'-7	3'-6	5'-1-11/16	4'-0	8'-10-9/16	-
4'-0	3'-5-9/16	2'-0	4'-6-7/16	4'-10	4'-0	6'-1-11/16	5'-0	10'-7-5/16	10'-8-7/8
6-'0	5'-2-3/8	3'-0	6'-3-1/4	5'-10	6'-0	10'-1-3/4	6'-0	12'-4-1/8	12'-2-1/2
8'-0	6'-11-1/8	4'-0	8'-0	6'-10	8'-0	14'-1-11/16	7'-0	14'-0-7/8	13'-8
10'-0	8'-7-15/16	5'-0	9'-8-13/16	7'-10	10'-0	18'-1-3/4	8'-0	15'-9-11/16	15'-1-5/8

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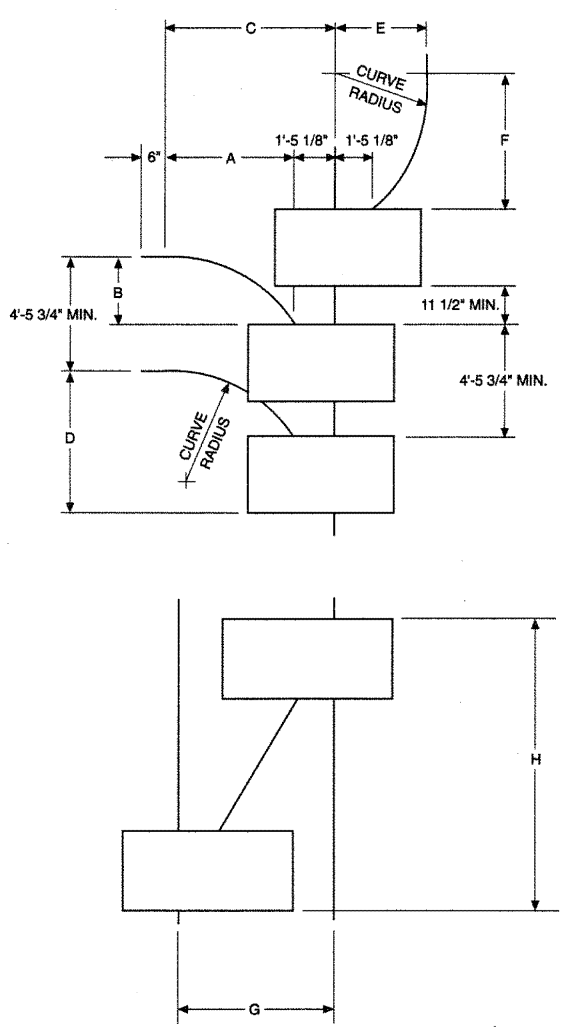
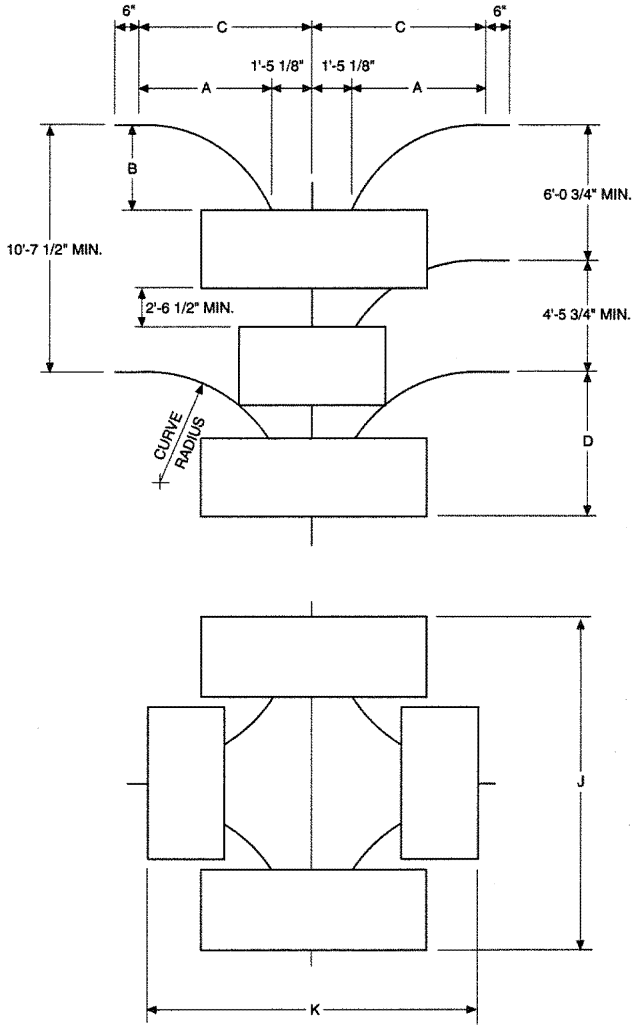
TYPE 3 SWITCHES

TYPICAL SWITCHING ARRANGEMENTS-14" THROW SWITCHES

The layouts illustrate some of the more frequently used switching arrangements and provide minimum grouping dimensions for the 14 inch throw switches. The table lists dimensions for the more commonly used curve radii.

Close grouping of switches may require outriggers for remote operation of the control ropes to avoid interference between the ropes on one switch and a carrier leaving an adjacent switch. Consult factory for information on outriggers and remote operation.





Curve Radius	A	B	C	D	E	F	G	H	J	K
3'-6	3'-0-3/8	1'-9	4'-5-1/2	5'-3-1/4	3'-6	4'-6-3/8	4'-0	9'-0-5/16	-	-
4'-0	3'-5-9/16	2'-0	4'-10-11/16	5'-6-1/4	4'-0	5'-6-5/16	5'-0	10'-9-1/8	-	-
6'-0	5'-2-3/8	3'-0	6'-7-1/2	6'-6-1/4	6'-0	9'-6-3/8	6'-0	12'-5-7/8	13'-7	12'-11
8'-0	6'-11-1/8	4'-0	8'-4-1/4	7'-6-1/4	8'-0	13'-6-5/16	7'-0	14'-2-11/16	15'-0-1/2	14'-4-1/2
10'-0	8'-7-15/16	5'-0	10'-1-1/16	8'-6-1/4	10'-0	17'-6-3/8	8'-0	15'-11-7/16	16'-6-1/8	15'-10-1/8

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TYPE 4 SWITCHES

Type 4 switches are satisfactory for Class A, B, C or D service. They can be used with any of the light rail tracks (Nos. 34011 through 34031) and with hand propelled or motor driven carriers having 4 inch or 5 inch diameter wheels.

Type 4 switches are available for 2-way right or left hand, 2-way Y or 3-way operation. They have 30 degree outlets on the curve tracks. These switches are provided with 11 inch throw for non-electrified and 2-bar electrified systems and 14 inch throw for 3-bar and 4-bar electrified systems.

Rated loads for Type 4 switches are:

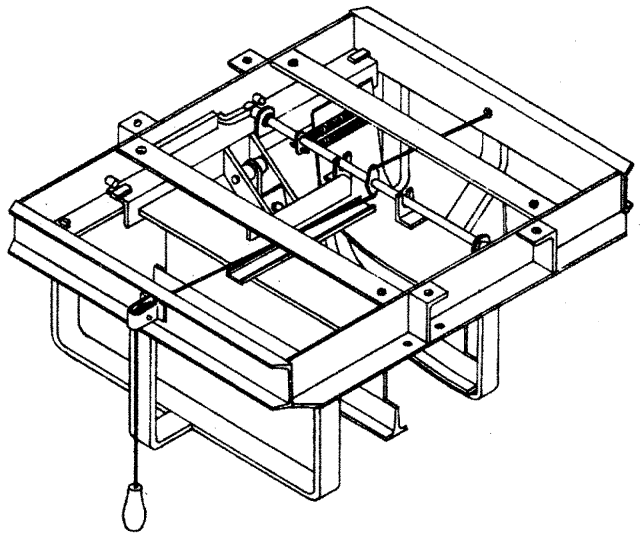
- 2,200 pounds per carrier head.
- 8,000 pounds on the sliding frame and at the outlets of the stationary frame.

Type 4 switches may be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Standard conductor spacing as illustrated in the Electrification Section is used for 2-bar and 3-bar switches. Special spacing of conductors is required for 4-bar switches. Elevation of conductors is 6-1/8 inch above the track tread for all Type 4 electrified switches. A wiring harness is furnished on electrified switches to provide power to the conductors in the switch. The harness also serves as a jumper to provide power to the conductors on the incoming tracks.

The sliding frame is a welded assembly consisting of structural angles and straight and curve tracks. The frame is supported on four roller assemblies. An energy absorbing stop is provided on the frame to protect the open end of the incoming track when the switch is set against the track. A spring loaded latch holds the switch tracks in alignment with the incoming tracks as the carrier moves through the switch.

The stationary frame is a welded assembly consisting of structural tees, angles and channels. The structural tees serve as runways for the roller assemblies supporting the sliding frame. Guards are provided on the frame to prevent a carrier from running off the open ends of switch tracks in the event a switch is thrown with a carrier on the sliding frame. Holes are provided in the frame for suspension of the switch. Slotted holes are provided for attaching the incoming tracks.

Type 4 switches are suspended by bolting direct to the superstructure using eight 3/4 inch bolts (recommended method) or by four 3/4 inch hanger rods. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Suspension hardware is not included with the switch and is ordered separately.

Incoming tracks are bolted to the stationary frame using two 3/4 inch heat treated capscrews, nuts and lockwashers. Slotted holes in the frame help in aligning the system by providing adjustment for the incoming tracks. Hardware is included with the switch and preparations for the incoming tracks.

Type 4 switch drawings and dimensional data are shown on Pages SW-15, SW-16 and SW-17. Switch suspension holes are indicated by the black dots. The drawings illustrate non-electrified switches; electrified switches have the same dimensions and outlines as shown for the non-electrified switches. The drawing and dimensional data for the 2-way right hand and left hand switches on Page SW-15 indicate the dimensions for 2-way right hand switches with 11 inch and 14 inch throw. Dimensions for left hand switches are identical; however, the layout is opposite from that shown and the dimensions are reversed about the centerline of the incoming straight tracks.

Suspension points for the incoming straight tracks are established so that the load on the stationary frame does not exceed its rated load of 8,000 pounds. Preferably, the first suspension point should be as close as possible to the stationary frame. The incoming curve tracks are supported as recommended in the Track & Fittings Section with a minimum of one suspension point on the curve.

Operating handles on the control chains are located approximately 8 feet below the track. Additional chain can be furnished as required.

Typical switching arrangements and minimum grouping dimensions for Type 4 switches are provided on Page SW-18.

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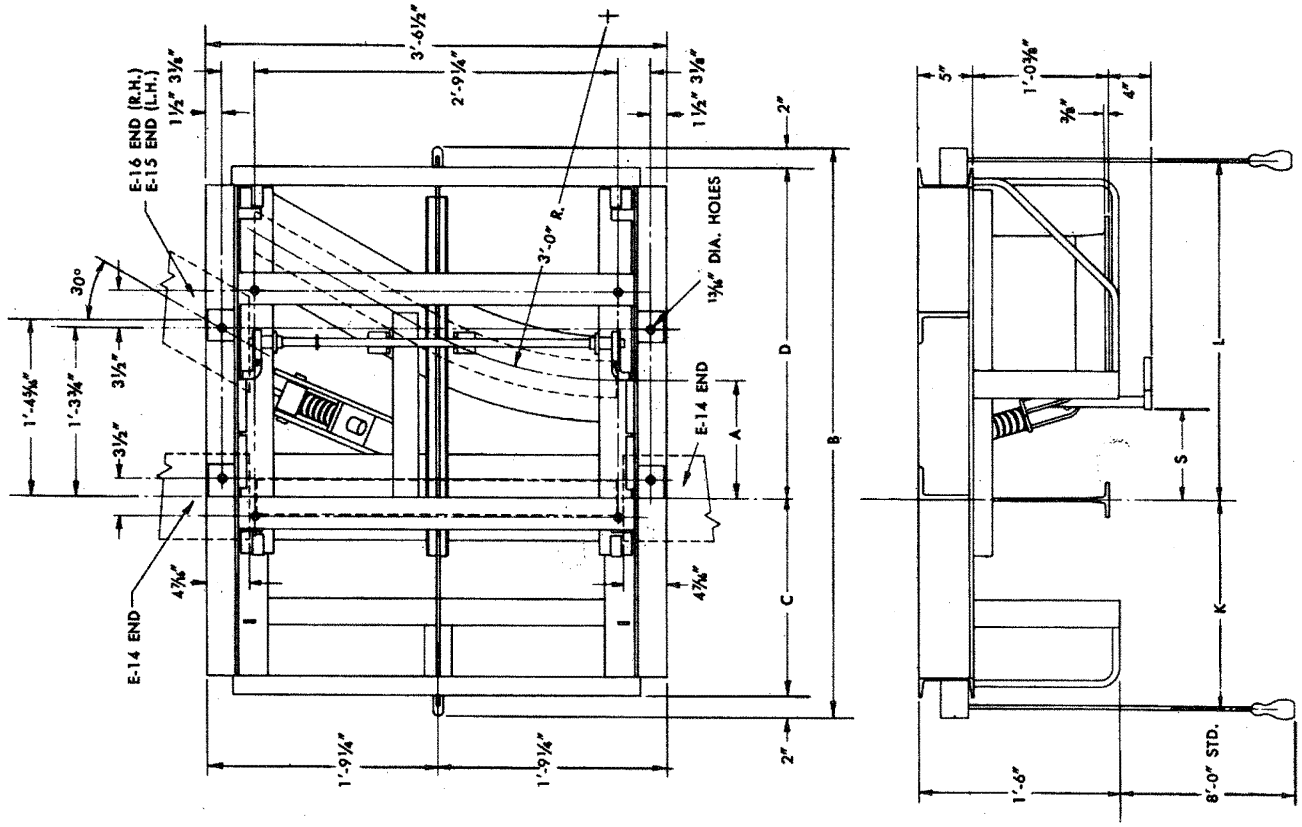
TYPE 4 SWITCHES

OUTLINE DRAWING OF 2-WAY RIGHT AND LEFT HAND SWITCHES

The drawing and table indicate the dimensions for 2-way right hand switches with 11" and 14" throw. Dimensions for left hand switches are identical, but the layout is opposite from that shown. (Left hand switch dimensions are reversed about the centerline of the incoming straight tracks.)

The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Eight 3/4" diameter bolts or four 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number		Type of	A						
Right Hand	Left Hand	Electrification	(Throw)	B	C	D	K	L	S
41012	41013	Non-Electrified	11 in.	4'-5	1'-6-1/4	2'-6-3/4	1'-7-1/4	2'-7-3/4	8-1/2
410312	410313	2-Bar Insul-8							
41070	41071	Non-Electrified	14 in.	4'-11	1'-9-1/4	2'-9-3/4	1'-10-1/4	2'-10-3/4	10-1/2
410370	410371	3-Bar Insul-8							

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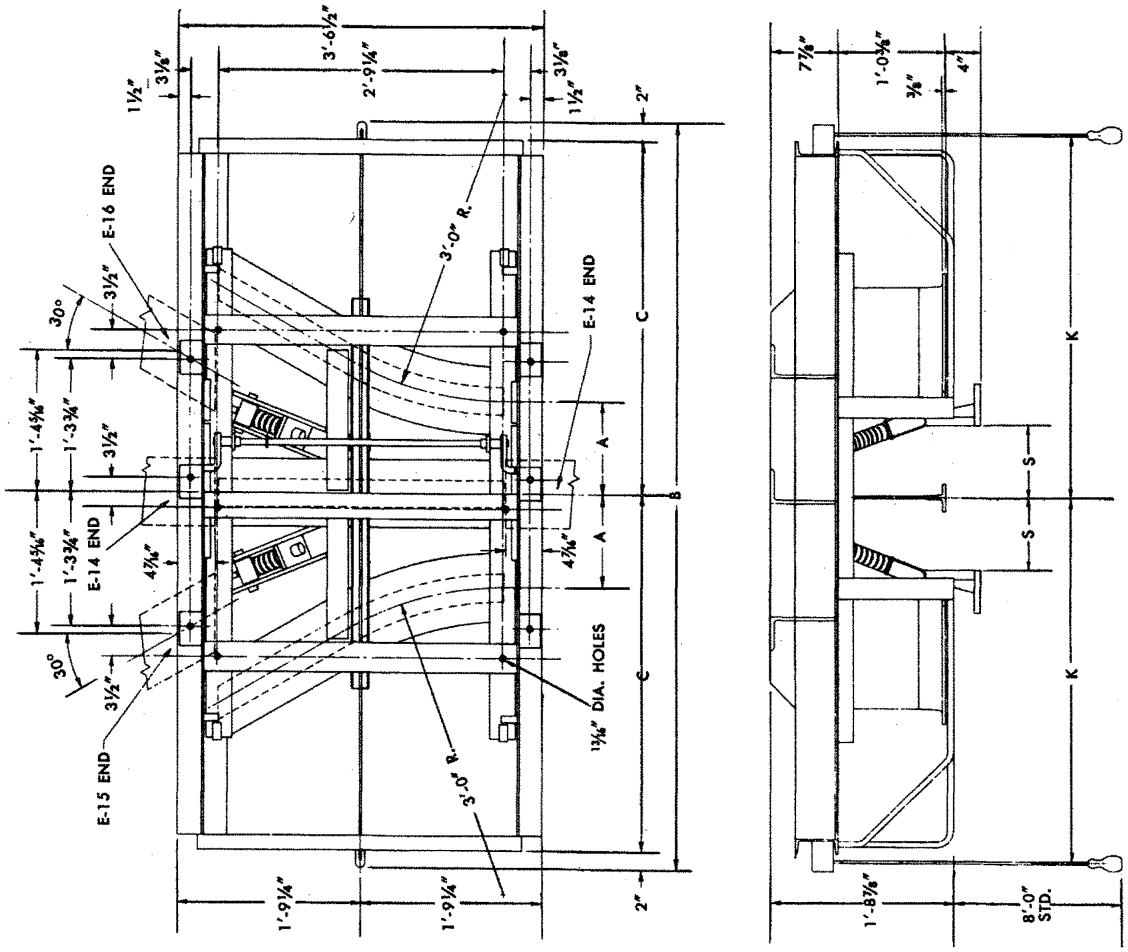
TYPE 4 SWITCHES

OUTLINE DRAWING OF 3-WAY SWITCH

The drawing and table indicate the dimensions for 3-way switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Eectrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Twelve 3/4" diameter bolts or six 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	K	S
41016	Non-Electrified	11 in.	7'-3-1/2	3'-5-3/4	3'-6-3/4	8-1/2
410316	2-Bar Insul-8					
41074	Non-Electrified	14 in.	8'-3-1/2	3'-11-3/4	4'-0-3/4	10-1/2
410374	3-Bar Insul-8					

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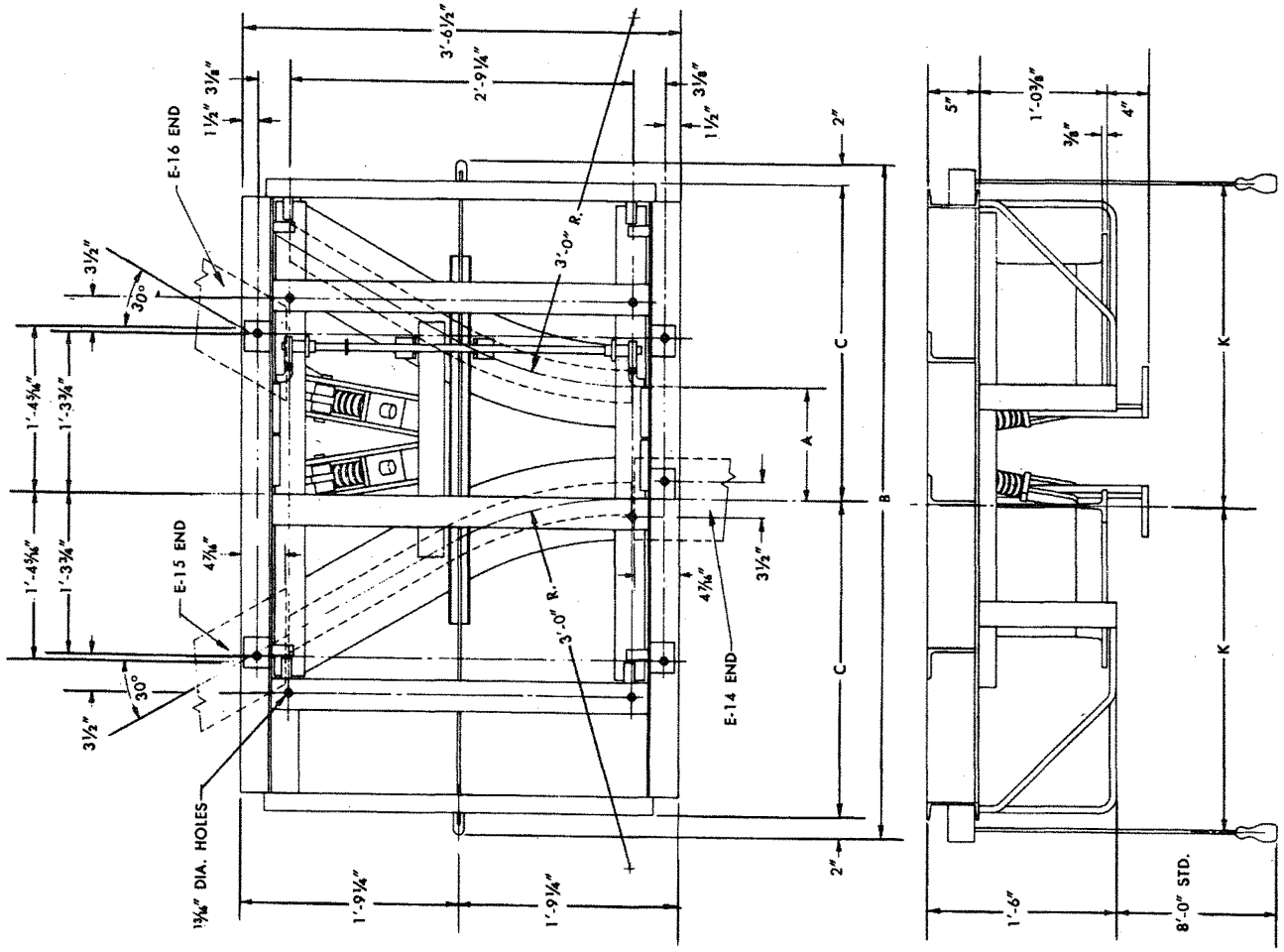
TYPE 4 SWITCHES

OUTLINE DRAWING OF 2-WAY Y SWITCH

The drawing and table indicate the dimensions for 2-way Y switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Electricified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Ten 3/4" diameter bolts or five 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	K
41020	Non-Electrified	11 in.	5'-5-1/2	2'-6-3/4	2'-7-3/4
410320	2-Bar Insul-8				
41076	Non-Electrified	14 in.	5'-11-1/2	2'-9-3/4	2'-10-3/4
410376	3-Bar Insul-8				

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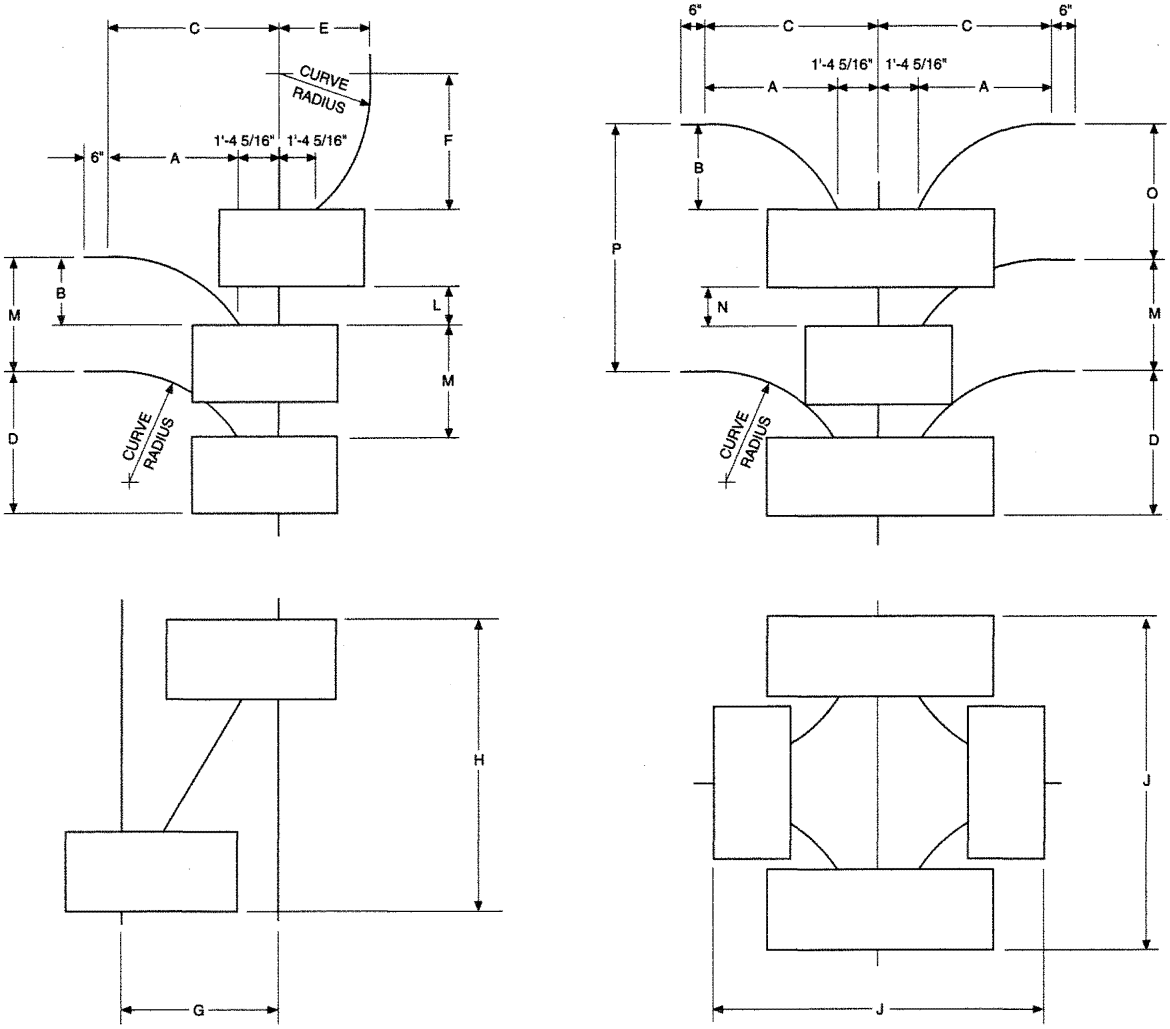
TYPE 4 SWITCHES

TYPICAL SWITCHING ARRANGEMENTS

The layouts illustrate some of the more frequently used switching arrangements and provide minimum grouping dimensions. The table lists dimensions for the more commonly used curve radii.

Close grouping of switches may require outriggers for remote operation of the control ropes to avoid interference between the ropes on one switch and a carrier leaving an adjacent switch. Consult factory for information on outriggers and remote operation.



Curve Radius	A	B	C	D	E	F	G	H	J
3'-6	3'-0-3/8	1'-9	4'-4-11/16	5'-3-1/2	3'-6	4'-7-3/4	4'-0	9'-3-5/8	-
4'-0	3'-5-9/16	2'-0	4'-9-7/8	5'-6-1/2	4'-0	5'-7-3/4	5'-0	11'-0-7/16	-
6'-0	5'-2-3/8	3'-0	6'-6-11/16	6'-6-1/2	6'-0	9'-7-3/4	6'-0	12'-9-3/16	14'-2-3/8
8'-0	6'-11-1/8	4'-0	8'-3-7/16	7'-6-1/2	8'-0	13'-7-3/4	7'-0	14'-6	15'-7-7/8
10'-0	8'-7-15/16	5'-0	10'-0-1/4	8'-6-1/2	10'-0	17'-7-3/4	8'-0	16-2-3/4	17'-1-1/2

MINIMUM DIMENSIONS	
11" Throw Switches	14" Throw Switches
L = 1'-2-1/2	L = 1'-7-3/4
M = 4'-9	M = 5'-2-1/4
N = 2'-9-1/2	N = 3'-8
O = 6'-4	O = 7'-2-1/2
P = 11'-1	P = 12'-4-3/4

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TYPE 5 SWITCHES

Type 5 switches are satisfactory for Class A, B, C or D service. They can be used with any of the heavy rail tracks (Nos. 34037 through 34066) and with hand propelled or motor driven carriers having 5 inch or 6-1/2 inch diameter wheels.

Type 5 switches are available for 2-way right or left hand, 2-way Y or 3-way operation. They have 30 degree outlets on the curve tracks. These switches are provided with 11 inch throw for non-electrified and 2-bar electrified systems and 14 inch throw for 3-bar and 4-bar electrified systems.

Rated loads for Type 5 switches are:

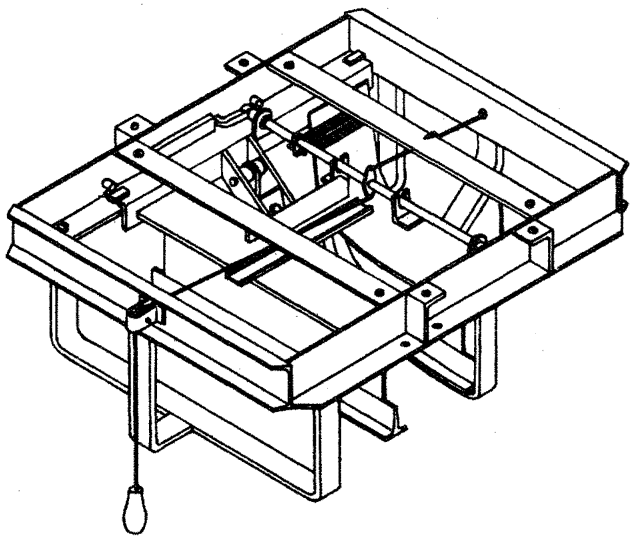
- 5,000 pounds per carrier head.
- 12,000 pounds on the sliding frame and at the outlets of the stationary frame.

Type 5 switches may be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Standard conductor spacing as illustrated in the Electrification Section is used for 2-bar and 3-bar switches. Special spacing of conductors is required for 4-bar switches. Elevation of conductors for Type 5 electrified switches is 6-1/8 inch above the track tread for 5 inch wheel carriers and 7-3/4 inch for 6-1/2 inch wheel carriers. A wiring harness is furnished on electrified switches to provide power to the conductors in the switch. The harness also serves as a jumper to provide power to the conductors on the incoming tracks.

The sliding frame is a welded assembly consisting of structural angles and straight and curve tracks. The frame is supported on four roller assemblies. An energy absorbing stop is provided on the frame to protect the open end of the incoming track when the switch is set against the track. A spring loaded latch holds the switch tracks in alignment with the incoming tracks as the carrier moves through the switch.

The stationary frame is a welded assembly consisting of structural tees, angles and channels. The structural tees serve as runways for the roller assemblies supporting the sliding frame. Guards are provided on the frame to prevent a carrier from running off the open ends of switch tracks in the event a switch is thrown with a carrier on the sliding frame. Holes are provided in the frame for suspension of the switch. Slotted holes are provided for attaching the incoming tracks.

Type 5 switches are suspended by bolting direct to the superstructure using eight 3/4 inch bolts (recommended method) or by four 3/4 inch hanger rods. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced



laterally and longitudinally to maintain alignment. Suspension hardware is not included with the switch and is ordered separately.

Incoming tracks are bolted to the stationary frame using two 3/4 inch heat treated capscrews, nuts and lockwashers. Slotted holes in the frame help in aligning the system by providing adjustment for the incoming tracks. Hardware is included with the switch end preparations for the incoming tracks.

Type 5 switch drawings and dimensional data are shown on Pages SW-20, SW-21 and SW-22. Switch suspension holes are indicated by the black dots. The drawings illustrate non-electrified switches; electrified switches have the same dimensions and outlines as shown for the non-electrified switches. The drawing and dimensional data for the 2-way right hand and left hand switches on Page SW-20 indicate the dimensions for 2-way right hand switches with 11 inch and 14 inch throw. Dimensions for left hand switches are identical; however, the layout is opposite from that shown and the dimensions are reversed about the centerline of the incoming straight tracks.

Suspension points for the incoming straight tracks are established so that the load on the stationary frame does not exceed its rated load of 12,000 pounds. Preferably, the first suspension point should be as close as possible to the stationary frame. The incoming curve tracks are supported as recommended in the Track & Fittings Section with a minimum of one suspension point on the curve.

Operating handles on the control chains are located approximately 8 feet below the track. Additional chain can be furnished as required.

Typical switching arrangements and minimum grouping dimensions for Type 5 switches are provided on Page SW-23.

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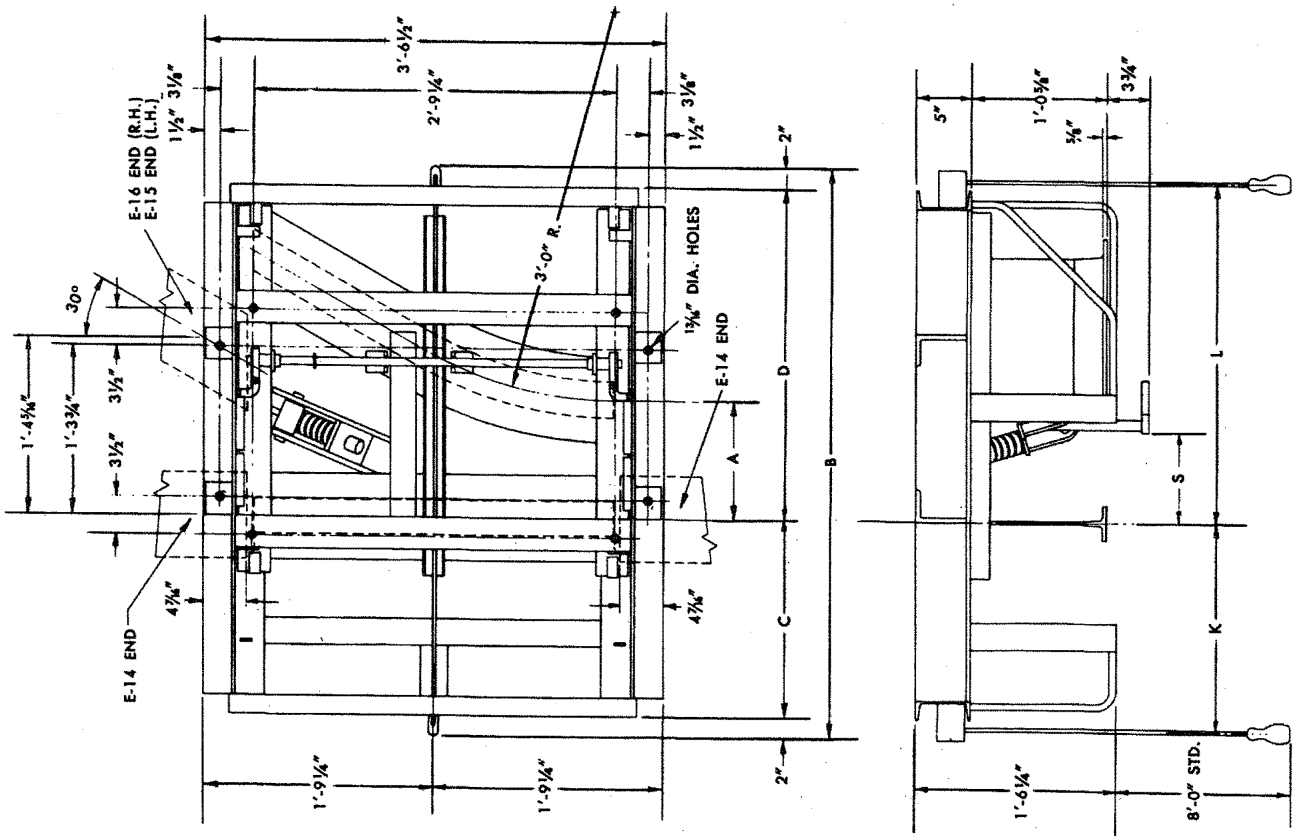
TYPE 5 SWITCHES

OUTLINE DRAWING OF 2-WAY RIGHT AND LEFT HAND SWITCHES

The drawing and table indicate the dimensions for 2-way right hand switches with 11" and 14" throw. Dimensions for left hand switches are identical, but the layout is opposite from that shown. (Left hand switch dimensions are reversed about the centerline of the incoming straight tracks.)

The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Eight 3/4" diameter bolts or four 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number		Type of	A						
Right Hand	Left Hand	Electrification	(Throw)	B	C	D	K	L	S
41024	41025	Non-Electrified	11 in.	4'-5	1'-6-1/4	2'-6-3/4	1'-7-1/4	2'-7-3/4	8-1/2
410324	410325	2-Bar Insul-8							
41078	41079	Non-Electrified	14 in.	4'-11	1'-9-1/4	2'-9-3/4	1'-10-1/4	2'-10-3/4	10-1/2
410378	410379	3-Bar Insul-8							

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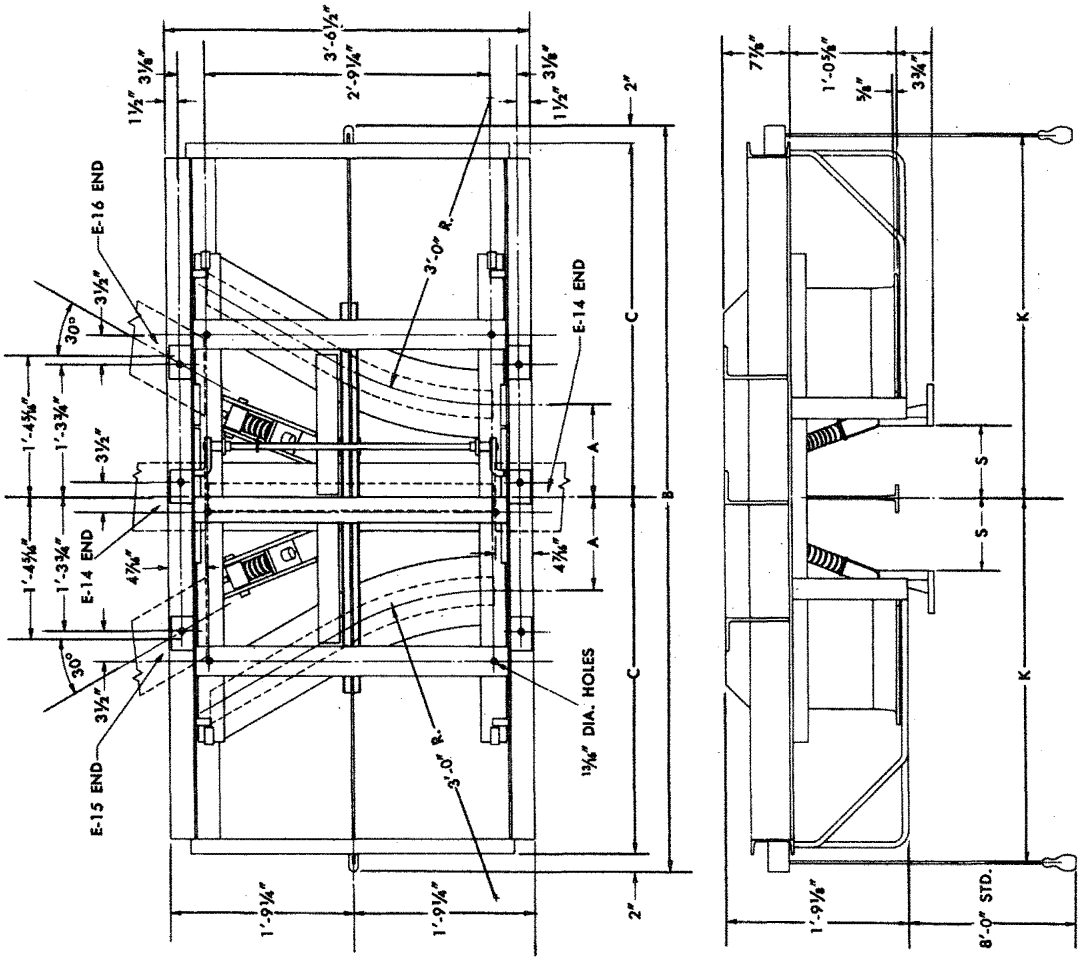
TYPE 5 SWITCHES

OUTLINE DRAWING OF 3-WAY SWITCH

The drawing and table indicate the dimensions for 3-way switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Twelve 3/4" diameter bolts or six 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	K	S
41028	Non-Electrified	11 in.	7'-3-1/2	3'-5-3/4	3'-6-3/4	8-1/2
410328	2-Bar Insul-8					
41082	Non-Electrified	14 in.	8'-3-1/2	3'-11-3/4	4'-0-3/4	10-1/2
410382	3-Bar Insul-8					

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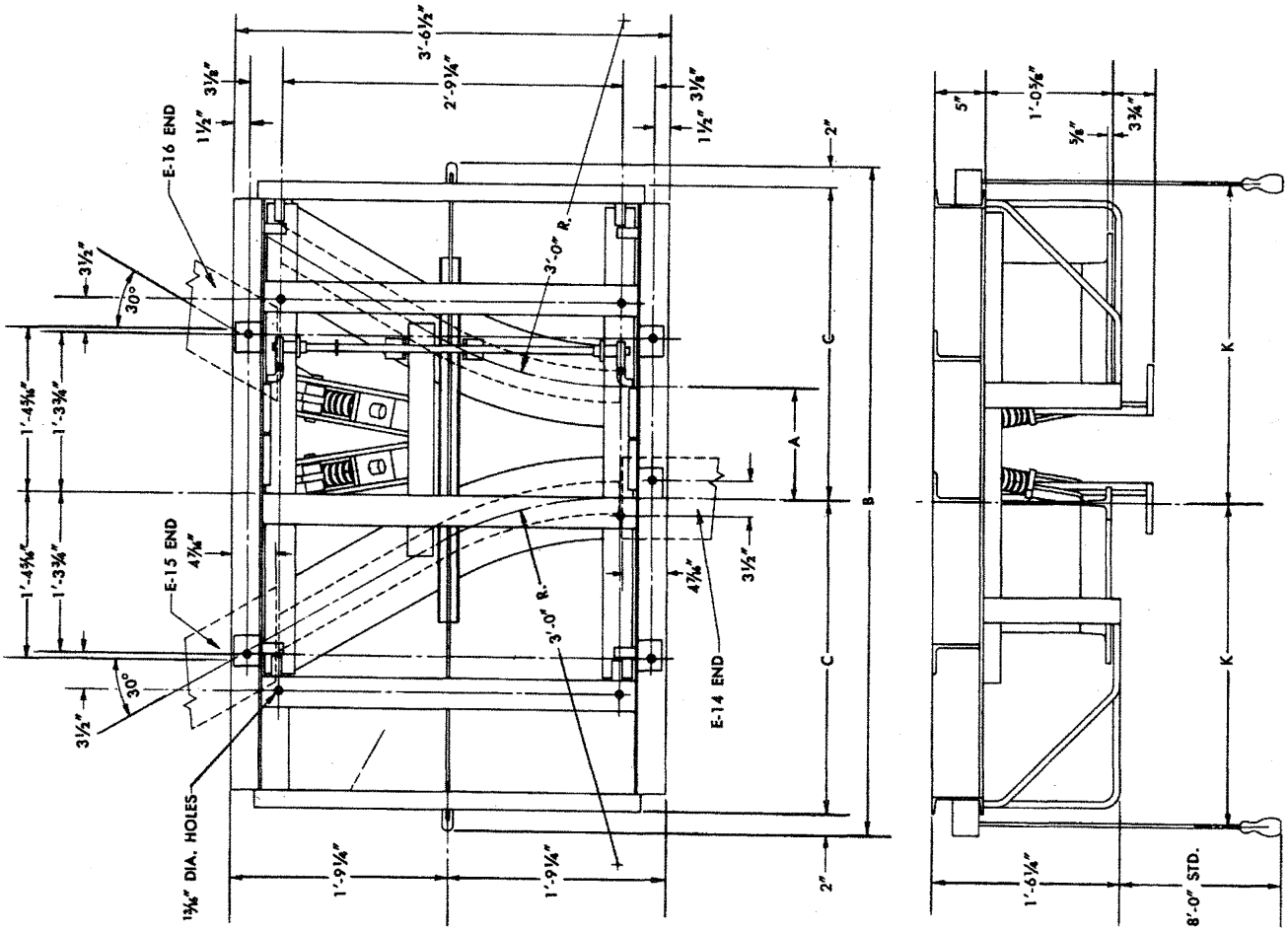
TYPE 5 SWITCHES

OUTLINE DRAWING OF 2-WAY Y SWITCH

The drawing and table indicate the dimensions for 2-way Y switches with 11" and 14" throw. The drawing illustrates the non-electrified switch. Electrified switches have the same dimensions and outline as shown for the non-electrified switch.

The black dots indicate 13/16" diameter holes for switch suspension. Ten 3/4" diameter bolts or five 3/4" diameter hanger rods are required to support the switch. Hanger rods are used with No. 340127 switch cleats which bolt to the stationary frame. When suspended from rods, the switch is braced laterally and longitudinally to maintain alignment.



Item Number	Type of Electrification	A (Throw)	B	C	K
41032	Non-Electrified	11 in.	5'-5-1/2	2'-6-3/4	2'-7-3/4
410332	2-Bar Insul-8				
41084	Non-Electrified	14 in.	5'-11-1/2	2'-9-3/4	2'-10-3/4
410384	3-Bar Insul-8				

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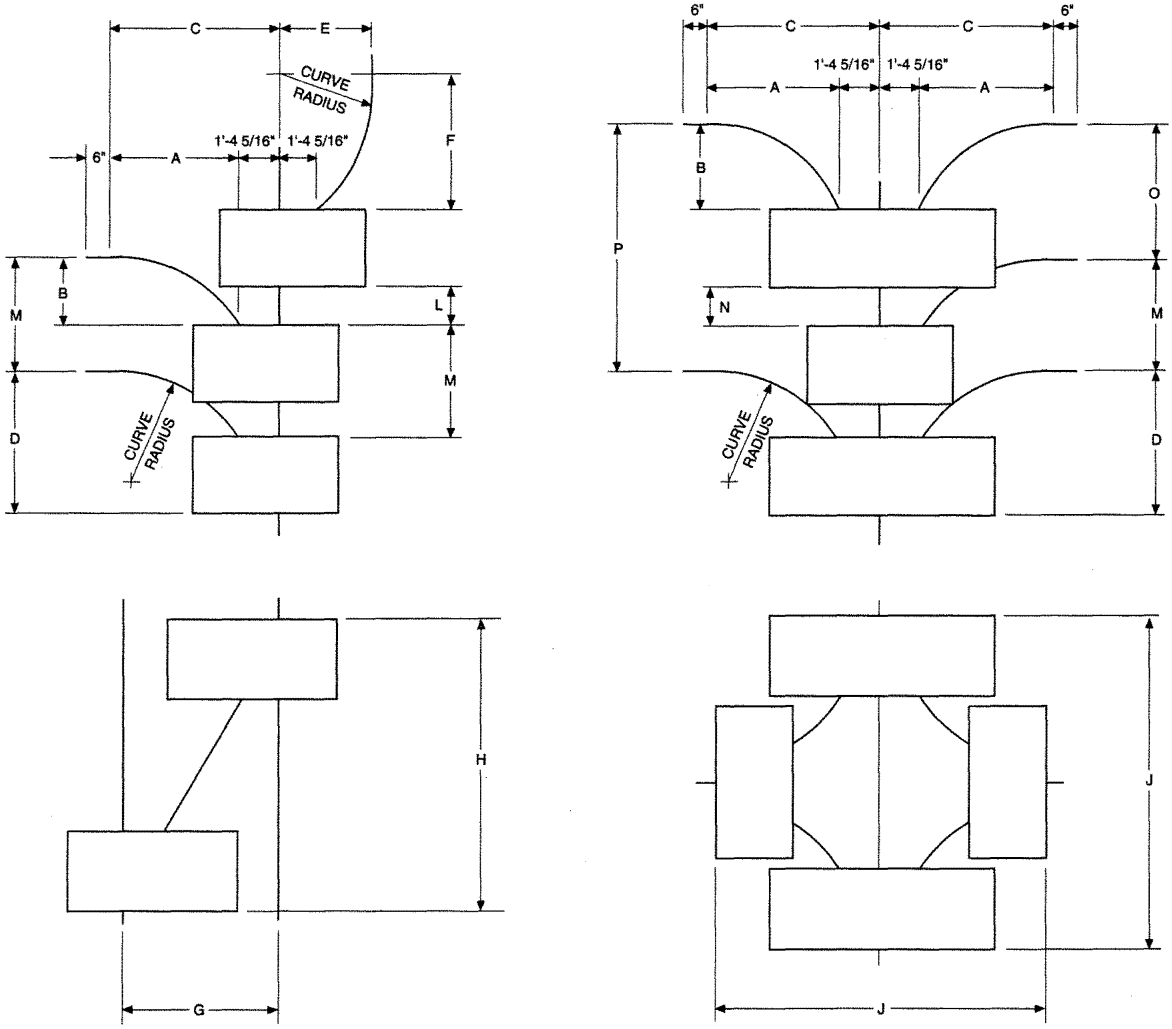
TYPE 5 SWITCHES

TYPICAL SWITCHING ARRANGEMENTS

The layouts illustrate some of the more frequently used switching arrangements and provide minimum grouping dimensions. The table lists dimensions for the more commonly used curve radii.

Close grouping of switches may require outriggers for remote operation of the control ropes to avoid interference between the ropes on one switch and a carrier leaving an adjacent switch. Consult factory for information on outriggers and remote operation.



Curve Radius	A	B	C	D	E	F	G	H	J
4'-0	3'-5-9/16	2'-0	4'-9-7/8	5'-6-1/2	4'-0	5'-7-3/4	5'-0	11'-0-7/16	-
6'-0	5'-2-3/8	3'-0	6'-6-11/16	6'-6-1/2	6'-0	9'-7-3/4	6'-0	12'-9-3/16	14'-2-3/8
8'-0	6'-11-1/8	4'-0	8'-3-7/16	7'-6-1/2	8'-0	13'-7-3/4	7'-0	14'-6	15'-7-7/8
10'-0	8'-7-15/16	5'-0	10'-0-1/4	8'-6-1/2	10'-0	17'-7-3/4	8'-0	16-2-3/4	17'-1-1/2
12'-0	10'-4-11/16	6'-0	11'-9	9'-6-1/2	12'-0	21'-7-3/4	9'-0	17'-11-9/16	18'-7

MINIMUM DIMENSIONS	
11" Throw Switches	14" Throw Switches
L = 1'-2-1/2	L = 1'-7-3/4
M = 4'-9	M = 5'-2-1/4
N = 2'-9-1/2	N = 3'-8
O = 6'-4	O = 7'-2-1/2
P = 11'-1	P = 12'-4-3/4

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TYPE 7 CROSSOVER

Type 7 crossovers are satisfactory for Class A, B or C service. They can be used with any of the light rail sections (Nos. 34011 through 34031) and with hand propelled or motor driven carriers having 4 inch or 5 inch diameter wheels. The Type 7 crossover allows two monorail tracks at the same elevation to cross at right angles. It is not designed to operate with a carrier on the rotating track.

Rated loads for Type 7 crossovers are:

- 2,000 pounds per carrier head.
- 4,000 pounds on the rotating frame and at the outlets of the stationary frame.

Type 7 crossovers may be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Standard conductor spacing as illustrated in the Electrification Section is used for 2-bar and 3-bar crossovers. Special conductor spacing is required for 4-bar crossovers. Elevation of conductors is 6-1/8 inch above track tread. A wiring harness is furnished on electrified crossovers to provide power to the conductors in the crossover. The harness also serves as a jumper to provide power to the conductors on the incoming tracks.

The rotating frame is a welded assembly consisting of structural channels and plates, a center pin and a straight track. The center pin supports the frame from a thrust bearing in the stationary frame. Stops are provided to protect the open ends of the incoming tracks when the crossover is set against the track. A spring loaded latch holds the crossover track in alignment with the incoming tracks as the carrier moves through the crossover.

The stationary frame is a welded assembly consisting of structural channels and plates. Four rollers in the frame stabilize the rotating frame. Holes are provided in the frame for suspension of the crossover. Slotted holes are provided for attaching the incoming tracks.

Type 7 crossovers are suspended by bolting direct to the superstructure using sixteen 5/8 inch bolts, nuts and lockwashers. Suspension hardware is not included with the crossover and must be ordered separately.

Incoming tracks are bolted to the stationary frame using four 5/8 inch heat treated capscrews, nuts and lockwashers. Slotted holes in the frame help in aligning the system by providing adjustment for the incoming tracks. Hardware is included with the switch and preparations for the incoming tracks

Suspension points for incoming tracks are established so that the load on the stationary frame does not exceed its rated load of 4,000 pounds. Preferably, the first suspension point should be as close as possible to the stationary frame. If incoming tracks are curved, they are supported as recommended in the Track & Fittings Section.

Operating handles on the control chains are located approximately 8 feet below the track. Additional chain can be furnished as required.

Optional accessories for Type 7 crossovers include electric baffles, air or electric operation, signal lights and protective hoods.

TYPE 8 TURNTABLE

Type 8 turntables are identical to Type 7 crossovers except that guards on the stationary frame allow rotation of the unit with a loaded carrier on the track. They can be used with any of the light rail sections (Nos. 34011 through 34031) and with hand propelled or motor driven carriers having 4 inch or 5 inch diameter wheels and a 21 inch or less wheelbase.

Rated loads for Type 8 turntables are the same as the Type 7 crossovers. They may be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Suspension of Type 8 turntables and their incoming tracks is the same as used for Type 7 crossovers.

Special turntables can be provided for applications where monorail tracks cross at an angle different than 90 degrees, carriers have a wheelbase greater than 21 inch, or rated loads are greater than 4,000 pounds. Consult factory for information on these applications.

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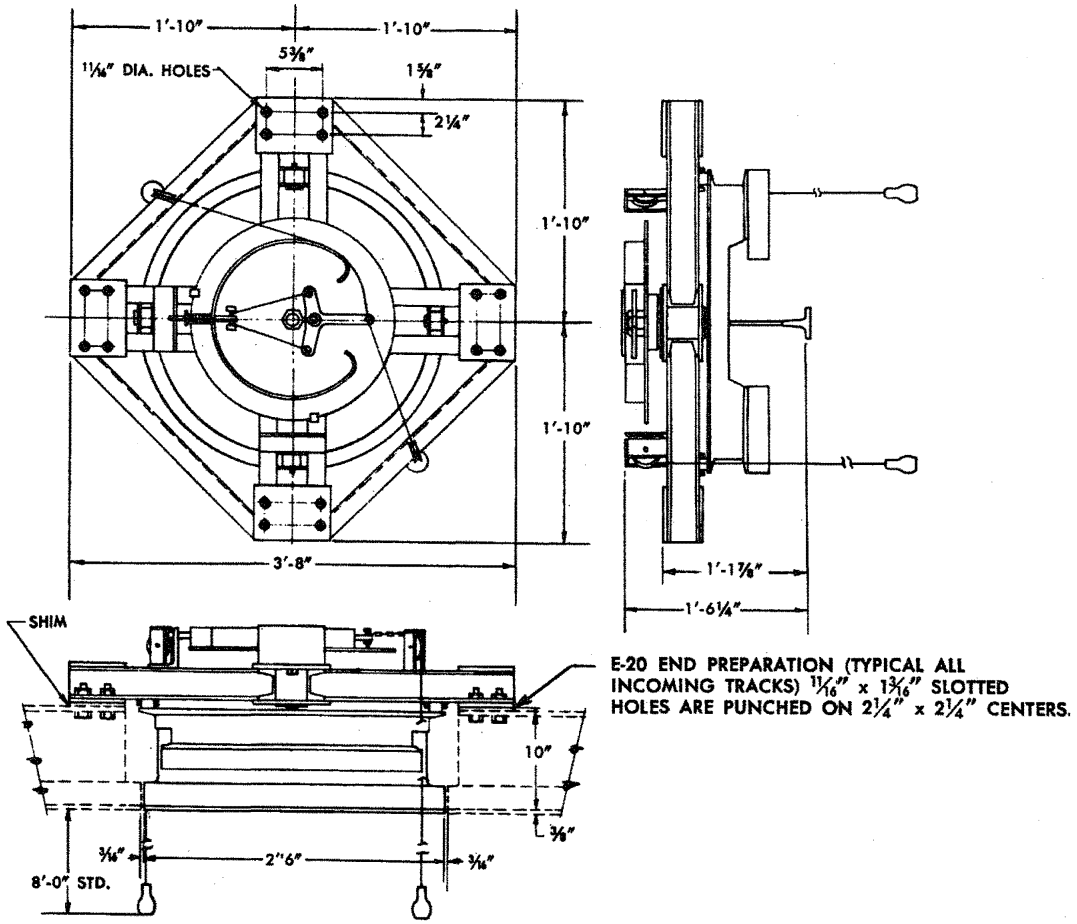
TYPE 7 CROSSOVER
TYPE 8 TURNTABLE

OUTLINE DRAWING

The drawing illustrates and provides dimensions for a non-electrified Type 7 crossover. Electrified crossovers have the same dimensions and outline as the non-electrified crossover. Dimensions and outline for Type 8 turntables are identical to those shown but with the addition of guards to the stationary frame.

The black dots indicate 11/16 inch diameter holes for suspension of the crossover. Sixteen 5/8 inch bolts are required to support the crossover.



Type 7 Crossover		Type 8 Turnable	
Item Number	Type of Electrification	Item Number	Type of Electrification
41050	Non-Electrified	41048	Non-Electrified
41035002	2-Bar Insul-8-Bar	41034802	2-Bar Insul-8-Bar
41035003	3-Bar Insul-8-Bar	41034803	3-Bar Insul-8-Bar

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GENERAL INFORMATION

For motor driven systems, electric current must be transferred from the building power source to the moving equipment. To accomplish this, a system of current conductors and collectors, supports and other accessories, known as electrification, is used.

Most Trambeam systems can be electrified to provide the power to the motors of electrically driven equipment. Monorail systems with Type 2 switches cannot be electrified because of space limitations.

Insul-8-Bar enclosed conductors are generally used for electrifying runway track and monorail systems. They are also used for electrifying cranes. Festooned cable conductors are also available and are generally used for electrifying cranes. They may be used for electrifying runway track and monorail systems. Insul-8-Bar and festooned cable systems are briefly described below. Consult factory for data when other electrification systems are specified.

Many underhung crane and monorail systems have been installed using open conductors (without insulating covers) and have operated successfully for many years. However, the National Electric Code now requires that runway conductors be guarded and open conductors are no longer recommended. Consult factory for data when open conductors are required for expansion of existing systems.

INSUL-8-BAR ELECTRIFICATION

Insul-8-Bar electrification is a dependable system for all crane and monorail applications. The conductors are rigid, figure-8 bars furnished in standard lengths and enclosed in specially compounded covers. They are available in ampacities of 90, 110 and 250 amperes and with PVC covers (for temperatures to 160 deg. F), medium heat covers (for temperatures to 250 deg. F), or high heat covers (for temperature to 400 deg. F). See Pages ES-3 through ES-14 for data on conductors, accessories, collectors and arrangements at transfers and switches.

FESTOONED ELECTRIFICATION

Festooning of electrical cables is an efficient way to deliver electric current to the crane, carrier and hoist motors of a motor driven crane. Flat cables are used for motor driven cranes and are supported from cable carriers operating in a galvanized steel C-track. The conductors are enclosed in a PVC orange colored jacket. Festooned electrification is well suited for use in damp, humid atmospheres.

TAGLINE ELECTRIFICATION

Tagline electrification is used on hand propelled cranes. Round cable is used to supply power to the hoist and is supported by slide rings from a wire. The slide wire is supported at each end by brackets with eyebolts providing wire tension.

CONDUCTOR SELECTION

Insul-8-Bar 90 ampere galvanized steel conductors will be satisfactory for most applications. On applications with larger horsepower motors, long runways or an unusual environment, consideration is given to the following when selecting the conductor and cover:

- AMPACITY - the current carrying capacity of the conductors expressed in amperes.
- VOLTAGE DROP - the arithmetical difference between the voltages at the load and supply ends of the conductor expressed as a percentage of the supply voltage.
- AMBIENT CONDITIONS - the characteristics of the atmosphere in which the system is located.

AMPACITY for a single carrier or crane is the nameplate full-load ampere rating of the largest motor or

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INSUL-8-BAR® ELECTRIFICATION

group of motors for any single motion plus 50% of the name-plate full-load ampere rating of the next largest motor or group of motors. For multiple carriers or cranes, compute the ampacity for each carrier or crane, add them together and multiply the sum by the demand factor from the table.

Number of Carriers or Cranes	Demand Factor
2	0.95
3	0.91
4	0.87
5	0.84
6	0.81
7	0.78

VOLTAGE DROP increases in direct proportion to the effective length of the conductors. The effective length is the distance from the powerfeed to the end of the conductor run. Powerfeeds are usually located at the center of a system resulting in the effective length being one-half the conductor length. Additional feed points may be necessary on longer systems to limit the voltage drop. The voltage drop for Insul-8-Bar conductors and 3 phase, 60 hertz, alternating current is shown in the table. Voltage drop is limited to 3% on runways and 2% on crane conductors.

Voltage Drop per 100 Feet of Effective Length per 100 Amperes of Current	
Galvanized Steel - 90 Amperes	16.20
Galvanized Steel - 110 Amperes	13.40
Stainless Clad Copper - 250 Amperes	2.01
Copper Steel Laminate - 250 Amperes	2.01

AMBIENT CONDITIONS. Temperature is of prime importance in selecting the electrification system. However, high humidity and the presence of chemicals or radiation should also be considered in selecting both the conductor and the cover; consult factory for recommendations on applications with these conditions.

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INSUL-8-BAR® ELECTRIFICATION

Rigid, hollow, figure-8 bars enclosed in specially compounded covers are used as conductors for Insul-8-Bar electrification. They are shipped in 10' lengths with connector pins and covers assembled to the bars. Conductor materials and ratings are:

- GALVANIZED STEEL - 90 and 110 Amperes.
- STAINLESS CLAD COPPER LAMINATE - 250 Amperes.
- COPPER STEEL LAMINATE - 250 Amperes.

Conductors are available with PVC covers for operating temperatures to 160 deg. F, with medium heat covers for temperatures to 250 deg. F or with high heat covers for temperatures to 400 deg F. Each cover type meets all requirements for plastic electrical insulation and may be used indoors or outdoors. Covers are non-burning and will not support combustion. All conductor bars and covers are dimensionally interchangeable except 90 amperes galvanized steel bar which uses larger diameter connector pins.

Expansion sections are installed every 300 feet for systems using galvanized steel conductors and every 200 feet for systems using stainless clad copper laminate or copper steel laminate conductors. They are factory assembled, ready for installation.

Conductors with PVC covers for curve track are formed to the curve radius in the field. Conductors with medium heat or high heat covers for curve tracks are factory fabricated.

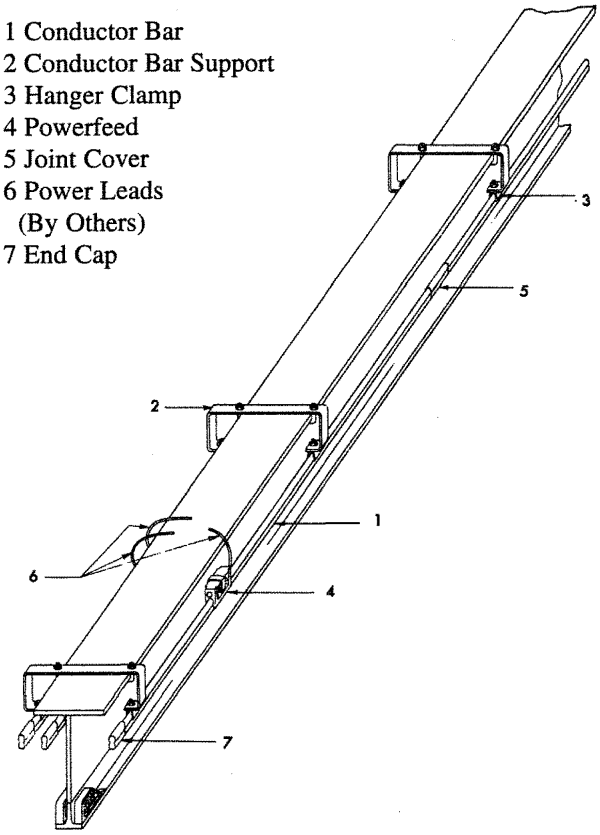
Stainless steel (40 ampere rating), formed electrolytic copper (350 ampere rating) and solid copper (500 ampere rating) conductors with PVC, medium heat or high heat covers are also available.

Conductors are suspended from track by supports which clamp to the top flange (Nos. 34011 through 34046 tracks) or bolt to the web (Nos. 34051 through 34079 tracks). Plastic snap-in hanger clamps are provided with each support. They grip the figure-8 shape and support the conductors. Crossbolt steel hanger clamps are used to support conductors on curve track. Recommended support spacing is 5' on straight runs and 3' on curves.

Conductor lengths are joined using a connecting tool which forces the connector pins on one conductor into the adjacent conductor. Connector pins bond the sections mechanically and electrically.

Snap-on joint covers are furnished to provide a continuous cover at the joints.

1 Conductor Bar
2 Conductor Bar Support
3 Hanger Clamp
4 Powerfeed
5 Joint Cover
6 Power Leads (By Others)
7 End Cap



Powerfeeds provide taps for connecting the power and control sources to the conductor. They clamp to the upper lobe of the conductor and can be installed at any point along the conductor.

Collectors are sliding shoe type with spring loaded arms to maintain contact shoe pressure. The contact heads articulate and swivel to allow for conductor misalignment. Self-centering collectors are available for discontinuous circuits.

Radi-8-Bar heated conductor systems are available to prevent icing and to de-ice conductors during icing conditions. An insulated heater wire is fed through the lower lobe of the conductor and hollow connector pins in a continuous length. The wire is thermostatically controlled by the ambient temperature. When the temperature falls to +35 deg. F, a thermostat closes and operates a contactor to energize the system. Power requirements for the heater systems (when in operation) are from 5 to 15 watts per conductor foot.

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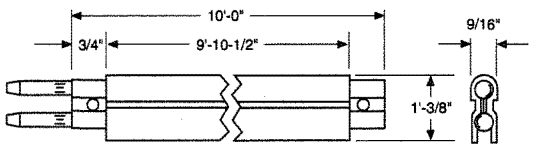
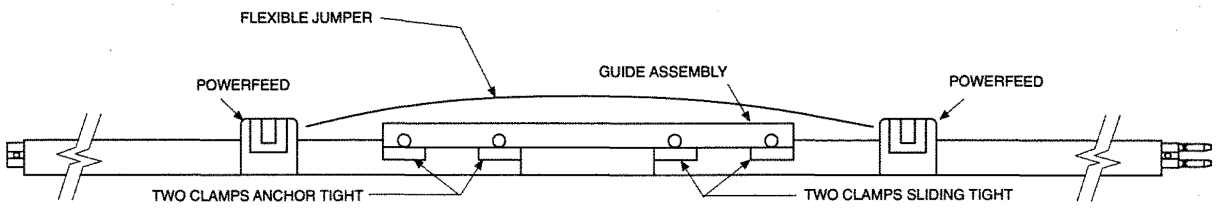
INSUL-8-BAR® ELECTRIFICATION

CONDUCTOR BAR



ITEM NUMBER			Description
With PVC Covers	With Medium Heat Covers	With High Heat Covers	
550270	**550272**	**550273**	10' long steel bar with steel connector pins and cover factory assembled. RATING: 90 Amperes
550271	-	-	Same as No. 550270 galvanized steel bar except with No. 550281 transfer insulator assembled at one end. They are used in the power circuit at interlock and discharge point gaps.
550422	**550250**	**550445**	10' long steel bar with steel connector pins and cover factory assembled. RATING: 110 Amperes
550407	-	-	Same as No. 550422 galvanized steel bar except with No. 550375 transfer insulator assembled at one end. They are used in the power circuit at interlock and discharge point gaps.
550441	**550252**	**550447**	10' long stainless clad copper laminate with copper connector pins and cover factory assembled. RATING: 250 Amperes
550445	**550254**	**550449**	10' long copper steel laminate bar with copper conector pins and cover factory assembled. RATING: 250 Amperes

EXPANSION SECTIONS



ITEM NUMBER			Description
With PVC Covers	With Medium Heat Covers	With High Heat Covers	
550274	**550275**	**550276**	10' long steel bar with steel connector pins, cover, and guide assembly, No. 550437 power feeds and flexible jumper factory assembled. RATING: 90 Amperes
550453	**550258**	**550458**	10' long steel bar with steel connector pins, cover, guide assembly, No. 550437 power feeds and flexible jumper factory assembled. RATING: 110 Amperes
550455	**550269**	**550459**	10' long stainless clad copper laminate bar with copper connector pins, cover, guide assembly, No. 550467 power feeds and flexible jumper factory assembled. RATING: 250 Amperes
550456	**550260**	**550460**	10' long copper steel laminate bar with copper connector pins, cover, guide assembly, No. 550467 power feeds and flexible jumper factory assembled. RATING: 250 Amperes

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INSUL-8-BAR® ELECTRIFICATION

SNAP-IN HANGER CLAMP

550402

Molded plastic clamps are used for indoor and outdoor applications and for temperatures to 250 Deg. F. They are not recommended for curves.

CROSS-BOLT HANGER CLAMPS

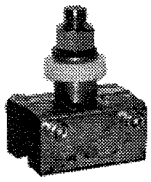
550429

Plated steel clamps are used for indoor applications and are recommended for curves.

550417

Same as No. 550429 except with insulator. They are used for outdoor applications, where ambient conditions warrant additional insulation, and for temperatures to 400 Deg. F.

ANCHOR CLAMP



550400

Plated steel clamps are used on conductor bars at transfer gaps to prevent cover from moving on bar..

END COVERS

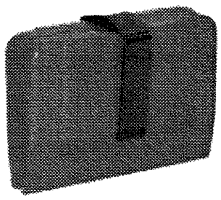
550278

Molded plastic caps used at ends of conductor runs for 90 amp steel bar and temperatures to 300 Deg. F.

550438

Molded plastic caps used at ends of conductor runs for 110 and 250 amp bars and temperatures to 300 Deg. F.

POWERFEEDS



550437

Steel clamp type powerfeeds are used for 90/110 amp steel conductors only. For #3 through #0 crimp lugs and temperatures to 160 Deg. F.

550277

Same as 550437 except with high heat case for temperatures to 400 Deg. F.

550467

Copper clamp type powerfeeds are used on systems using #8 through 1/0 AWG feed wires. For temperatures to 160 Deg. F.

550386

Same as No. 550467 except with high heat case for temperatures to 400 Deg. F.

CONNECTOR PINS

550279

Galvanized steel pin used with 90 amp steel bar.

550280

Galvanized steel transition pin for connecting 90 amp and 110 amp steel bars.

550351

Galvanized steel pin used with 110 amp steel bar.

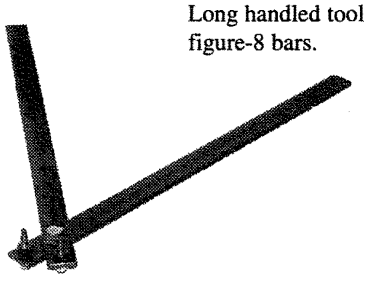
550383

Copper pins used with stainless clad copper and copper steel laminate bars.

CONNECTOR TOOL

550358

Long handled tool for connecting hollow figure-8 bars.



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INSUL-8-BAR® ELECTRIFICATION

TRANSFER CAPS

550278

Molded plastic caps used with 90 amp steel bar at conductor gaps of straight switch tracks and with pickup guide for discontinuous circuits. For temperatures to 300 Deg. F.

550282

Same as No. 550278 but with left hand bevel for conductor gaps of curve switch tracks.

550283

Same as No. 550278 but with right hand bevel for conductor gaps of curve switch tracks.

550347

Molded plastic caps used with 110 amp steel bar at conductor gaps of straight switch tracks and with pickup guide for discontinuous circuits. For temperatures to 300 Deg. F

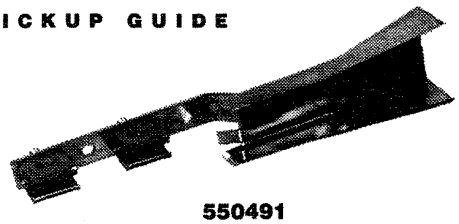
550348

Same as No. 550347 but with left hand bevel for conductor gaps of curve switch tracks.

550349

Same as No. 550347 but with right hand bevel for conductor gaps of curve switch tracks.

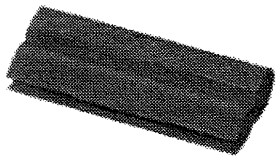
PICKUP GUIDE



550491

Metal guides used to retrack collectors on conductors of discontinuous circuits. Minimum conductor spacing is 3 in.

JOINT COVERS



550421

Plastic covers provide a continuous cover at joints. They are used with PVC covers.

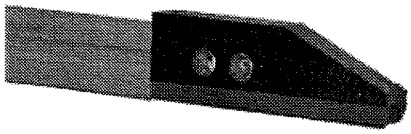
550414

Similar to No. 550421 but are used with medium heat covers for temperatures of 250 Deg. F.

550470

Similar to No. 550421 but are used with high heat covers for temperatures of 400 Deg. F.

TRANSFER INSULATORS



550281

Phenolic insulatros used at each end of power conductors at interlock and discharge point gaps. For 90 amp steel bars only.

550375

Similar to No. 550281 but used with 110 amp steel bars and 250 amp stainless clad copper laminate and copper steel laminate bars.

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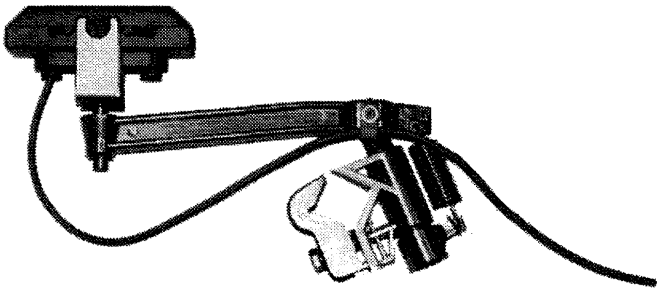
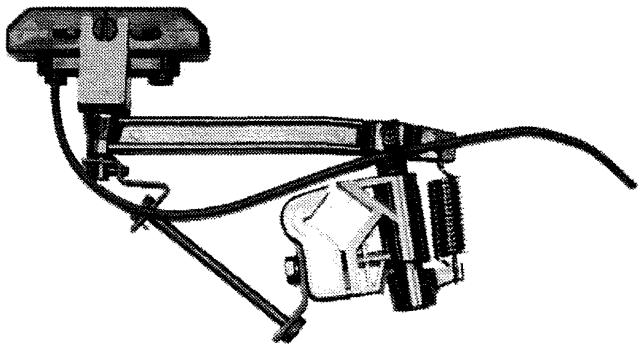
INSUL-8-BAR ELECTRIFICATION

COLLECTORS



560394
Sliding shoe collector used for straight and curve conductor runs. Spring loaded arms maintain contact shoe pressure. The head and contact shoe assembly articulates and swivels to allow for conductor misalignment. Shoes are mounted in non-conducting cases and are easily replaced.
RATING: 30 Amperes

560395
Sliding shoe collectors used for straight conductor runs only. They are similar to No. 560394 but with larger head and contact shoe assemblies.
RATING: 100 Amperes.



560393
Sliding shoe collectors used for discontinuous circuits and for straight and curve conductor runs. They are similar to No. 560394 collectors but have self-centering devices to maintain head alignment when collectors are not tracking on the conductors.
RATING: 30 Amperes

560397
Sliding shoe collectors used for discontinuous circuits and for straight conductor runs only. They are similar to No. 560395 collectors but have self-centering devices to maintain head alignment when collectors are not tracking on the conductors.
RATING: 100 Amperes

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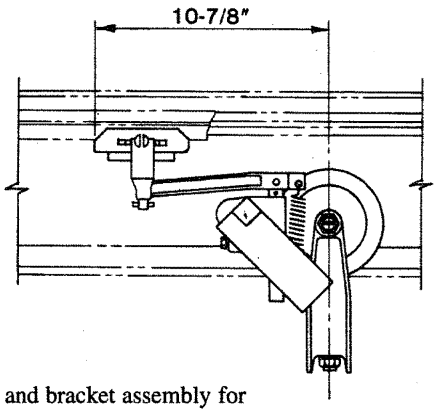
INSUL-8-BAR® ELECTRIFICATION

COLLECTOR BRACKETS

Collectors are generally supported from brackets bolted to the carrier heads of carriers and crane end trucks. The brackets for crane end trucks match the collectors to the conductor elevations and spacings shown on Page ES-11. Brackets for monorail carriers match the collectors to the conductor elevations and spacings shown on Page ES-12. Brackets for carriers operating on cranes match the collectors to the conductor elevations and spacings shown in the Crane Section.

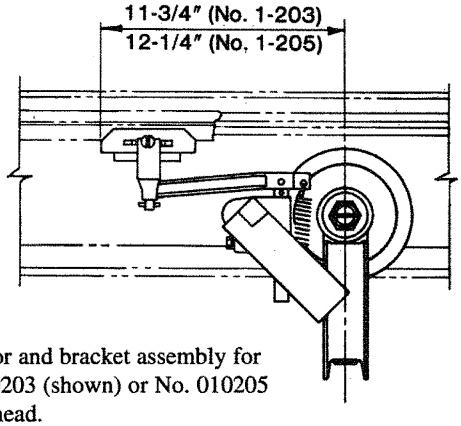
The drawings illustrate the brackets for No. 560394 collectors and for conductor elevations of 6-1/8 inch (4 inch and 5 inch diameter wheels) and 7-3/4 inch (6-1/2 inch diameter wheels). Dimensions are for the No. 560394 collector. Brackets for No. 560395 collectors are identical to those shown; add 1 inch to the dimensions for the No. 560394 collectors.

COLLECTOR & BRACKET



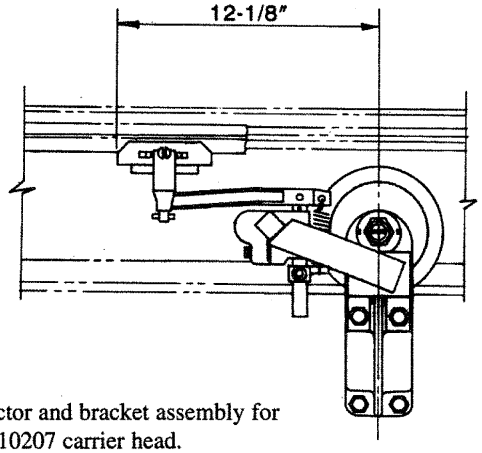
Collector and bracket assembly for No. 010201 carrier head.

COLLECTOR & BRACKET



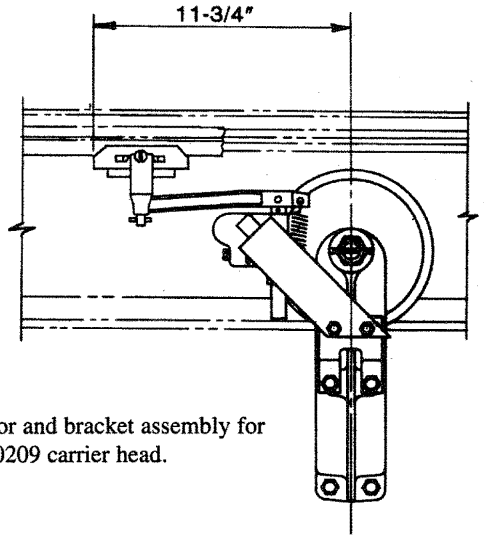
Collector and bracket assembly for No. 010203 (shown) or No. 010205 carrier head.

COLLECTOR & BRACKET



Collector and bracket assembly for No. 010207 carrier head.

COLLECTOR & BRACKET



Collector and bracket assembly for No. 010209 carrier head.

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INSUL-8-BAR® ELECTRIFICATION

RUNWAY CONDUCTOR BAR SUPPORTS

Runway 3-bar conductor bar supports are selected from the tables by track size and crane end truck operating on the runway.

Four types of supports are used and are illustrated on Page ES-11. The figure number in the tables indicates the type of support.

Consult factory for special supports: (1) when 2 or more cranes with different end trucks operate on the runway and different types of supports are indicated in the tables or (2) when Figure No. 3 supports are indicated and more than one track size is used on the runway

RUNWAY 3-BAR CONDUCTOR BAR SUPPORTS FOR 4 INCH AND 5 INCH DIAMETER WHEEL END TRUCKS

Runway Item Number	End Truck Item Number					
	170301, 170302, 170303, 170304, 170305, 170306, 170307, 170308, 170309, 170312, 170318, 170408, 170409, 170418		170313, 170319, 170419		180102, 180202, 180106 180206, 180112, 180212	
	Support Item Number	Figure Number Page ES - 11	Support Item Number	Figure Number Page ES - 11	Support Item Number	Figure Number Page ES - 11
34011	550318D	1	*	-	*	-
34016	550317G	1	*	-	550493L	3
34021	550327J	1	*	-	550493K	3
34026	550327K	1	*	-	550493J	3
34031	550327W	1	550493S	3	550493S	3
34037	550327F	1	550493R	3	550493R	3
34041	550327M	1	550493T	3	550493T	3
34046	550327X	1	550493U	3	550493U	3
34051	550341H	2	550493V	3	550493V	3
34056	550341H	2	550493W	3	550493W	3
34061	550341H	2	550496	4	550496	4
34066	550341H	2	550496	4	550496	4

RUNWAY 3-BAR CONDUCTOR BAR SUPPORTS FOR 6-1/2 INCH AND 8 INCH DIAMETER WHEEL END TRUCKS

Runway Item Number	End Truck Item Number					
	170314, 170315, 170320 170414, 170415, 170420		170416, 170417, 170422, 180104 180204, 180205, 180108, 180208 180113, 180213, 180214		170321, 170421, 170423, 180209	
	Support Item Number	Figure Number Page ES - 11	Support Item Number	Figure Number Page ES - 11	Support Item Number	Figure Number Page ES - 11
34037	550333C	1	550493R	3	*	-
34041	550333E	1	550493T	3	550493T	3
34046	550333G	1	550493U	3	550493U	3
34051	550341H	2	550493V	3	550493V	3
34056	550341H	2	550493W	3	550493W	3
34061	550341H	2	550496	4	550496	4
34066	550341H	2	550496	4	550496	4

* End trucks will not operate on this size track due to interference between load bar and conductor.

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INSUL-8-BAR® ELECTRIFICATION

RUNWAY CONDUCTOR BAR SUPPORTS

Four types of supports are used and are illustrated in the drawings. Support selection is made from the tables on Page ES-10.

The supports cataloged on Page ES-10 are furnished with No. 550402 snap-in hanger clamps and are satisfactory for indoor applications. Supports with No. 550417 insulated hanger clamps are available for outdoor applications or where ambient conditions warrant additional insulation.

Figure Nos. 1 and 3 supports are furnished with hardware to clamp supports to the top flange of runway tracks. Figure Nos. 2 and 4 supports are furnished with hardware to bolt the supports to the web of runway tracks.

FIGURE NO. 1

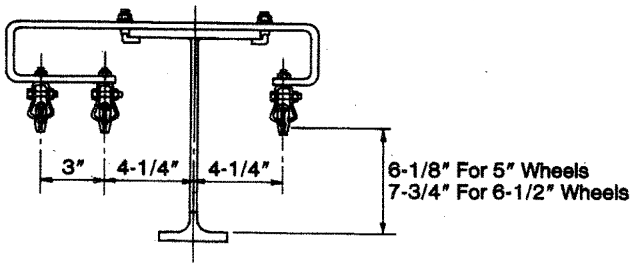


FIGURE NO. 2

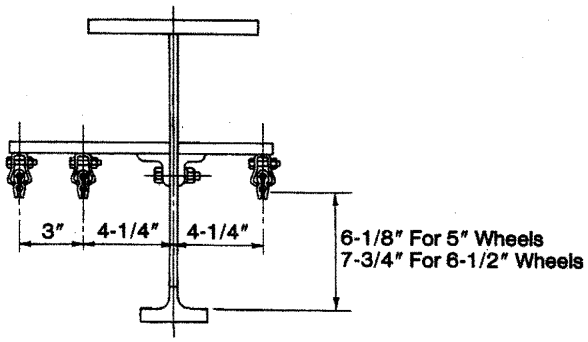


FIGURE NO. 3

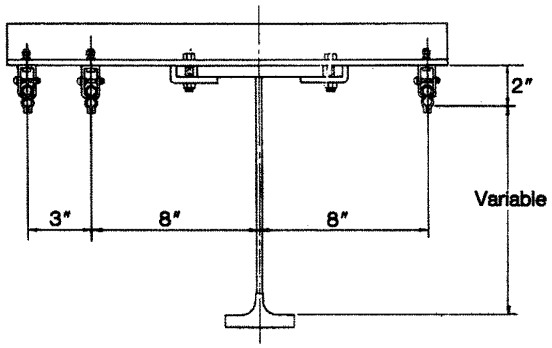
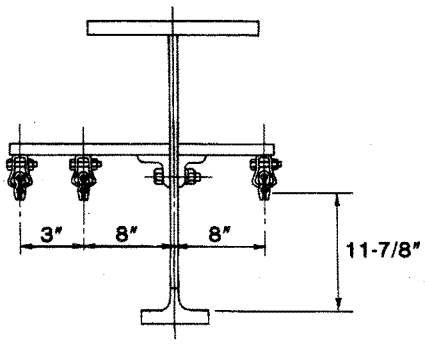


FIGURE NO. 4



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INSUL-8-BAR® ELECTRIFICATION

MONORAIL CONDUCTOR BAR SUPPORTS

Supports for Nos. 34011 through 34046 track are furnished with hardware to clamp the support to the track as illustrated in Figure No. 1. Supports for Nos. 34051 through 34066 track are furnished with hardware to bolt the support to the track as illustrated in Figure No. 2.

No. 550420 snap-in hanger clamps are furnished with the supports listed in the table and are satisfactory for indoor applications. Supports with No. 550417 insulated hanger clamps are available for outdoor applications or where ambient conditions warrant additional insulation.

Supports are available for 2-bar, 3-bar and 4-bar systems. The illustrations show the supports for the 3-bar systems. Supports for 2-bar systems are similar but with one bar mounted on each side of the track. Supports for 4-bar systems are similar but with 2 bars mounted on each side of the track. Supports with special conductor spacings are required for 4-bar systems with switches.

FIGURE NO. 1

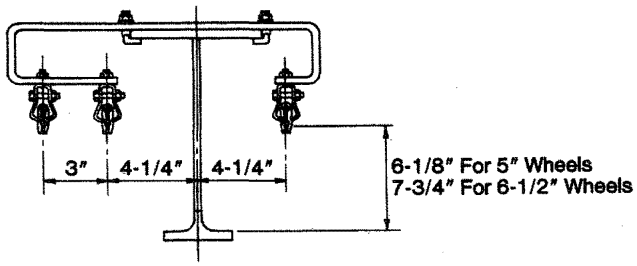
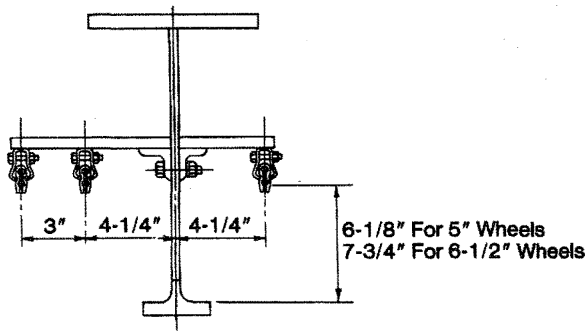


FIGURE NO. 2



Monorail Item Number	Conductor Elevation	Figure Number	Support Item Number		
			2 - Bar	3 - Bar	4 - Bar
34011	6-1/8 in.	1	550318C	550318D	550318E
34016	6-1/8 in.	1	550317F	550317G	550317H
34021	6-1/8 in.	1	550321H	550327J	550329J
34026	6-1/8 in.	1	550321J	550327K	550329K
34031	6-1/8 in.	1	550321W	550327W	550329W
34037	6-1/8 in.	1	550321F	550327F	550329F
	7-3/4 in.	1	550330C	550333C	550334C
34041	6-1/8 in.	1	550321L	550327M	550329M
	7-3/4 in.	1	550330E	550333E	550334E
34046	6-1/8 in.	1	550321X	550327X	550329X
	7-3/4 in.	1	550330G	550333G	550334G
34051 Through 34066	6-1/8 in. or 7-3/4 in.	2	550341G	550341H	550341J

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INSUL-8-BAR ELECTRIFICATION

SWITCH ELECTRIFICATION

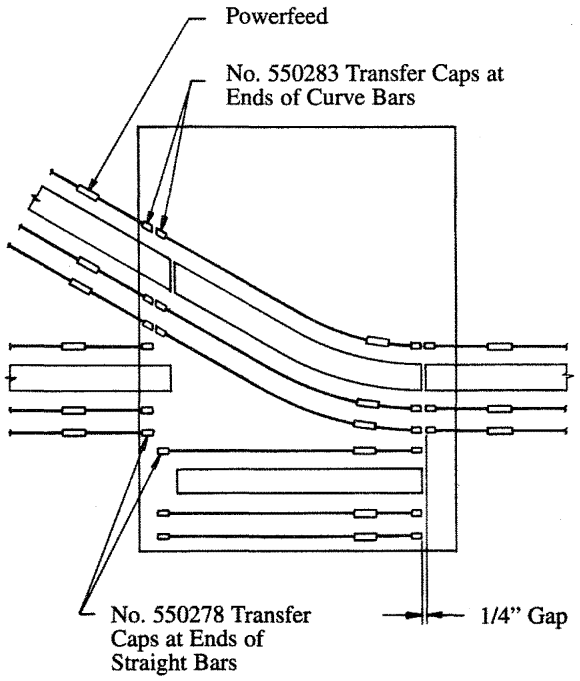
Type 3, 4 and 5 switches can be electrified with 2, 3 or 4 power conductors of Insul-8-Bar electrification. Two conductors are used for direct current and for 3 phase alternating current grounded rail systems.Three conductors are used for 3 phase alternating current systems. Four conductors are used for 3 phase alternating current systems where a separate ground conductor is desired.

Factory assembled wiring harnesses are furnished with electrified switches. Conductors, transfer caps and powerfeeds with flexible jumpers to the harness are also factory assembled on the straight and curve tracks of the switch. Five foot lengths of conductors, transfer caps and powerfeeds are furnished for field installation on tracks incoming to the switch. These conductors are used to jumper the power through the wiring harness to the conductors on the switch and to the conductors on the other incoming tracks. Conductors for incoming curve tracks are formed to the curve radius in the field.

The conductors on 3-bar systems are not symmetrical. Where more than one switch is in a system, right and left hand conductor arrangements may be required. These arrangements are illustrated in the drawings. When ordering 3-bar switches, specify the required conductor arrangement.

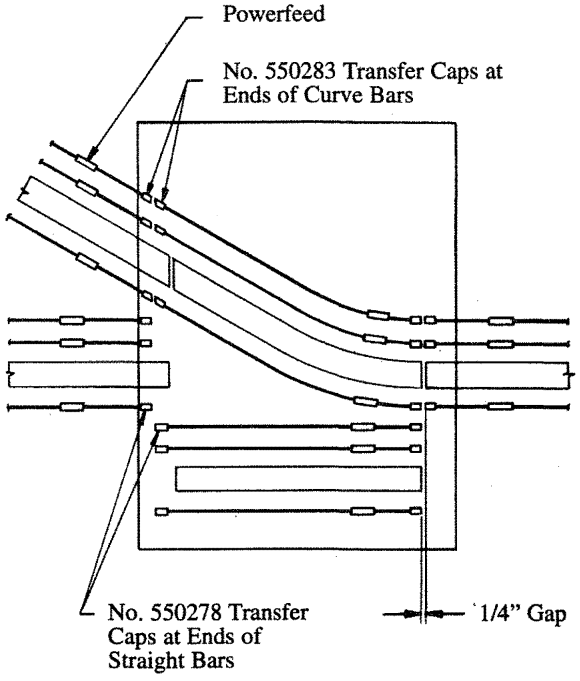
Type 3 and 4 switches have the bottom of the conductors at 6-1/8 inch elevation above the tread. Type 5 switches have the bottom of the conductors at 6-1/8 inch elevation for 4 inch and 5 inch wheel carriers and 7-3/4 inch elevations for 6-1/2 inch wheel carriers. Conductor spacing for 2-bar and 3-bar systems is shown on Page ES-11; 4-bar systems require special spacing.

LEFT HAND



Left hand conductor arrangement for 3-bar switch.

RIGHT HAND



Right hand conductor arrangement for 3-bar switch.

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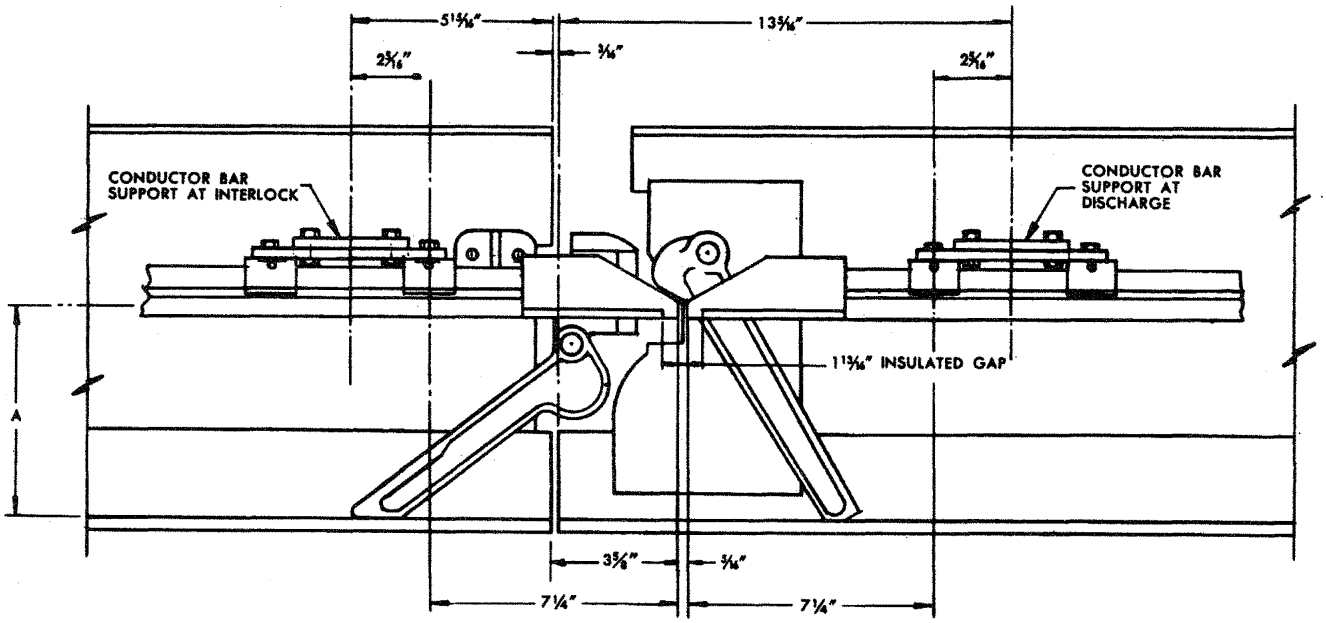
INSUL-8-BAR ELECTRIFICATION

INTERLOCK AND DISCHARGE
POINT ELECTRIFICATION

The drawing illustrates the arrangement of Insul-8-Bar electrification at the interlock and discharge point gap. No. 550271 conductors with No. 550281 transfer insulators are installed on each side of the gap to provide insulation against cross-phasing. Transfer insulators at the interlock end project beyond the end of the track and into the discharge point making the gap 5/16 inch wide.

Supports with double hanger clamps are used at the gap to maintain conductor alignment and bolt to the web of the track. Supports listed in the table are furnished with No. 550402 snap-in hanger clamps and are satisfactory for indoor applications. Supports with No. 550417 insulated hanger clamps are available for outdoor applications or where conditions warrant additional insulation.



A= 6-1/8" For 4" and 5" wheels
7-3/4" For 6-1/2" wheels
9-1/2" For 8" wheels

Number of Conductors	Conductor Bar Support Item Number	
	Interlock	Discharge
2	550315C	550311C
3	550315D	550311D
4	550315E	550311E

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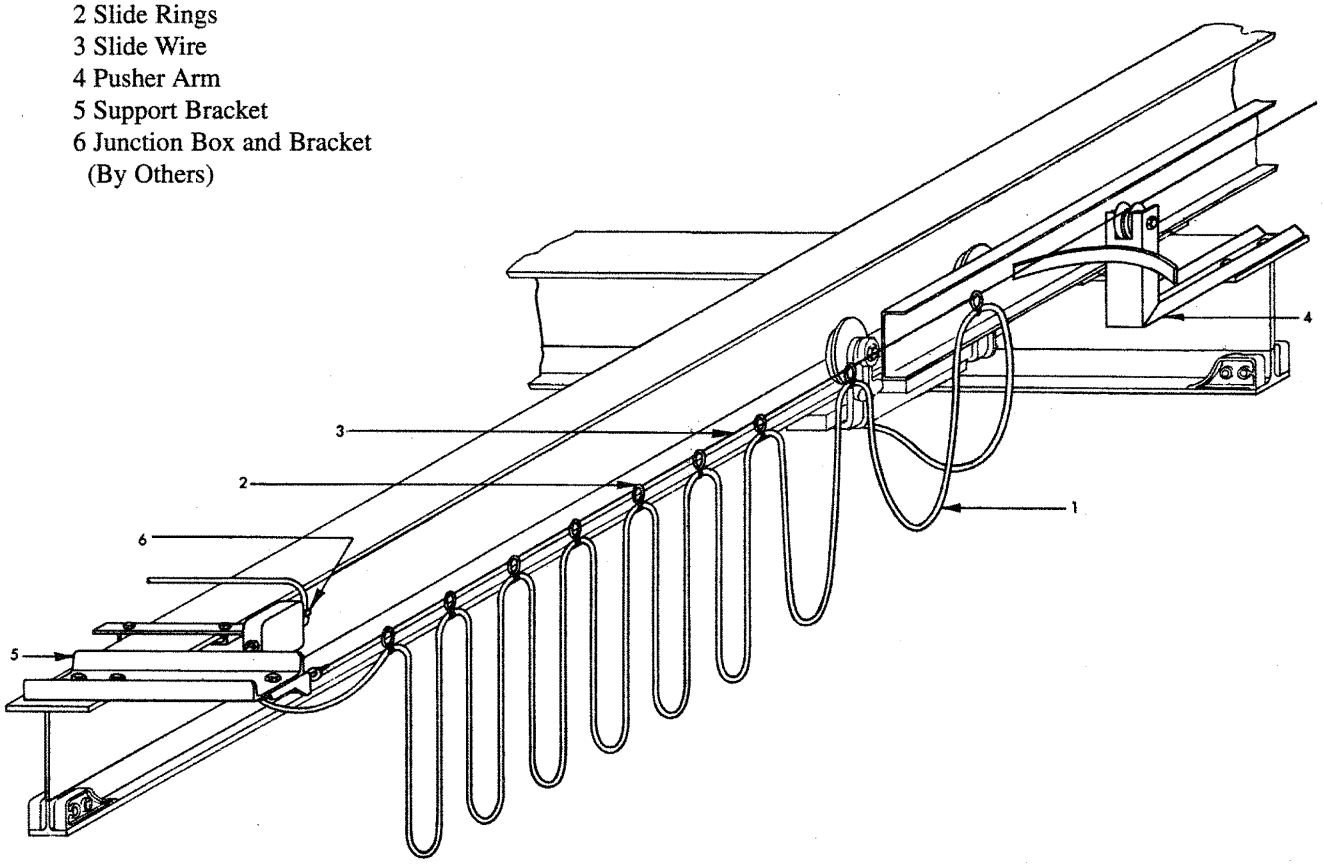
TAGLINE ELECTRIFICATION

1 Flexible Cable
2 Slide Rings
3 Slide Wire
4 Pusher Arm
5 Support Bracket
6 Junction Box and Bracket
(By Others)



Tagline electrification uses flexible cable for the conductors. It is well suited for applications in hazardous locations or where there are corrosive fumes or high humidity in the atmosphere. Tagline is not generally used on systems with curves, switches or interlocks.

Many types of tagline are available. Round or flat cables or separate wires in a neoprene jacket can be used for the conductors. The conductor cable can be supported by slide rings from a wire or by trolleys from a specially rolled track.

The runway tagline system in the illustration consists of 4-conductor round cable suspended by slide rings from a wire. The slide wire is supported at each end from brackets bolted to the top flange of the runway track. Eyebolts in the brackets provide adjustment for wire tension. A pusher arm for the crane is recommended to avoid having the crane end truck interfere with the cable or slide wire. Tagline using the slide wire suspension is suitable for use on runways or straight monorails up to 80 feet in length.

Tagline using the slide wire suspension can also be used on cranes with spans to 40'-0". Cranes with spans greater than 40'-0" require a more rigid support for the conductor cables.

Consult factory for information on tagline sustems using flat cables or separate wires in a neoprene jacket or where a more rigid support is required for the conductor cables.

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