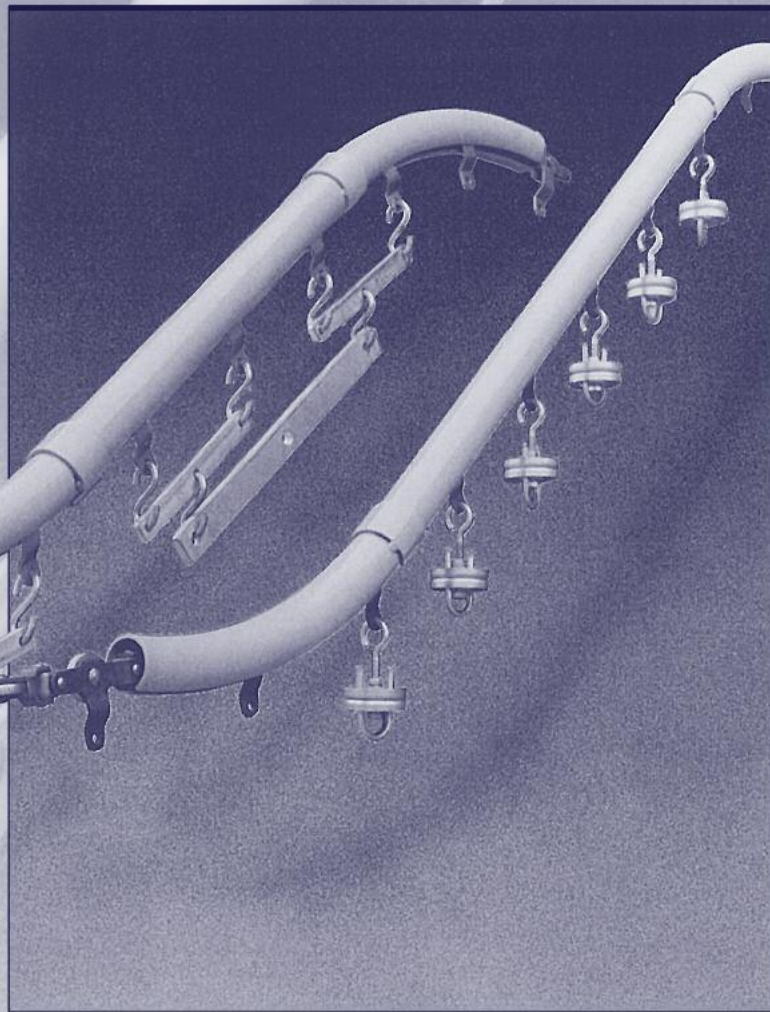




CHAINVEYOR[®]

TECHNICAL MANUAL



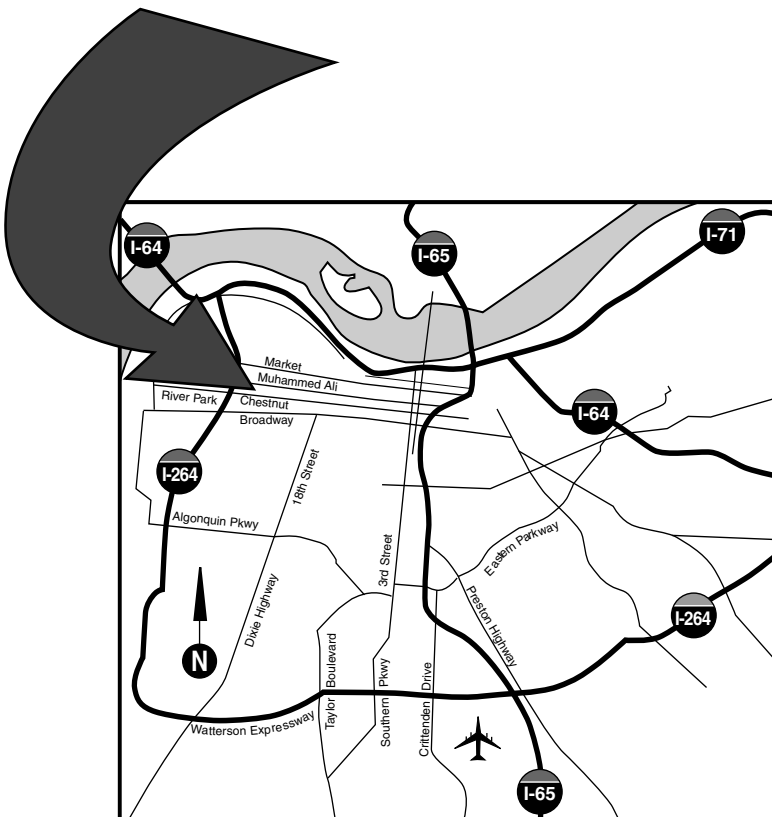
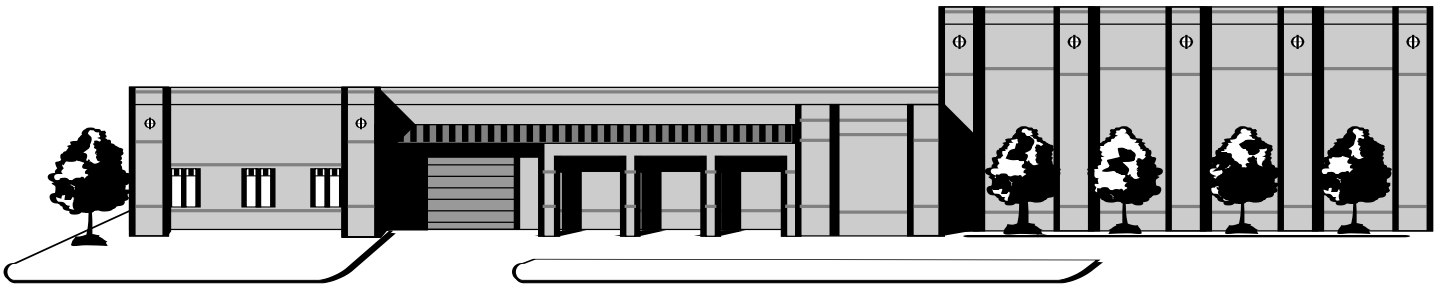
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CHAINVEYOR®

CHAINVEYOR® TECHNICAL MANUAL

The Best Name in the Business



GREGORY-ADAMS, INC. offers the unique Chainveyor® overhead conveyor—an economical and efficient system that has been solving materials handling problems for over 50 years. Gregory-Adams, Inc. continues the tradition of the highest quality products and absolute customer satisfaction that began so long ago. At Gregory-Adams, Inc., we know there are many solutions to our customers' varied application needs and we have the expertise and experience to provide those solutions.

This broad base of solutions combined with Chainveyor's® remarkable features such as its compact, tubular, enclosed track design and extraordinary adaptability make Chainveyor® and Gregory-Adams, Inc. front runners in material handling solutions and—the best name in the business.



SAFETY LABELS

Important Safety Instructions

Continued compliance with safety standards, including industry standards, OSHA and other Federal, State and local codes or regulations is the responsibility of the user of the conveyor installation. However, initial compliance in design of the equipment is the responsibility of the designer and installer of the system. Placement of guards and other safety equipment in accordance with such safety standards is dependent upon the area and use to which the system is put. A safety study must be made of the conveyor application and guards should be installed wherever appropriate. As the manufacturer, we will **insist** on compliance with such safety standards and **will not knowingly sell our product** to anyone who fails to comply.

Product design and dimensional information in this manual are subject to change without notice.

Safety Labels

Gregory-Adams, Inc. designed pressure sensitive safety labels for potentially hazardous areas of equipment are placed on various components prior to shipment. At the time a conveyor system becomes operational or when changes are made to a system, additional areas may require safety labels. An order form for blank safety labels is, therefore, included with shipments of pre-engineered conveyor products.



Label 1

Red on White (2" x 4")
Locate on all drives, end idlers and take-ups



Label 2

Red on White (2-7/8" x 3-5/8")
Locate on all motor control panels.
Locate at eye level if possible



Label 3

Red on White (2-7/8" x 3-5/8")
Locate on any conveyor obstruction less than 7'-0" clear above walking area.



Label 4

Black on Yellow (2" x 4")
Locate on the fixed half of all chain guards or gear slave guards.



Label 5

Black on Yellow (2-7/8" x 3-5/8")
Locate on all electrical start/stop push button stations or control consoles.



Label 6

Black on Yellow (2-7/8" x 3-5/8")
Locate on conveyor units that start remotely and are accessible to personnel working in the area. Place in locations easily seen by personnel.



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CHAINVEYOR®

GREGORY-ADAMS, INC. offers the unique Chainveyor® overhead conveyor, an economical and efficient system that has been solving materials handling problems for over 40 years.

Among the many features that make Chainveyor® the unique problem-solver are:

Tubular, enclosed-track design reduces the chances of injury because the moving chain is inaccessible to casual contact.

Compact – small track cross section and small radius horizontal and vertical curves allow installation in confined areas and take fullest advantage of available space.

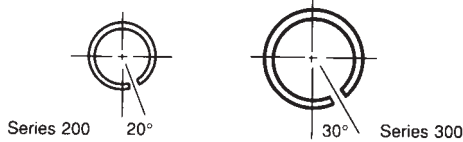
Economical – most systems can be powered by one drive, including curves and inclines. Fewer drives mean lower operating and maintenance costs.

Adaptable – product is suspended from the Chainveyor® system permitting a wide range of products to be handled, including many items that are non-conveyable by other means. It is particularly suited for cleaning, painting and plating applications that would contaminate or destroy belt or roller conveyors.

Two models are available with capacities of:

	Series 200	Series 300
Load per foot	60 lbs.	150 lbs.
Chain pull and Drive	600 lbs.	1000 lbs.
Recommended Maximum Length	600 ft.	1000 ft.

Both series are capable of functioning in temperatures up to 450°F.



Maximum system length is ultimately determined by chain pull. If the chain pull is less than 600 pounds for Series 200 or 1,000 pounds for Series 300, the drive will pull the chain regardless of length.

Longer Systems

Properly designed and installed systems in excess of 1,000 feet will operate satisfactorily. Long conveyor systems and especially those operating at speeds less than 15 FPM may develop chain surge. **Chain surge** in itself is not harmful to the conveying equipment but may be objectionable from an operational point of view.

Chain surge develops when the chain lacks sufficient tension to keep it running smoothly, e.g., full carriers descending a vertical change in elevation push slack chain in front causing low or negative chain pull. If the slack is not taken up, surging will result. A counterweighted take-up located at the bottom of the decline could be installed to eliminate the surge.

Adding a counterweighted take-up to increase chain tension also increases chain pull. On some systems, the addition of a second drive is preferable.

It cannot be determined when surge will occur since it may be caused by a combination of things such as: length, speed, number of changes in direction, location of drive, compound curves, improper installation, lack of lubrication, etc.

On excessively long systems, where the chain pull exceeds the drive rating, **multiple drives** can be used: refer to Step 2 of 5-Step Guideline to System Layout.

Three Types of Chainveyor®

-Free-Only



-Power-Only



-Power & Free



The conveyor may be Free-Only, Power-Only, or Power & Free. The selection guides, listed below, may be used in determining the appropriate conveyor type. If more than one conveyor meets all of the requirements, economics should determine the final selection.

Free-Only Chainveyor® – non-powered, level or gravity-flow conveyor

Suited for:

- Low production
- Small installations
- Multi-station (switching) functions

Typical Applications:

- Portable-tool supports
- Assembly, inspection and/or testing
- FIFO product storage
- Auxiliary work areas (P&F)

Application Notes:

Use for unit loads (carrier + product) up to 240 lbs. (120 lbs. per trolley). Keep total line pressure, at the end of gravity accumulation lines, below 30 lbs. To calculate line pressure, use the following formula:

$$\text{Max. line pressure (lbs.)} = \frac{\text{Line Pitch (in./ft.)}}{12} \times \frac{\text{Unit Load (lbs.)}}{\text{Carrier Length (ft.)}} \times \text{Length of grav. Line (ft.)}$$

Free-Only systems should be installed in areas that are accessible to workers.

Inclines and declines should be kept to a minimum.

Power-Only Chainveyor® – continuous flow systems.

Suited for:

- Medium and high production
- Continuous product flow
- Small, medium or large systems

Typical Applications:

- High-bay, live storage
- Finishing lines—dip or spray
- Oven and freezer lines
- Transport systems
- Assembly-line operations
- Order picking systems

Power & Free Chainveyor® – continuous, intermittent or hold/release product flow.

Suited for:

- Low, medium, high or variable rate production
- Multi-station (switching) functions
- Medium or large systems
- Logic-controlled systems

Typical Applications:

- Automatic store/retrieve (FIFO and/or random)
- Finishing lines
- Assembly, inspection and testing
- Oven and freezer lines
- Transport systems
- Order picking systems
- All combinations of above

Locate gravity accumulation lines in accessible locations and keep line pressure to a minimum. See Free-Only systems above.



5-Step Guideline to Planning an Overhead System

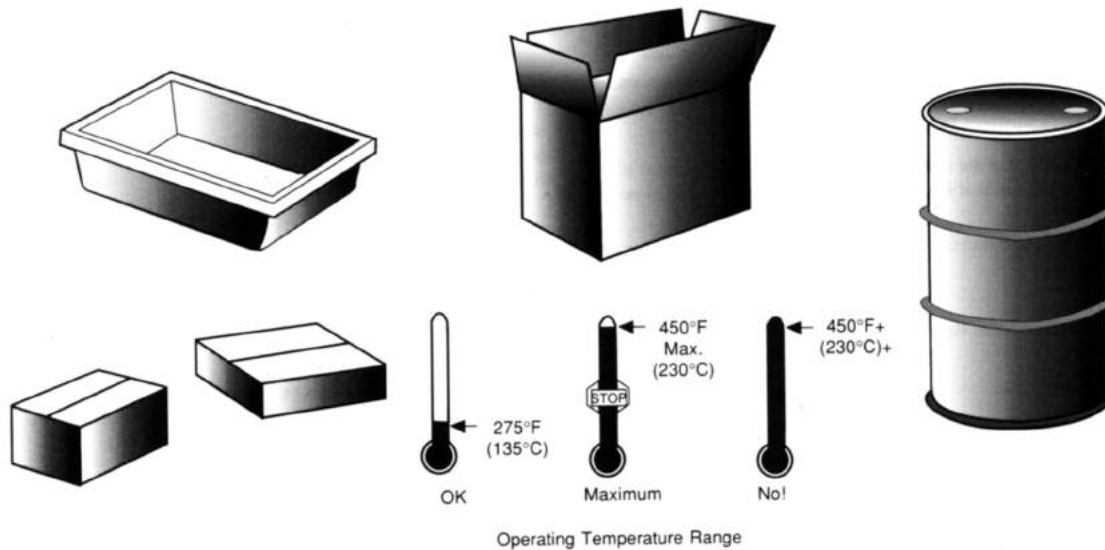
A Chainveyor® system is designed in two stages: System Planning and Layout. Proper planning will assure an efficient system and will account for most of the time spent on an application.

The following steps are involved in system planning:

1. Material To Be Conveyed
2. Conveyor Selection
3. Sequence of Operation
4. Production Rates
5. Carrier Design and Clearance

Step 1. Material To Be Conveyed

Determine the minimum and maximum size and weight of the loads to be handled.



Step 2. Conveyor Selection

After deciding which type of conveyor will best suit the application, the proper conveyor series can be determined.

The two criteria for Series selection are: load capacity and chain pull.

A. Load Capacity

Chainveyor® is rated for evenly distributed loads as follows:

Series:	200	300
lbs./ft.	60	150
per pendant	30	100

B. Chain Pull

Chain pull ratings are:

Series:	200	300
Chain Pull	600 lbs.	1,000 lbs.

A preliminary method for approximating chain pull is to first estimate the total footage of conveyor chain that will be in the system. Then multiply that figure by the expected load per foot figure and multiply the result by .035 friction factor.

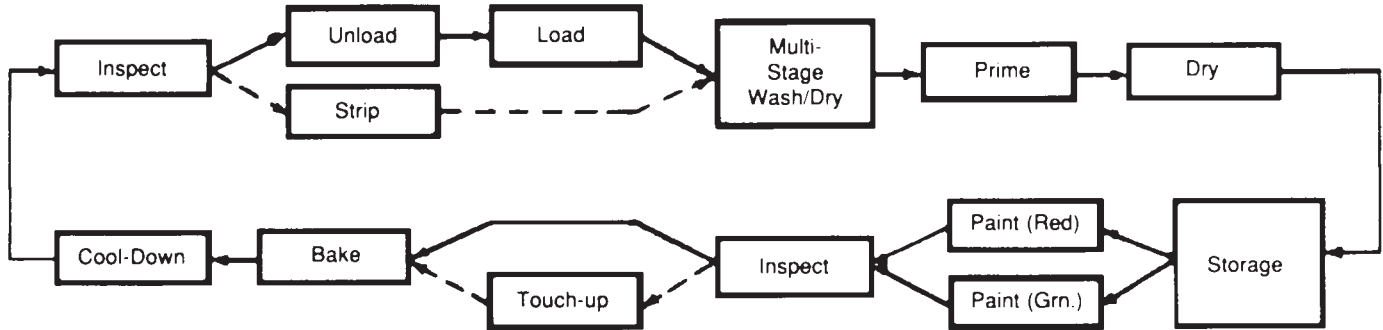
$$\text{Chain Pull} = \text{Footage of Chain} \times \text{load wt./ft} \times .035$$

The Chainveyor® series that is selected by the above method must be verified after the conveyor path is determined



Step 3. Sequence of Operation

The sequence of operation is a step-by-step description of the product path through the system. It is not the same as the physical path of the Chainveyor® system, but it will be a valuable guide when the system is being drawn. A diagram of the sequence of operation is called a flow chart. The flow chart shown here might be typical of many paint finishing operations.



Step 4. Production Rates

Once the sequence of operation has been established, the next step is to determine the rate at which the product will be transported through the system.

Production rates and load size will determine conveyor speed and carrier spacing.

$$\text{Production Rate} = \frac{\text{Conveyor Speed FPM}}{\text{Carrier spacing (Ft.)}}$$

Example 1:

If production requirement is 1200 parts/hr with 1 part/carrier and carrier spacing is 18", what is the production rate in carriers/min. and required conveyor speed?

$$\frac{1200 \text{ parts/hr} + 1 \text{ part/carrier}}{60 \text{ minutes}} = 20 \text{ carriers/min.}$$

$$20 \text{ carriers/min.} \times 1.5' \text{ spacing} = 30 \text{ FPM}$$

The above does not take into account the load size. If solving for carrier spacing, load clearances must be checked.

If parts must be exposed to a process for a definite amount of time, such as curing in an oven, process time will determine conveyor speed and space requirements. For calculation purposes:

$$\text{Process Time} = \frac{\text{Space Requirement (Ft.)}}{\text{Conveyor Speed FPM}}$$

Example 2:

If process time is 40 minutes in an oven and conveyor speed is 8.5 FPM, what is the space requirement?

$$40 \text{ min.} \times 8.5 \text{ FPM} = 340 \text{ ft. of space}$$

Applications having specific production rates, process time requirements and space limitations will present special problems for the Chainveyor® designer. The following is a criteria for solving difficult applications.

1. Qualify the Rates

Production rates are usually expressed as parts per minute (parts/min.). There are two types to consider; constant and variable.

Example: Base Rate; 8 parts/min. x 45 min.
Peak Rate; 12 parts/min. x 15 min.

With variable production rates, the Chainveyor® system should be designed to handle the peak rate. This will eliminate the possibility of temporary backlogs.

2. Determine the Number of Parts Per Carrier

Carrier spacing can be varied in increments of pendant centers. ALWAYS DETERMINE THE MINIMUM PRACTICAL CARRIER SPACING FIRST.

Remember, carrier design may permit handling two or more pieces of product on each carrier; thus allowing greater spacing or slower conveyor speeds at the same spacing.

3. Changing Conveyor Speed

Conveyor speeds can be made faster or slower to meet production rates. An increase in speed will shorten process time unless more space is available. A decrease in speed will increase process time at the expense of production rates unless it is possible to reduce carrier spacing or to use multiple-product carriers.



Step 5. Carrier Design and Clearances

A. Design

The primary function of the carrier is to attach the load to the conveyor and keep it there until it is time to remove it. The capacity of the carrier must be designed to carry the maximum load weight.

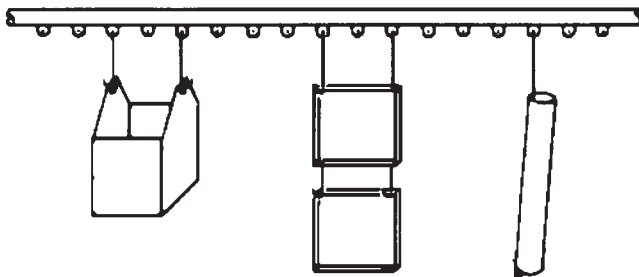
Some of the secondary functions of carriers are:

1. Carriers must balance the load on the conveyor.
2. Carriers must, in some applications, be able to orient the load for special process; i.e., rotation of parts in paint booth.

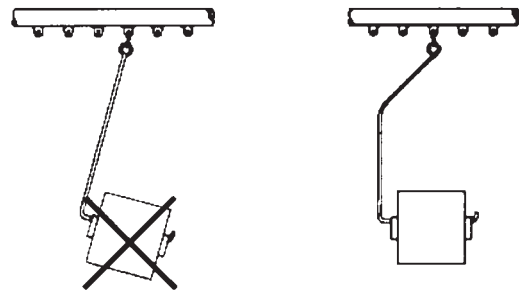
3. Carriers must provide stability; when interfacing the conveyor with automatic machinery or processes, stability often becomes critical.

Key considerations in determining the final design are:

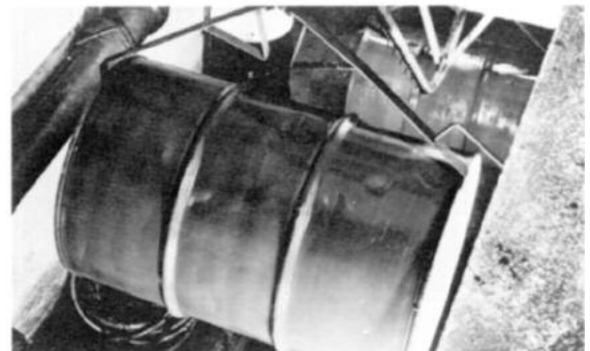
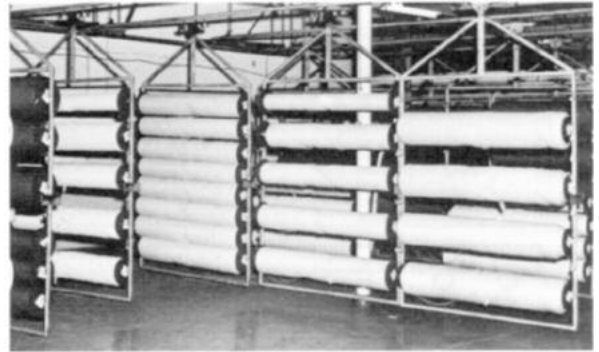
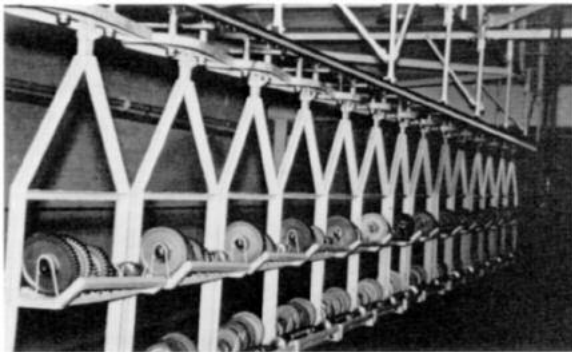
1. Number of parts per carrier
2. Carrier weight
3. Ease of loading and unloading
4. Simplicity in manufacturing
5. Clearance requirement



Does The Part Suggest A Method...?



Load Must Balance



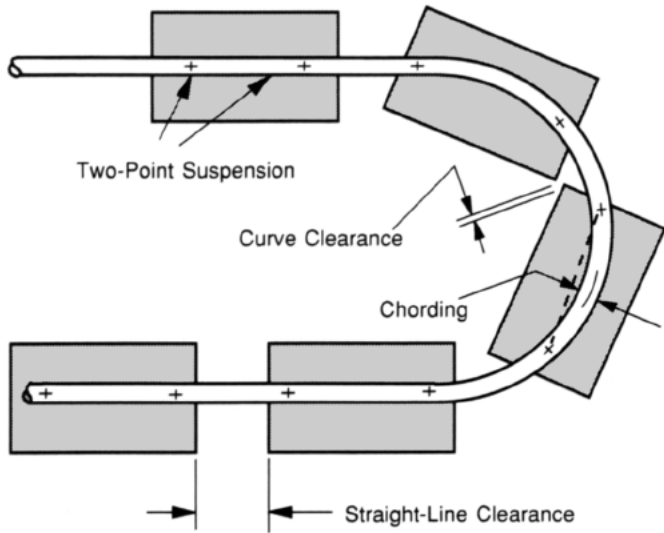
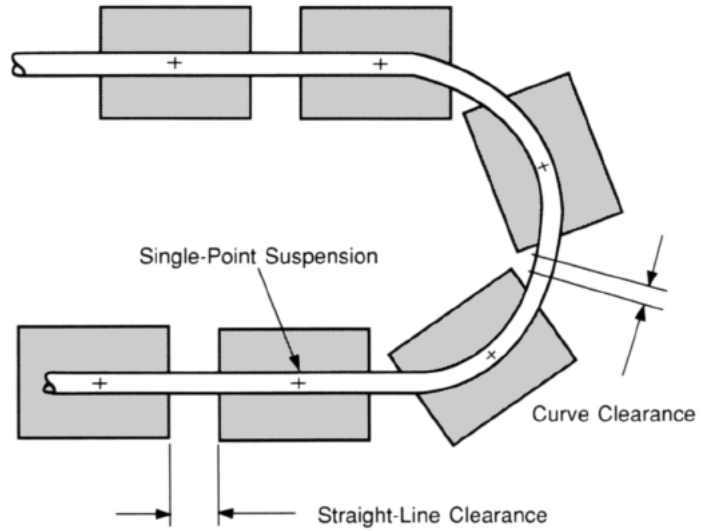


B. Clearances

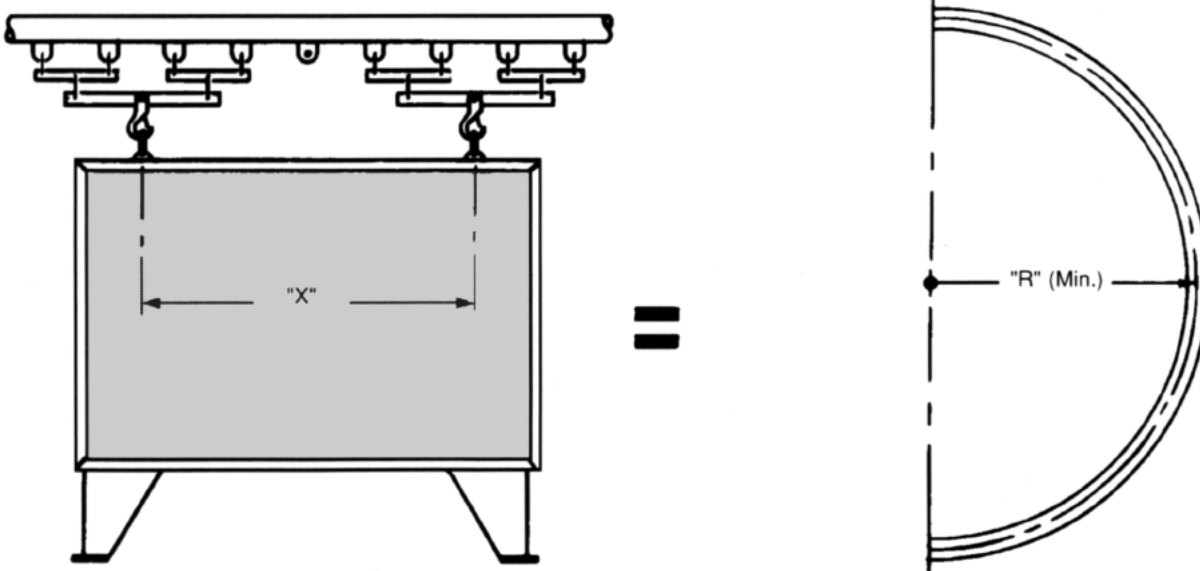
Never Allow Zero Clearance!

As long as a conveyor run is straight, carrier clearance will only be a minor concern; but, as soon as horizontal or vertical curves are used, some additional clearance will have to be allowed. How much extra clearance is required depends on the radius and angle of curve. The illustration, right, demonstrates how clearances change through a horizontal curve when using SINGLE-POINT suspension.

An example of TWO-POINT suspension, shown below, illustrates that, in addition to curve clearance, the effect of CHORDING must be considered. Chording becomes more pronounced as the distance between the two suspension points increases or as the curve radius decreases. On carriers with two suspension points, the distance between suspension points should be equal to or less than the radius of the horizontal curve.



If there is any doubt about the carrier or product clearance around a horizontal curve, a scale drawing should be made. Determining how much clearance to allow depends on how flexible the linkage is and the consequences of accidental contact between carriers. If contact must be avoided at all costs, be especially generous with clearances. Always try to add at least six inches to the product spacing that would result in contact if two carriers were pushed together in a curve. This is a safety margin against external forces that can affect clearance such as: line surge during start-up, bumping or jostling and side-sway induced by changes in direction at higher conveyor speeds.

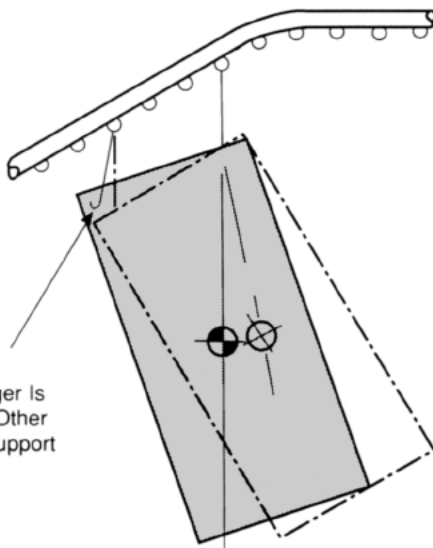
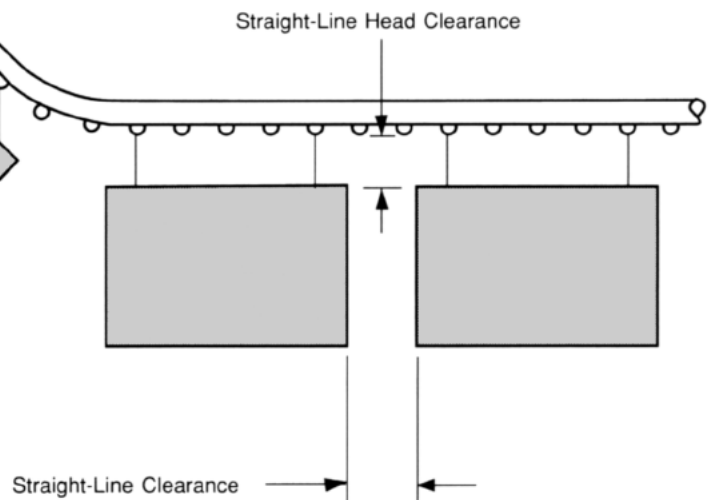
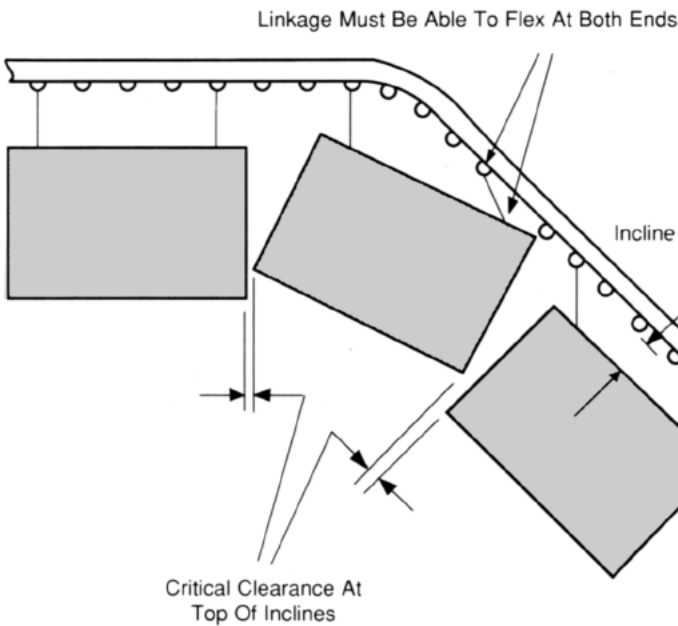
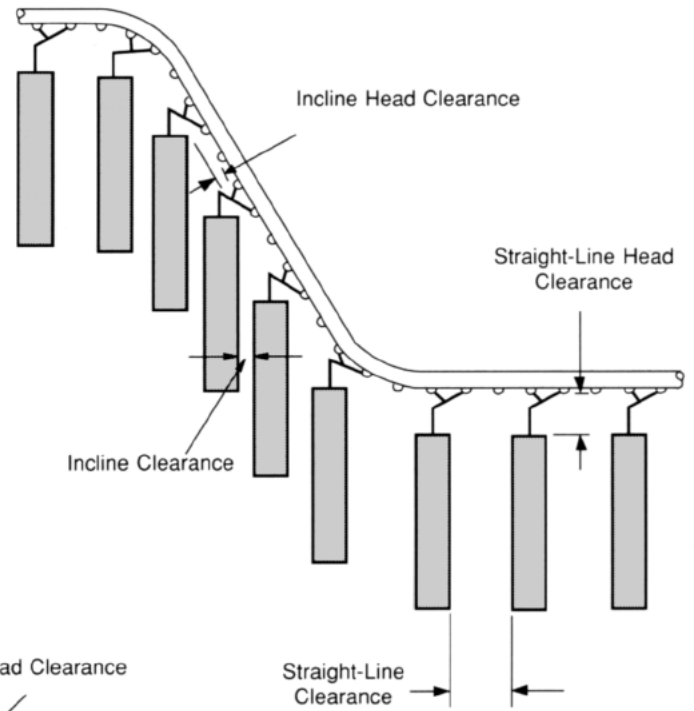


Minimum Curve Radius For 2-Point Suspension



Vertical curves require incline and head clearance allowances but they must be figured separately. Load clearances are affected by the type of suspension used. The illustration at right shows how clearances change when using single-point suspension. Product clearance for two-point suspension is most critical at the top of the incline.

The tables on the next page will aid in determining load centers and head clearance requirements for various vertical curves and single-point suspension. Applications involving two-point suspension should be calculated to determine load centers.



Note That Hanger Is Disconnected, Other Hanger Must Support The Full Load

Illustrated at left is a problem which may be encountered when using two-point suspension and vertical curves. The weight of the load shifts to the highest suspension point tending to disengage the lower hanger. The only satisfactory solution is to decrease the angle of incline.



Incline Clearance Charts

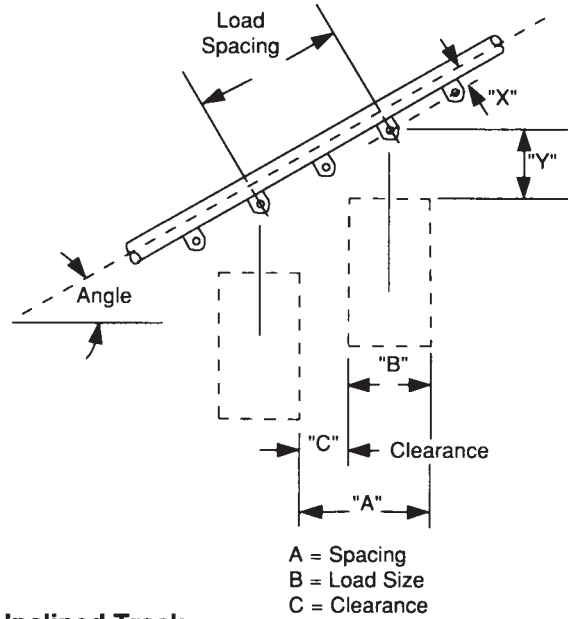
Example: Series 200

Load Clearance – 12' long loads at 24" spacing on 45° incline.

Determine value of A from chart
A = 16 7/8"

Clearance formula: A - B = C
16 7/8" - 12" = 4 7/8"

Head clearance – using above example and looking at Series 200 chart;
Load Length = 12"
For 45° incline, Y = 8"



Load Clearance Charts on Inclined Track

Series 200 X = 1 9/16"

Load Spacing	Maximum Values of "A" For Angle of Incline			
	15°	30°	45°	60°
6"	5 3/4"	5 1/8"	4 1/8"	3"
12"	11 1/2"	10 3/8"	8 3/8"	6"
18"	17 3/8"	15 1/2"	12 5/8"	9"
24"	23 1/8"	20 3/4"	16 7/8"	12"
30"	28 7/8"	25 7/8"	21 1/8"	15"
36"	34 3/4"	31 1/8"	25 3/8"	18"
42"	40 1/2"	36 3/8"	29 5/8"	21"
48"	46 1/4"	41 1/2"	33 7/8"	24"
54"	52 1/8"	46 3/4"	38 1/8"	27"
60"	57 7/8"	51 7/8"	42 3/8"	30"

A = Load Spacing X Cosine of the Angle

Series 300 X = 2 5/8"

Load Spacing	Maximum Values of "A" For Angle of Incline			
	15°	30°	45°	60°
8"	7 5/8"	6 7/8"	5 5/8"	4"
16"	15 3/8"	13 3/4"	11 1/4"	8"
24"	23 1/8"	20 3/4"	16 7/8"	12"
32"	30 7/8"	27 5/8"	22 5/8"	16"
40"	38 5/8"	34 5/8"	28 1/4"	20"
48"	46 1/4"	41 1/2"	33 7/8"	24"
56"	54"	48 1/2"	39 1/2"	28"
64"	61 3/4"	55 3/8"	45 1/4"	32"
72"	69 1/2"	62 1/4"	50 7/8"	36"
80"	77 1/4"	69 1/4"	56 1/2"	40"

Cos 15° = .96592 Cos 45° = .70711
Cos 30° = .86603 Cos 60° = .50000

Head Clearance Charts on Inclined Track

Series 200

Load Length B	Minimum Values of "Y" For Angle of Incline			
	15°	30°	45°	60°
6"	2 7/8"	3 3/4"	5"	7 1/4"
9"	3 1/4"	4 5/8"	6 1/2"	9 7/8"
12"	3 5/8"	5 1/2"	8"	12 1/2"
15"	4 1/8"	6 3/8"	9 1/2"	15"
18"	4 1/2"	7 1/4"	11"	17 5/8"
21"	4 7/8"	8 1/8"	12 1/2"	20 1/4"
24"	5 1/4"	9"	14"	22 7/8"
27"	5 5/8"	9 7/8"	15 1/2"	25 1/2"
30"	6 1/8"	10 3/4"	17"	28"
33"	6 1/2"	11 5/8"	18 1/2"	30 5/8"

Y = (1/2 Load Length x Tangent of the Angle) + 2"

tan. 15° = .2679 tan. 45° = 1.0000
tan. 30° = .5774 tan. 60° = 1.7321

Series 300

Load Length B	Minimum Values of "Y" For Angle of Incline			
	15°	30°	45°	60°
6"	3 7/8"	4 3/4"	6"	8 1/4"
9"	4 1/4"	5 5/8"	7 1/2"	10 7/8"
12"	4 5/8"	6 1/2"	9"	13 1/2"
15"	5 1/8"	7 3/8"	10 1/2"	16"
18"	5 1/2"	8 1/4"	12"	18 5/8"
21"	5 7/8"	9 1/8"	13 1/2"	21 1/4"
24"	6 1/4"	10"	15"	23 7/8"
27"	6 5/8"	10 7/8"	16 1/2"	26 1/2"
30"	7 1/8"	11 3/4"	18"	29"
33"	7 1/2"	12 5/8"	19 1/2"	31 5/8"

Y = (1/2 Load Length x Tangent of the Angle) + 3"



5-Step Guideline to Chainveyor® System Layout

When system planning has been completed, the layout can be started. The system layout is comprised of the following 5 steps:

1. Locating The Conveyor Path
2. Locating Components
3. Calculating Chain Pull
4. Determining Support Methods And Spacing
5. Preparing The Bill Of Material

Step 1. Locating the Conveyor Path

Layout drawings should be done to scale. A scale of 1/4" = 1'-0" is frequently used, and is the smallest scale recommended if the drawing is to be used for installation.

Use the sequence below for locating the conveyor path.

A. Obtain Building Drawings if Possible

Locate building columns and joists on the layout, but remember that dimensions should be verified before starting installation.

B. Locate Work Stations

Refer to the flow chart for sequential operations description and locate the actual position of each process area. Note the process being performed at each location, the carrier and product orientation requirements, and any elevation changes.

C. Draw the Conveyor Path

Refer again to the flow chart and link each work station to the next in the correct sequence. Know how much room the carrier needs to clear columns, walls, and fixed obstructions. Determine curve radii when laying out turns and remember that carriers on parallel conveyor lines must clear each other.

D. Draw Elevation Changes

The length of an elevation change must be marked on the conveyor path. The drawings and charts on the next pages show the dimensions of many common elevation changes.

Note:

Always allow at least one foot of straight track between a horizontal and vertical curve.

If 1' straight is eliminated between curves, chain pull will be doubled through the curves.

E. Locate Equipment, etc.

Locate production machines, stock racks, platforms and mezzanines, heater/blower units, etc. Note the height of these items if the conveyor is to go over or under them. Be aware of the locations of major conduit runs and sprinkler lines.

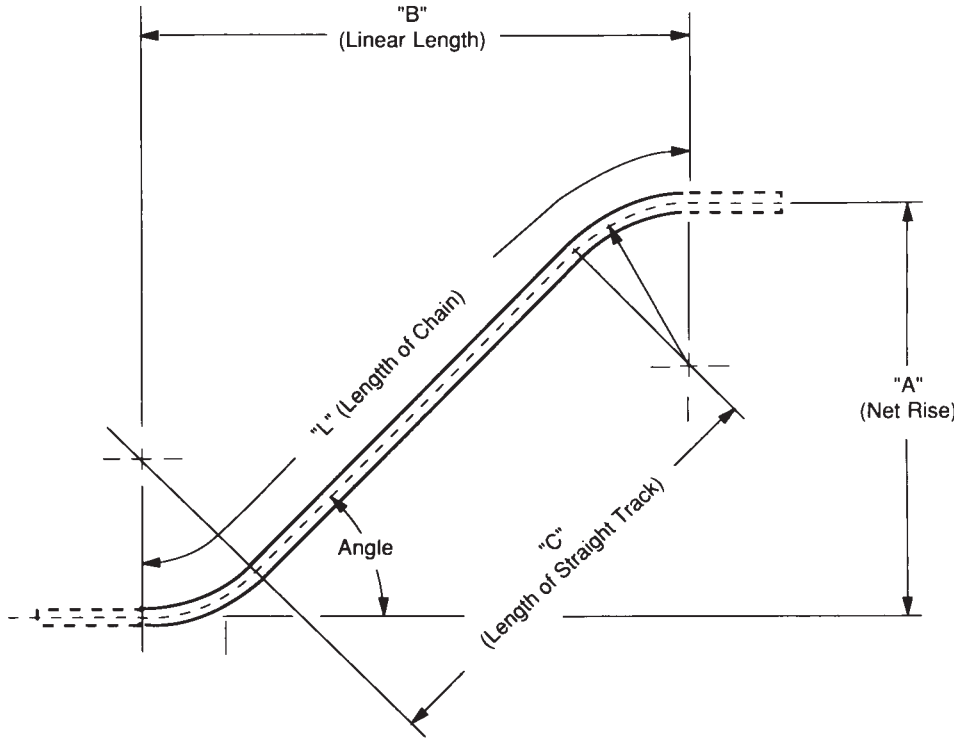
F. Review the System Layout

Visualize the product being loaded onto a carrier at the loading station and being conveyed through the system. At the same time, review such things as the following:

- * Does the product go to each work station in the correct sequence?
- * Does the conveyor take the carrier past each work station at the right height and distance?
- * Is the position and orientation of the product correct at every work station?
- * Will the carrier clear the floor, walls, other fixed obstructions and adjacent areas throughout the system?
- * Are the aisles and other traffic areas clear?



Series 200 Inclines



Elevation Change Charts

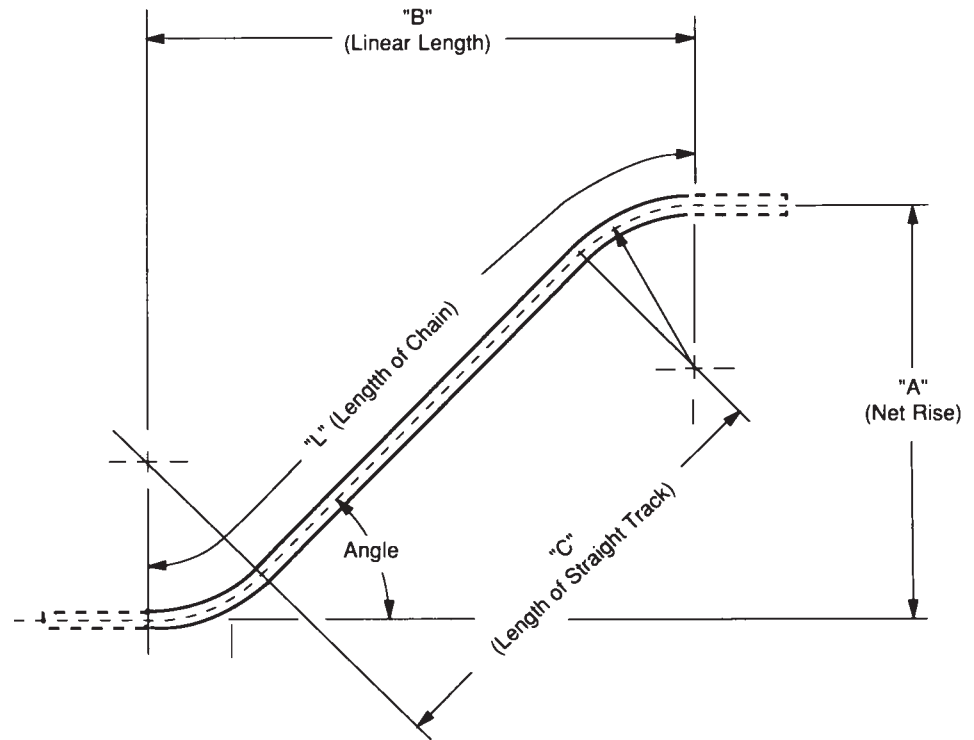
R = 16"

Angle	"A" =	"B" =	"C" =	"L" =
15°	Min.: 1 1/16"	8 5/16"	—0—	8 3/8"
	6"	2'- 2 5/8"	1'- 7"	2'- 3 3/8"
	1'-0"	4'- 1"	3'- 6 1/8"	4'- 2 1/2"
	1'-6"	5'-11 3/8"	5'- 5 5/16"	6'- 1 11/16"
	2'-0"	7'- 9 13/16"	7'- 4 1/2"	8'- 0 7/8"
	2'-6"	9'- 8 3/8"	9'- 3 11/16"	10'- 0 1/8"
	3'-0"	11'- 6 9/16"	11'- 2 7/8"	11'-11 1/4"
	4'-0"	15'- 3 3/8"	15'- 1 1/4"	15'- 9 5/8"
	5'-0"	19'- 0 1/8"	18'-11 5/8"	19'- 8"
	6'-0"	22'- 8 15/16"	22'-10"	23'- 6 2/8"
7'-0"	26'- 5 11/16"	26'- 8 5/16"	27'- 4 11/16"	
8'-0"	30'- 2 1/2"	30'- 6 11/16"	31'- 3 1/16"	
30°	Min.: 4 5/16"	1'- 4"	—0—	1'- 4 3/4"
	1'-0"	2'- 5 3/8"	1'- 3 7/16"	2'- 8 3/16"
	1'-6"	3'- 3 3/4"	2'- 3 7/16"	3'- 8 3/16"
	2'-0"	4'- 2 1/8"	3'- 3 7/16"	4'- 8 3/16"
	2'-6"	5'- 0 9/16"	4'- 3 7/16"	5'- 8 3/16"
	3'-0"	5'-10 15/16"	5'- 3 7/16"	6'- 8 3/16"
	4'-0"	7'- 7 11/16"	7'- 3 7/16"	8'- 8 3/16"
	5'-0"	9'- 4 1/2"	9'- 3 7/16"	10'- 8 3/16"
	6'-0"	11'- 1 5/16"	11'- 3 7/16"	12'- 8 3/16"
	8'-0"	14'- 6 7/8"	15'- 3 7/16"	16'- 8 3/16"
	10'-0"	18'- 0 7/16"	19'- 3 7/16"	20'- 8 3/16"
	12'-0"	21'- 6"	23'- 3 7/16"	24'- 8 3/16"

Angle	"A" =	"B" =	"C" =	"L" =
45°	Min.: 9 3/8"	1'-10 5/8"	—0—	2'- 1 1/8"
	1'-0"	2'- 1 1/4"	3 11/16"	2'- 4 7/8"
	1'-6"	2'- 7 1/4"	1'- 0 3/16"	3'- 1 5/16"
	2'-0"	3'- 1 1/4"	1'- 8 11/16"	3'- 9 13/16"
	3'-0"	4'- 1 1/4"	3'- 1 11/16"	5'- 2 13/16"
	4'-0"	5'- 1 1/4"	4'- 6 5/8"	6'- 7 3/4"
	5'-0"	6'- 1 1/4"	5'-11 5/8"	8'- 0 3/4"
	6'-0"	7'- 1 1/4"	7'- 4 9/16"	9'- 5 1/16"
	8'-0"	9'- 1 1/4"	10'- 2 1/2"	12'- 3 3/8"
	10'-0"	11'- 1 1/4"	13'- 0 7/16"	15'- 1 9/16"
12'-0"	13'- 1 1/4"	15'-10 3/8"	17'- 11 1/2"	
14'-0"	15'- 1 1/4"	18'- 8 5/16"	20'- 9 7/16"	
60°	Min.: 1'-4"	2'- 3 11/16"	—0—	2'- 9 7/8"
	2'-0"	2'- 8 5/16"	9 1/4"	3'- 6 3/4"
	3'-0"	3'- 3 1/4"	1'- 11 1/8"	4'- 8 5/8"
	4'-0"	3'-10 3/16"	3'- 0 15/16"	5'-10 7/16"
	6'-0"	5'- 0 1/16"	5'- 4 11/16"	8'- 2 3/16"
	8'-0"	6'- 1 7/8"	7'- 8 3/8"	10'- 5 7/8"
	10'-0"	7'- 3 3/4"	10'- 0 1/16"	12'- 9 5/8"
	12'-0"	8'- 5 5/8"	12'- 3 13/16"	15'- 1 5/16"
	14'-0"	9'- 7 1/2"	14'- 7 1/2"	17'- 5"
	16'-0"	10'- 9 5/16"	16'-11 1/4"	19'- 8 3/4"
	18'-0"	11'-11 3/16"	19'- 2 5/16"	22'- 0 7/16"
	20'-0"	13'- 1 1/16"	21'- 6 5/8"	24'- 4 3/16"



Series 300 Inclines



Elevation Change Charts

R = 24"

Angle	"A" =	"B" =	"C" =	"L" =
15°	Min.: 1 ⁵ / ₈ "	1'- 0 ⁷ / ₁₆ "	—0—	1'- 0 ⁹ / ₁₆ "
	6"	2'- 4 ¹¹ / ₁₆ "	1'- 4 ⁷ / ₈ "	2'- 5 ⁷ / ₁₆ "
	1'-0"	4'- 3 ¹ / ₈ "	3'- 4 ¹ / ₁₆ "	4'- 4 ⁵ / ₈ "
	1'-6"	6'- 1 ¹ / ₂ "	5'- 3 ¹ / ₄ "	6'- 3 ¹³ / ₁₆ "
	2'-0"	7'-11 ⁷ / ₈ "	7'- 2 ⁷ / ₁₆ "	8'- 3"
	2'-6"	9'-10 ¹ / ₄ "	9'- 1 ⁹ / ₁₆ "	10'- 2 ³ / ₁₆ "
	3'-0"	11'- 8 ¹ / ₁₆ "	11'- 0 ³ / ₄ "	12'- 1 ⁵ / ₁₆ "
	4'-0"	15'- 5 ⁷ / ₁₆ "	14'-11 ¹ / ₈ "	15'-11 ¹ / ₁₆ "
	5'-0"	19'- 2 ¹ / ₄ "	18'- 9 ¹ / ₂ "	19'-10 ¹ / ₁₆ "
	6'-0"	22'-11"	22'- 7 ⁷ / ₈ "	23'- 8 ⁷ / ₁₆ "
7'-0"	26'- 7 ¹³ / ₁₆ "	26'- 6 ¹ / ₄ "	27'- 6 ¹³ / ₁₆ "	
8'-0"	30'- 4 ⁵ / ₈ "	30'- 4 ⁵ / ₈ "	31'- 5 ³ / ₁₆ "	
30°	Min.: 6 ⁷ / ₁₆ "	2'- 0"	—0—	2'- 1 ¹ / ₈ "
	1'-0"	2'- 9 ⁵ / ₈ "	11 ¹ / ₈ "	3'- 0 ¹ / ₄ "
	1'-6"	3'- 8 ¹ / ₁₆ "	1'-11 ¹ / ₈ "	4'- 0 ¹ / ₄ "
	2'-0"	4'- 6 ⁷ / ₁₆ "	2'-11 ¹ / ₈ "	5'- 0 ¹ / ₄ "
	2'-6"	5'- 4 ¹ / ₁₆ "	3'-11 ¹ / ₈ "	6'- 0 ¹ / ₄ "
	3'-0"	6'- 3 ³ / ₁₆ "	4'-11 ¹ / ₈ "	7'- 0 ¹ / ₄ "
	4'-0"	8'- 0"	6'-11 ¹ / ₈ "	9'- 0 ¹ / ₄ "
	5'-0"	9'- 8 ¹ / ₁₆ "	8'-11 ¹ / ₈ "	11'- 0 ¹ / ₄ "
	6'-0"	11'- 5 ³ / ₁₆ "	10'-11 ¹ / ₈ "	13'- 0 ¹ / ₄ "
	8'-0"	14'-11 ¹ / ₈ "	14'-11 ¹ / ₈ "	17'- 0 ¹ / ₄ "
	10'-0"	18'- 4 ¹ / ₁₆ "	18'-11 ¹ / ₈ "	21'- 0 ¹ / ₄ "
	12'-0"	21'-10 ¹ / ₄ "	22'- 11 ¹ / ₈ "	25'- 0 ¹ / ₄ "

Angle	"A" =	"B" =	"C" =	"L" =
45°	Min.: 1'-2 ¹ / ₁₆ "	2'- 9 ¹⁵ / ₁₆ "	—0—	3'- 1 ¹ / ₁₆ "
	1'-6"	3'- 1 ⁷ / ₈ "	5 ⁹ / ₁₆ "	3'- 7 ¹ / ₄ "
	2'-0"	4'- 7 ⁷ / ₈ "	1'- 2 ¹ / ₁₆ "	4'- 3 ³ / ₄ "
	3'-0"	5'- 7 ⁷ / ₈ "	2'- 7"	5'- 8 ³ / ₄ "
	4'-0"	6'- 7 ⁷ / ₈ "	4'- 0"	7'- 1 ¹ / ₁₆ "
	5'-0"	7'- 7 ⁷ / ₈ "	5'- 5"	8'- 6 ¹¹ / ₁₆ "
	6'-0"	8'- 7 ⁷ / ₈ "	6'- 9 ¹⁵ / ₁₆ "	9'-11 ⁵ / ₈ "
	8'-0"	9'- 7 ⁷ / ₈ "	9'- 7 ⁷ / ₈ "	12'- 9 ⁹ / ₁₆ "
	10'-0"	11'- 7 ⁷ / ₈ "	12'- 5 ¹³ / ₁₆ "	15'- 7 ¹ / ₂ "
	12'-0"	13'- 7 ⁷ / ₈ "	15'- 3 ³ / ₄ "	18'- 5 ⁷ / ₈ "
14'-0"	15'- 7 ⁷ / ₈ "	18'- 1 ¹ / ₁₆ "	21'- 3 ³ / ₈ "	
16'-0"	17'- 7 ⁷ / ₈ "	20'- 11 ⁵ / ₈ "	24'- 1 ³ / ₈ "	
60°	Min.: 2'-0"	3'- 5 ⁹ / ₁₆ "	—0—	4'- 2 ¹ / ₄ "
	3'-0"	4'- 0 ¹ / ₂ "	1'- 1 ⁷ / ₈ "	5'- 4 ¹ / ₈ "
	4'-0"	4'- 7 ⁷ / ₁₆ "	2'- 3 ¹ / ₁₆ "	6'- 6"
	5'-0"	5'- 2 ³ / ₈ "	3'- 5 ⁹ / ₁₆ "	7'- 7 ¹³ / ₁₆ "
	6'-0"	5'- 9 ⁵ / ₁₆ "	4'- 7 ⁷ / ₁₆ "	8'- 9 ¹¹ / ₁₆ "
	8'-0"	6'-11 ¹ / ₈ "	6'-11 ¹ / ₈ "	11'- 1 ³ / ₈ "
	10'-0"	8'- 1"	9'- 2 ⁷ / ₈ "	13'- 5 ¹ / ₈ "
	12'-0"	9'- 2 ⁷ / ₈ "	11'- 6 ⁹ / ₁₆ "	15'- 8 ¹³ / ₁₆ "
	14'-0"	10'- 4 ¹ / ₁₆ "	13'- 10 ¹ / ₄ "	18'- 0 ⁹ / ₁₆ "
	16'-0"	11'- 6 ⁹ / ₁₆ "	16'- 2"	20'- 4 ¹ / ₄ "
	18'-0"	12'- 8 ⁷ / ₁₆ "	18'- 5 ¹ / ₁₆ "	22'- 7 ¹⁵ / ₁₆ "
	20'-0"	13'- 10 ¹ / ₄ "	20'- 9 ⁷ / ₁₆ "	24'-11 ¹ / ₁₆ "



Step 2. Locating Components

Once the system layout has been completed, the next step is to properly locate the individual components of each conveyor. Four basic components need special attention for location; drive, take-up, lubricator, and inspection section. Application notes for guidance in locating these components are listed below.

A. Drives

1A. Single Drives

The drive unit should be located as near as possible to the highest elevation in the system, and just ahead of a take-up. The drive must always PULL-never PUSH. Since chain pull is zero on the outlet side of the drive, the take-up should be located immediately after the drive to provide chain tension. Do not locate a drive at the bottom of a decline or just before an incline, or near a spray booth or washer.

On oven serpentine systems, chain pull increases rapidly as the conveyor winds back and forth through turns. The drive should be located on the inlet side of the oven to keep chain pull at a minimum.

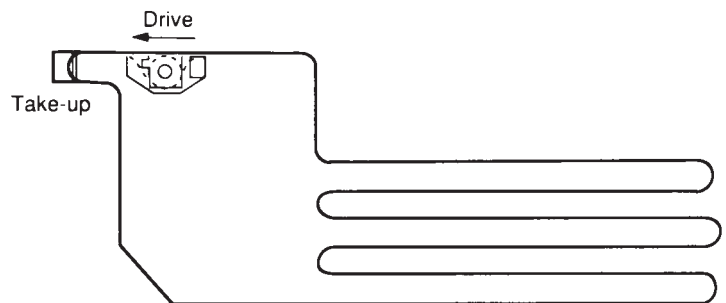
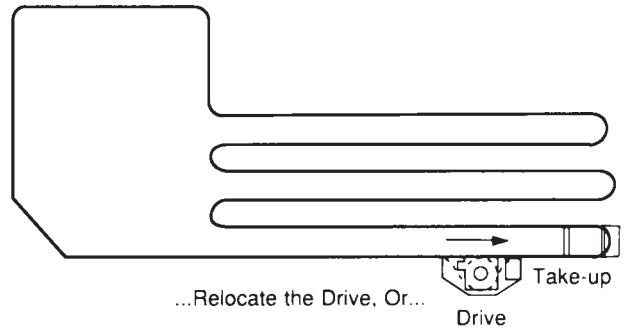
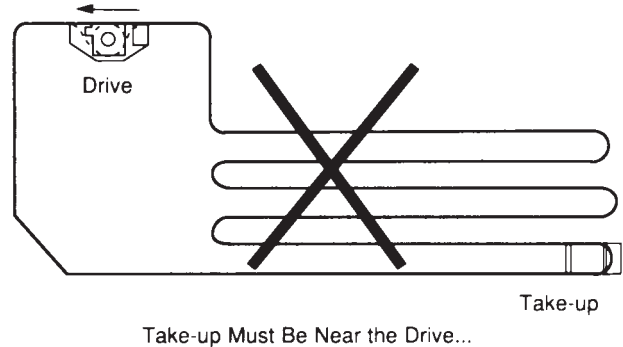
On slow moving spray paint systems and electrostatic spray applications, the drive should be located near the outlet side of the paint booth so the chain in the paint booth will be tight and the possibility of chain surge in the booth is minimized.

When locating the drive, plan ahead for future access for maintenance and inspection. Try to position the drive near an area that will be easily accessible with clear floor space for a ladder or maintenance truck.

Drives are available in Inline or Corner drive configurations with the Corner drive configuration being available in 90° and 180° models. The Inline drive is more easily fitted into a system, because it can be placed anywhere there is a four foot section of straight track.

Note that the location of an Inline drive will determine the slot location for the entire conveyor.

Refer to the component section for drive speed and horsepower data.



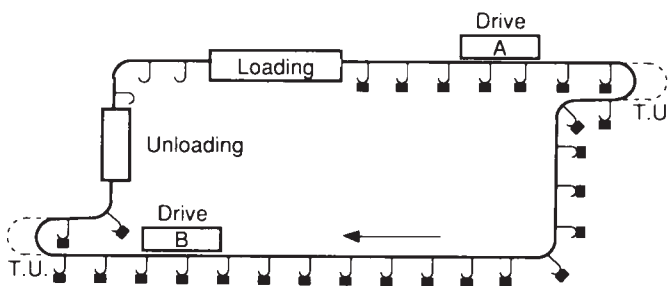


2A. Multiple Drives

Two or more drives may be used on excessively long systems where the chain pull exceeds the drive rating. Sensorless Vector Variable Frequency Controllers are used to synchronize the drives (one VFD per drive).

Chain pull calculations using the long-form method must be made to determine proper location of drives in the system for near equal load sharing operation.

A counterweighted take-up with 36" of travel and lockouts is required for each drive.



Multiple Drive-Load Sharing

Multiple drive synchronization is accomplished through the use of a sensorless vector AC variable frequency controller for each drive. The sensorless vector capability of the VFDs maintains constant drive speed under a broad range of output torque. This means that precise load sharing is not essential although load balancing is still good design practice.

System Requirements For Multiple Drive Controls and Engineering Requirements Using AC Control

1. Counterweighted take-ups (one per drive) with 36" travel and lock-outs.
2. Drives with identical motors and reducers.
3. Sensorless Vector Variable Frequency Controllers are required for each drive. The speed set points must be set precisely for each VFD. This is accomplished by communication between a master to one or more slave VFDs.
4. Engineering Requirements
 - a. System layout with all inclines, dimensions, load and unload points.
 - b. Description of operation
 - c. Locate the drives
 - d. Perform preliminary chain pull calculations-per the system operation long formulas. Example: If an incline is empty, figure the load per foot that way, not as if it were loaded.
 - e. Adjust drive locations to help balance the system and obtain optimum location. Figure chain pull on the new drive locations.
 - f. For the ideal system, the chain pull on each drive will be approximately the same-the load will be equally shared between the drives.
 - g. Describe any particulars for system operation, if required; i.e. initial loading must be staggered to keep from overloading a single drive.

B. Take-ups

The take-up must be located downstream from, and as close as possible to, the drive. By locating the take-up where the chain pull is lowest, (at the exit of the drive) all of the take-up will be used to take up slack chain.

Avoid curves between the drive and take-up. Never locate the take-up at the top of a vertical rise or in an oven, spray booth or washer.

The primary purpose of a take-up is to take up slack and maintain tension on the chain. It also is able to compensate for slight elongation of the chain which occurs during the initial start-up of new chain.

Spring-loaded take-ups are used on non-reversing conveyors.

Counterweighted take-ups are used on conveyors with multiple drives and on conveyors that have excessive expansion and contraction due to variation in temperature.

If the conveyor layout and drive location do not permit proper take-up placement, consider moving the drive to another position. The best solution is to modify the layout to permit proper drive/take-up orientation.



C. Inspection Section

The inspection section should be installed right after the chain lubricator to permit checking the chain for proper lubrication. The inspection section is also used to remove slack chain from the conveyor and to insert carriers in free lines. Long conveyors should have a minimum of one inspection section every 250 feet.

D. Chain Lubricator (Power Line)

The chain lubricator should be placed near the input end of the drive to permit some of the oil carried by the conveyor chain to be imparted to the drive sprocket.

Applications involving power washers, where overspray can wash the lubricant off, and ovens, should have the lubricator positioned so the chain will be relubricated right after having passed through the process.

NOTE: Allow some space after an oven for the chain to cool before being lubricated.

Oil flow to the chain is manually adjusted by a needle valve on the unit which should be set to apply a light film of oil. Flow is controlled by an electrically operated solenoid valve. The lubricator should always be off when the conveyor is not running.

Refer to component section for description and solenoid coil voltages.

E. Expansion Joint

Expansion joints should be used in any conveyor line which runs through an oven. One should be located in each conveyor pass which crosses the expansion joint of the oven.

The centerline of the expansion joint must be located on the centerline of the oven expansion joint.

Step 3. Calculating Chain Pull

Two methods of calculating chain pull are available. A short-form method may be used for Power-Only Chainveyor® systems having fewer than fifty, 45° curves (or the equivalent). The long-form method is more time consuming, but much more accurate. The long-form method should be used on all Power & Free systems and on Power-on systems with fifty, or more, 45° curves (or the equivalent).

Short-form Method

A. Determine total length of conveyor and total weight of moving load (chain, carriers, and unit loads). Multiply total moving weight by .015 friction factor.

A = Total Moving Weight x .015

B. Determine the equivalent number of 45° vertical and horizontal curves. Multiply equivalent number of 45° curves by .035 friction factor.

B = Number of 45° curves x .035

C. Multiply result in A by result in B above.

C = A x B

D. Add the result in A to the result in C above

D = A + C

E. Multiply equivalent number of 45° curves x .88.

E = Number of 45° curves x .88

F. Add the result in D to the result in E above.

F = D + E

G. Add up the amount of rise of all INCLINES in the system and multiply by the total load per foot.

Add this result to the result in F above

G = F + (Total rise in feet x Total load per foot)

To Determine Load Per Foot:

$$\frac{\text{Empty Carrier (lbs.)} + \text{Product (lbs.)}}{\text{Carrier Spacing (ft.)}} + \text{Chain (lbs./ft.)}$$

H. To find total chain pull (CP), multiply result in G by 1.1.

Chain Pull = G x 1.1



Long-Form Method

The long-form method determines chain pull along each segment of the loop; a segment being a straight run or any particular change of direction. Each segment develops a specific pull, calculated separately, which becomes a part of the accumulative total.

A. Determine the Dead Load per Foot (DL)

$$DL = \text{Chain (lbs./ft.)} + \frac{\text{Empty Carrier (lbs.)}}{\text{Carrier Spacing (ft.)}}$$

B. Determine the Total Load per Foot (TL)

Total Load is the Dead Load plus the Live Load (Product)

$$TL = \text{Chain (lbs./ft.)} + \frac{\text{Empty Carrier} + \text{Product (lbs.)}}{\text{Carrier Spacing (ft.)}}$$

C. Divide the conveyor layout into segments. Start at the output end of the drive with segment 1. Each straight run will be a segment, each horizontal curve a separate segment and each incline or decline another segment. Proceed through the entire layout as shown on the right.

D. List the conveyor segment numbers on a calculation form. See sample calculation on next page.

E. Fill in segment lengths. For straight runs, segment lengths can be determined from the layout. For horizontal curves, see chart at bottom of next page. For inclines and declines, use the elevation change charts in Step 1 for the "L" dimension.

F. Fill in the moving load per foot. Use the total load value (TL) for all segments **except** those that come after the unload area and **before** the load area (see segments 6 to 13 on sample layout and calculation).

G. Fill in the appropriate data for an incline or decline. Always use the "TL" value for inclines **unless** it is between the unload and load areas (see segment 6-7).

The "DL" value should be used for **all declines, without exception.**

H. Fill in the curve factor "F". See chart for the proper factors.

I. Fill in the "K" factor. See chart for the proper factors.

J. Complete the calculations using the symbols noted at the top of the form. Starting with the first segment, make calculations across to the right hand column, then calculate the next segment completely across form, then third segment, etc.

NOTE: If the value in the "Sub-Total" column is NEGATIVE, **divide** the sub-total by the curve factor. (See segment 4-5)

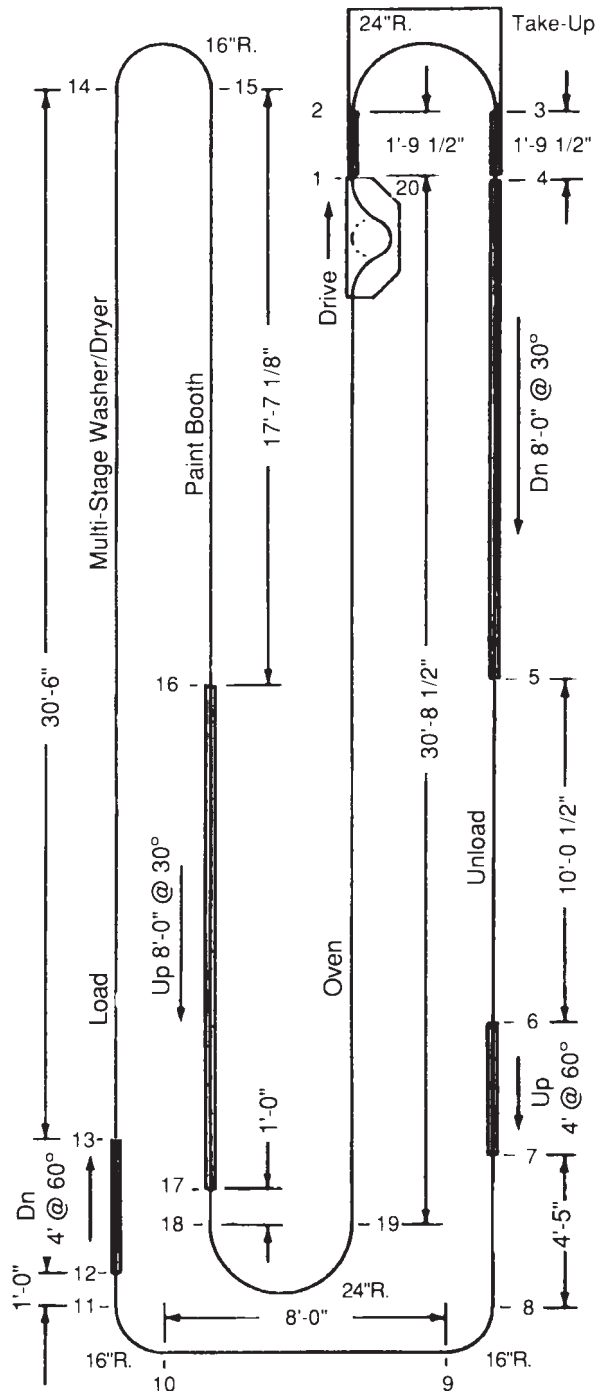
K. If the final "x" figure is greater than rated chain pull for the series conveyor being used, it may be necessary to use multiple drives.

Sample Calculations:

Chainveyor Series 200, Chain = 1.3 lbs./ft., Empty carrier wt = .5 lbs., Product wt. = 11 lbs., Carrier spacing = 2 ft.

$$DL = 1.3 \text{ lbs.} + \frac{.5 \text{ lbs.}}{2 \text{ ft.}} = 1.55 \text{ lbs./ft.}$$

$$TL = 1.3 \text{ lbs.} + \frac{.5 \text{ lbs.} + 11}{2 \text{ ft.}} = 7.05 \text{ lbs./ft.}$$





Sample Chain-Pull Calculation

Calculate each segment across to column "X".

Final "X" is total chain pull

Segment No.	Length	DL or TL	Friction .015 Factor	Previous "X"	Inclines TL x "L" x Sine Angle	Declines DL x "L" x Sine Angle	Sub-total	Curve	"K"	"X" (lbs)
							if (+) if (-)	"F" Factor		
1-2	1.79'	7.05	.19	0			.19	—	—	.19
2-3	6.28'	7.05	.66	.19			.85	1.12	3.0	3.96
3-4	1.79'	7.05	.19	3.96			4.15	—	—	4.15
4-5	16.68'	7.05	1.76	4.15		1.55 x 16.68 x .5	- 7.02	1.051	1.25	- 5.43
5-6	10.04'	7.05	1.06	- 5.43			- 4.37	—	—	- 4.37
6-7	5.87'	1.55	.14	- 4.37	1.55 x 5.87 x .866		3.65	1.082	2.00	5.95
7-8	4.42'	1.55	.10	5.95			6.05	—	—	6.05
8-9	2.09'	1.55	.05	6.05			6.1	1.06	1.50	7.97
9-10	8.0'	1.55	.19	7.97			8.15	—	—	8.15
10-11	2.09'	1.55	.05	8.15			8.2	1.06	1.50	10.19
11-12	1.00'	1.55	.02	10.19			10.22	—	—	10.22
12-13	5.87'	1.55	.14	10.22		1.55 x 5.87 x .866	2.47	1.082	2.00	4.68
13-14	30.5'	7.05	3.23	4.68			7.9	—	—	7.9
14-15	4.19'	7.05	.44	7.9			8.35	1.06	1.50	10.35
15-16	17.59'	7.05	1.86	10.35			12.21	—	—	12.21
16-17	16.68'	7.05	1.76	12.21	7.05 x 16.68 x .5		72.77	1.051	1.25	77.73
17-18	1.00'	7.05	.11	77.73			77.84	—	—	77.84
18-19	6.28'	7.05	.66	78.5			78.5	1.12	3.0	90.92
19-20	30.71'	7.05	3.25	90.92			94.17	1.07	3.0	103.76

Segment Lengths of Horiz. Curves

Radius	Degrees	"L"	Radius	Degrees	"L"
16"	15°	.35 ft	24"	15°	.52 ft
	30°	.7 ft		30°	1.05 ft
	45°	1.05 ft		45°	1.57 ft
	60°	1.40 ft		60°	2.09 ft
	90°	2.09 ft		90°	3.14 ft
	180°	4.19 ft		180°	6.28 ft

Sine's of Common Angles

Angle	Sine =	Angle	Sine =
10°	.174	50°	.766
15°	.259	60°	.866
20°	.342	70°	.940
30°	.500	75°	.966
40°	.643	80°	.985
45°	.707	90°	1.00

Chain Pull Factors For Various Segments and Components

Horizontal Curves

Degrees	"F"	"K"
15°	1.015	—
30°	1.025	.62
45°	1.035	.88
60°	1.04	1.00
90°	1.06	1.50
180°	1.12	3.00

Inclines and Declines

Angle	"F"	"K"
15°	1.03	—
30°	1.051	1.25
45°	1.071	1.75
60°	1.082	2.00
90°	1.124	3.00

Other Items

Item	"F"	"K"
Inline Drive	1.07	3.0
180° Drive	1.07	3.0
90° Drive	1.07	1.5
180° Sprkt.	1.0	3.0
90° Sprkt.	1.0	1.5



Chain-Pull Calculation

Calculate each segment across to column "X".

Final "X" is total chain pull →

Segment		DL or TL	Friction .015 Factor	Previous "X"	Inclines TL x "L" x Sine Angle	Declines DL x "L" x Sine Angle	Sub-total if (+) (x) if (-) (÷)	Curve "F" Factor	"K"	"X" (lbs)
No.	Length	(x)	(x)	(+)	(+)	(-)	(x) / (÷)	(+)	(+)	(=)



Step 4. Determine Support Spacing

Support spacing is based on the total load that can be carried by the Chainveyor® track. The total load is expressed in lbs. per foot and includes the weight of the track, chain, carriers and product, plus any accessories, such as safety guarding, that may be supported by the track.

Example 1:

Series 200 Power

1/2 lb. carrier, 4 lbs. product on 6" centers;

Track =	2	lbs./ft.
Chain =	1.3	lbs./ft.
Loaded Carrier =	<u>9</u>	lbs./ft.
Total Load =	12.3	lbs./ft.

Series 300 Power

15 lb. carrier, 120 lbs. product on 24" centers:

Track =	3.5	lbs./ft.
Chain =	3	lbs./ft.
Loaded Carrier =	<u>67.5</u>	lbs./ft.
Total Load =	74	lbs./ft.

If screen guarding @ 22 lbs. per 10 ft. section is required, the total load would be increased by another 2.2 lbs./ft. When calculating total load for Power & Free systems, it will be necessary to make separate calculations for transport lines and accumulation lines.

Example 2:

Series 200 Power & Free Transport Line

10 lbs. carrier, 55 lbs. product on 8'-0" centers:

Track (2) =	4	lbs./ft.
Chain* =	1.5	lbs./ft.
Loaded Carrier =	<u>8.13</u>	lbs./ft.
Total Load=	13.63	lbs./ft.

Series 200 Power & Free Accumulation Line

10 lbs. carrier, 55 lbs. product on 12" centers:

Track(2) =	4	lbs./ft.
Chain* =	1.5	lbs./ft.
Loaded Carrier =	<u>65</u>	lbs./ft.
Total Load=	70.5	lbs./ft.

*Note that chain weight for Power & Free systems includes the weight of the drive dog: 1.5 lbs. 8' centers = .2 lbs./ft., chain 1.3 lbs./ft. + 2 lbs./ft. carrier = 1.5 lbs./ft.

Once the conveyer load has been calculated, find the correct hanger spacing in the table below:

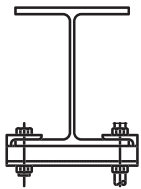
Series 200 Chainveyor®

Max. Load (Lbs./Ft.)	Support Spacing
20	10'-0"
60	7'-0"
120	5'-0"

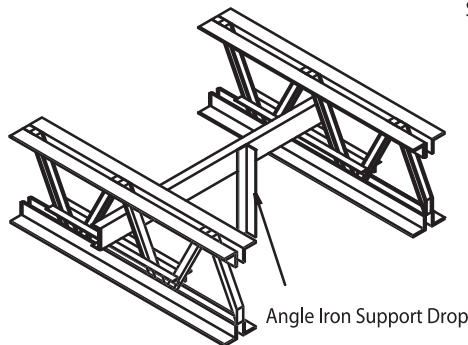
Series 300 Chainveyor®

Max. Load (Lbs./Ft.)	Support Spacing
50	10'-0"
125	7'-6"
150	5'-0"

Illustrated below are a few common methods for supporting a Chainveyor® system. Before attempting to attach to the building steel, make sure the extra load can be safely carried.

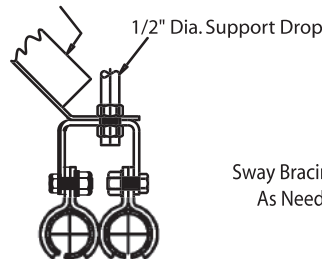


Beam Clamp

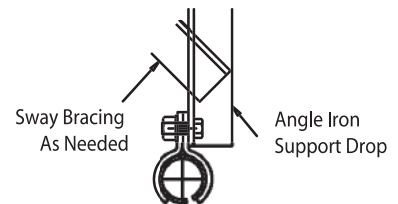


Bar Joist Suspension

Sway Bracing As Needed



Power And Free Hanger Clamp



Single-Track Hanger Clamp

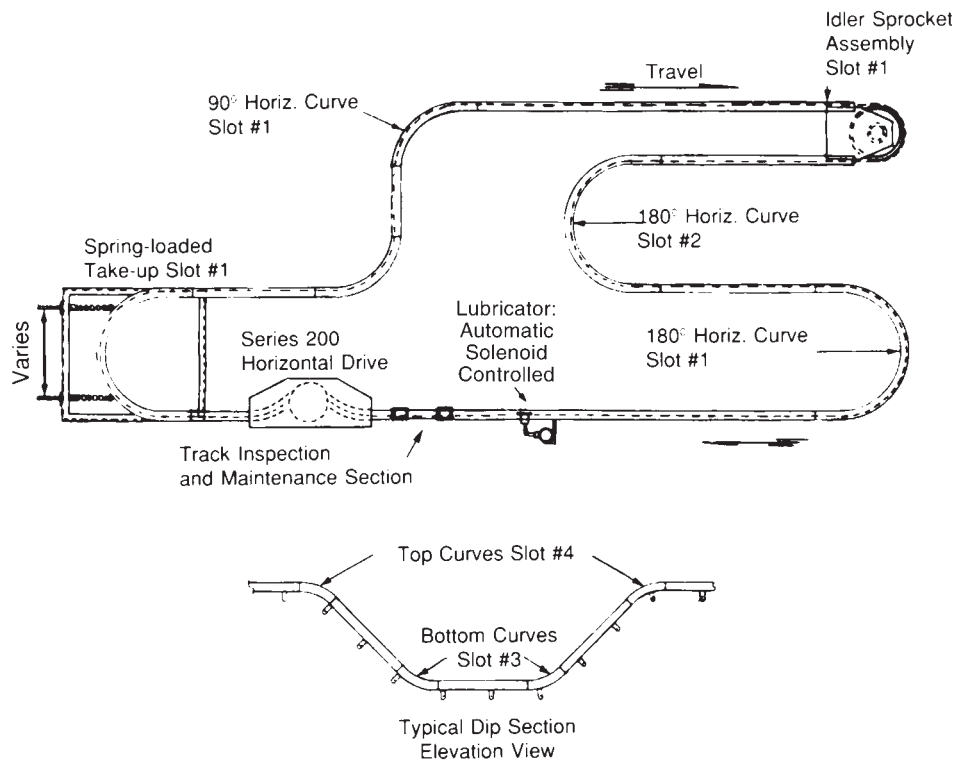
Note: Most Codes Prohibit Welding To Building Steel



Step 5. Preparing The Bill Of Material

When preparing the bill of material, the following information is required.

1. Total length of straight track-add all straight segment lengths including the straight portion of vertical inclines/declines-shown on the conveyor layout. Divide total track length by ten and round up to the next whole number (14.1 rounds up to 15), this is the minimum number of 10' track sections needed to install the project.
2. Number of curves-curves must be classified by radius, degree and slot position. To determine slot position, note the drive location; in all applications the drive location determines slot position for all horizontal curves-see illustration below. Regarding vertical curves: all bottom vertical curves are slot position #3; all top vertical curves are slot position #4-see illustration below. Note: do not count the curve portion of the take-up.
3. Total length of chain-to the total amount of straight track add the segment length of all horizontal and vertical curve sections including the curve portion of the take-up. For Series 200, divide total chain length by ten and round up to the next whole number to determine the number of lengths of chain required. For Series 300, specify the total number of feet.
4. Specify quantity and part number of track accessories such as: Inspection Sections, Track Hangers, Weld Sleeves, etc. See individual components for notes on where to use.
5. Specify Take-up required by part number, description, radius, travel and track slot position.
6. Specify Drive unit by part number, speed range and electrical characteristics.
7. Specify quantity of each curve or idler sprocket assembly by part number, description, degree and track slot position.
8. Specify quantity and part number of chain accessories, such as Crossbar Carriers, Rotating Carriers and Indexing Hooks.
9. Specify Lubricators by part number and coil voltage.





Power & Free

The Chainveyor® Series 200 combination Power & Free overhead conveyor provides load-switching features often called for, but not possible with, standard power systems. By combining Series 200 Power and 200 Free, the standard Power line moves carriers from one area to another while the 200 Free system is used for switching and in-process storage. Power & Free applications afford almost unlimited versatility in fast and slow stop-and-go production and can route carriers and loads into and out of pre-selected processing or storage lines, to and from stations, areas and departments, or will recycle if required.

Typical Applications

Automatic Dispatching: Independently operating carriers make it possible to dispatch loads to various destinations in a system. Preset index devices automatically switch the carrier off at any desired station, returning it to the same power line or to another power line, to be transported to any other station in the system.

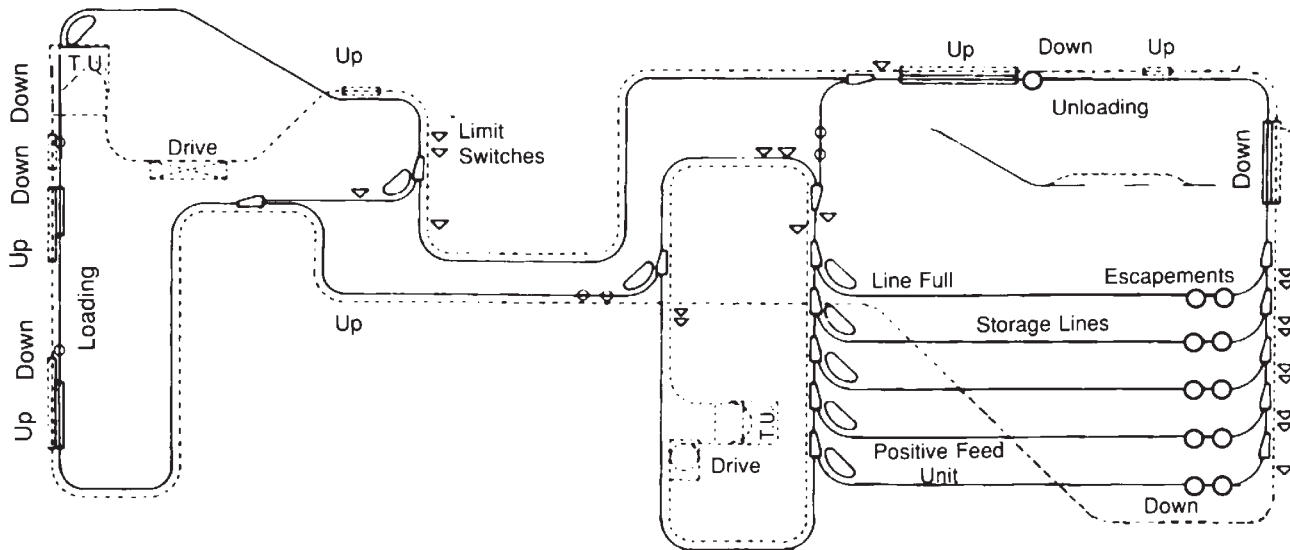
Selective Storage: Any number of storage lines may be provided in a Chainveyor system, and parts may be stored with selectivity as to type, size, color, etc. Loads in live storage are up and out of the way, saving valuable floor space, yet may be released to a power line at any time either automatically or manually.

Different Production Speeds: With Power & Free systems, different speeds in production units per hour can be provided at different areas as well as being able to provide spacing variations between carriers for certain processes or operations. In stop-and-go operations, loads may be diverted to a free line or any number of free lines at any work station for processing while the load is at a standstill; and after completion, the carrier may re-enter the Power & Free system and automatically move to the next station or operation.

Rework and Repair: If inspection reveals that a part requires attention before subsequent assembly or between operations, it is easily switched to an adjacent loop for rework or repair without interrupting the main line production. After rework or repair, the part can be re-routed back to the main line.

Re-Circulation: This feature makes it possible to shunt excess materials into a recirculating circuit or standby storage lines when necessary, and automatically release them back into the main line as required. This is accomplished by the use of line-full sensing devices which do not allow additional carriers to enter the line once it is filled.

Repeating Cycles: A Power & Free system is especially valuable in applications where certain routine steps must be repeated in between major production operations. For those types of applications, a Power & Free system can be installed to repeat a single step or a complete production cycle or be set to by-pass a particular operation or station.





5-Step Guideline To Planning A Power & Free Overhead System

The following two 5-step guidelines for designing a Chainveyor® Power & Free system assumes the reader is fully familiar with standard Chainveyor® Power-Only applications.

The following steps are involved in system planning:

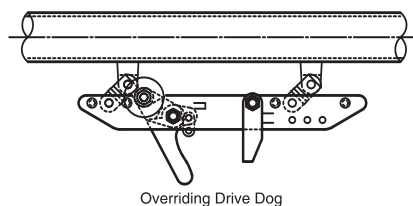
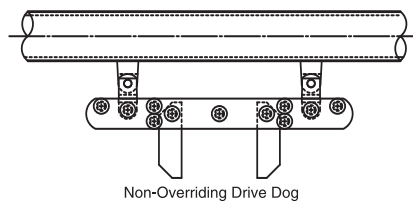
1. Material To Be Conveyed
2. Functions In The System
3. Sequence Of Operations
4. Production Rates
5. Carrier Design And Clearances

Step 1. Material to be Conveyed

Determine the minimum and maximum size and weight of the loads to be handled. Refer to Power-Only planning guideline Step 1.

Step 2. Functions in the System

Determine the types of functions to be accomplished with the system; storage and retrieval, transfers, merges, gravity accumulation, powered accumulation, work stations, manual or automatic feeding, release or escapement, etc. Functions in the system will determine the type of drive dogs to be used on the power chain, e.g., powered accumulation required overriding type drive dogs.



Step 3. Sequence of Operation

Develop a sequence of operation and a flow chart of the system. Refer to Power-Only planning guideline Step 3.

Step 4. Production Rates

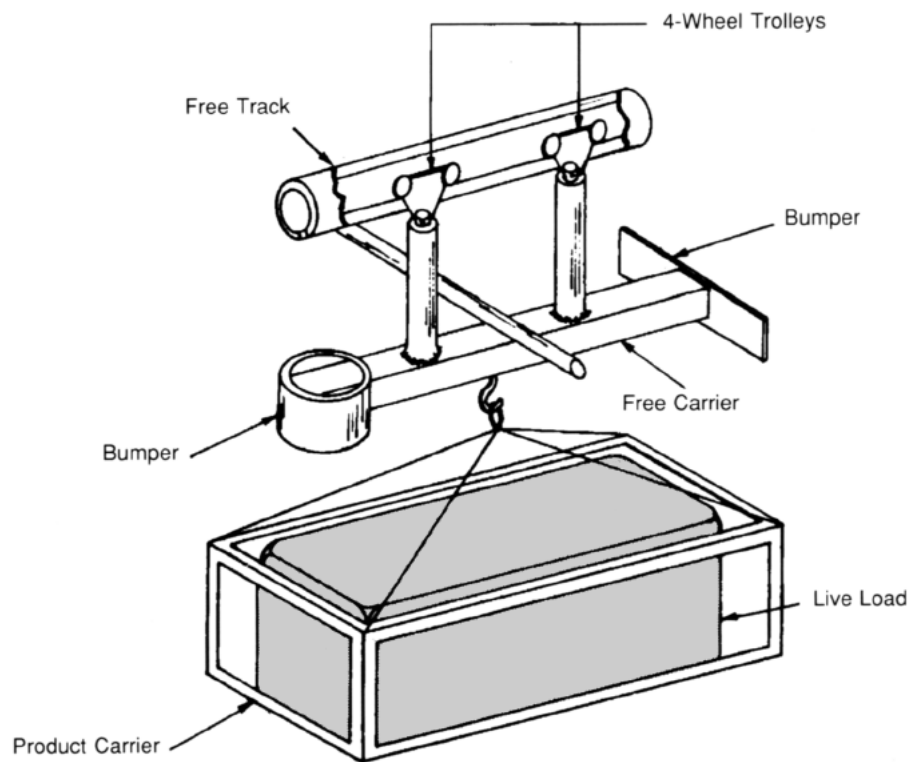
Production rates and load size will determine conveyor speed and carrier spacing. Carrier spacing is equal to the drive dog centers or spacing on the power chain. Refer to Power-Only planning guideline Step 4.

Step 5. Carrier Design and Clearances

Refer to Power-only planning guideline Step 5.

A. Design

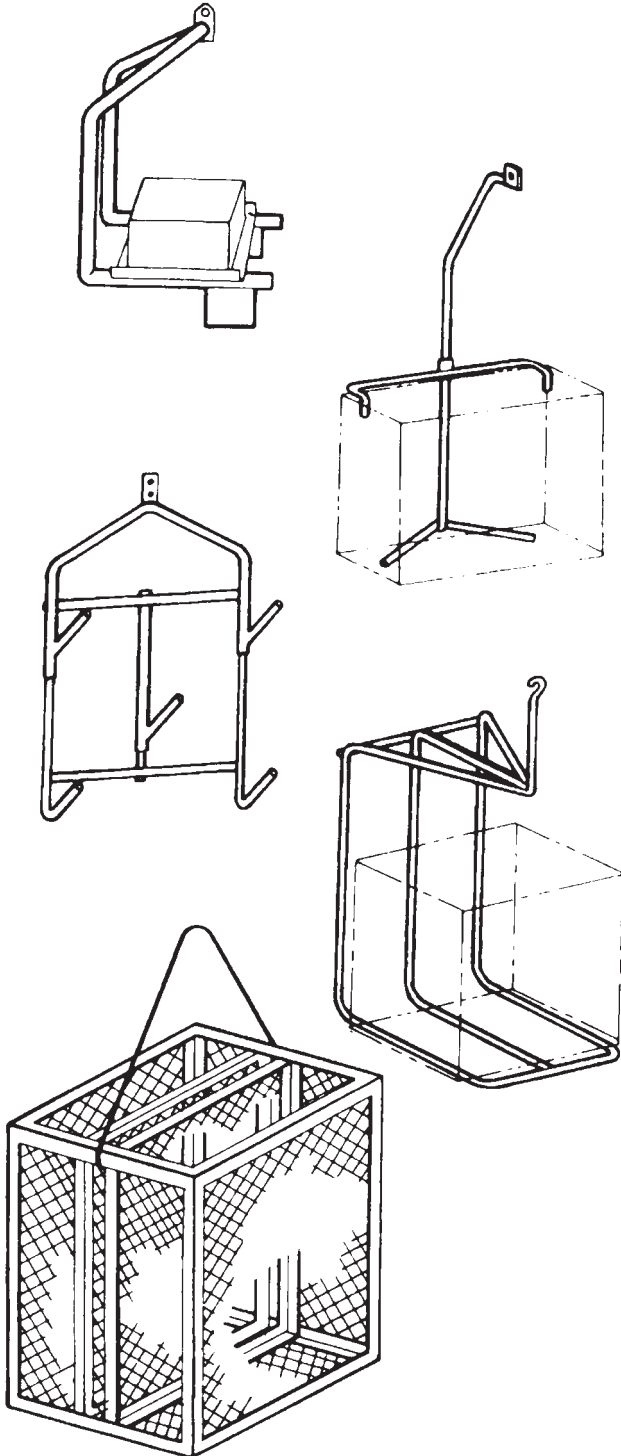
In a Series 200 P&F system, loads are suspended from 8-wheel free carriers running in the free track.





Step 5. Carrier Design and Clearances (Continued)

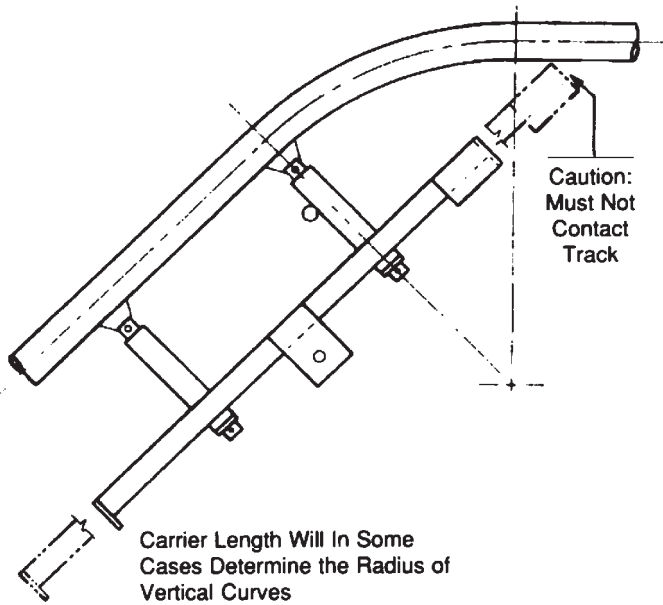
Product carriers must be designed for the application. Design depends upon the type of product and quantity to be carried. Typical examples of different types of product carriers are shown here:



B. Clearances

When determining horizontal clearances in curves, remember, the standard radius of the power curve is 16" and the radius of the free curve in which the carriers run is either 14" or 18" depending on whether the free curve is located to the inside or the outside of the power track curve.

When determining vertical clearances, the length of the carrier may require using a vertical curve with a radius larger than the 16" standard.





5-Step Guideline to Power and Free System Layout

When system planning has been completed, the layout can be started. The system layout is comprised of the following 5 steps:

1. Locating the conveyor path
2. Locating components
3. Calculating chain pull
4. Determining support methods and spacing
5. Preparing the bill of material

Step 1. Locating the Conveyor Path

Layout drawings should be done to scale. A scale of 1/4" = 1'-0" is frequently used, and is the smallest scale recommended if the drawing is to be used for installation.

Refer to Power-only system layout guideline Step 1.

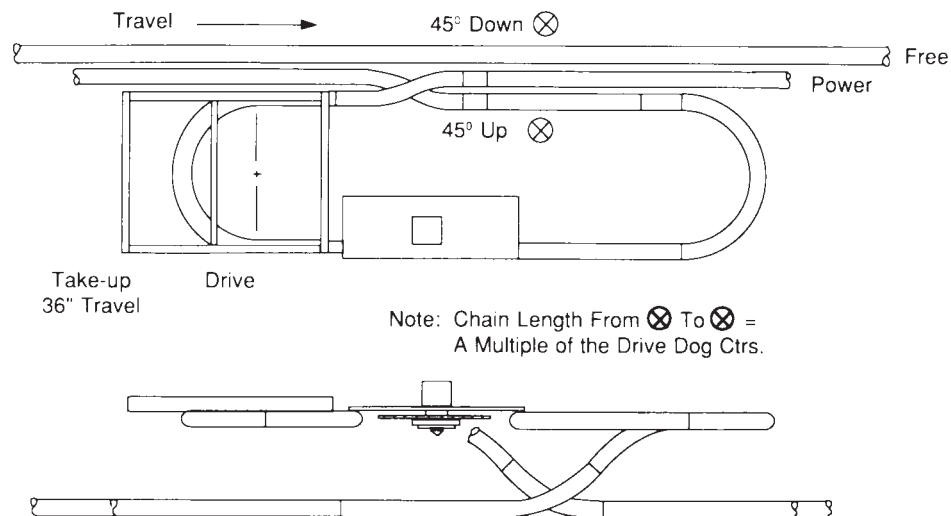
Step 2. Locating Components

Once the system layout has been completed, the next step is to properly locate the individual components of each conveyor. Four basic components need special attention for locations; drive, take-up, lubricator, and inspection section. Application notes for guidance in locating these components are listed below.

A. Drives

Refer to Power-only system layout guideline Step 2.A

Drives for Power & Free conveyors have to be located in a crossover or return line, where the Power & Free tracks are separated.



Note: Chain Length From ⊗ To ⊗ = A Multiple of the Drive Dog Ctrs.

Drive and Take-up Arrangement W/O Transfer
- Power Line Remains on Same Side of Free Line -



Step 2. Locating Components

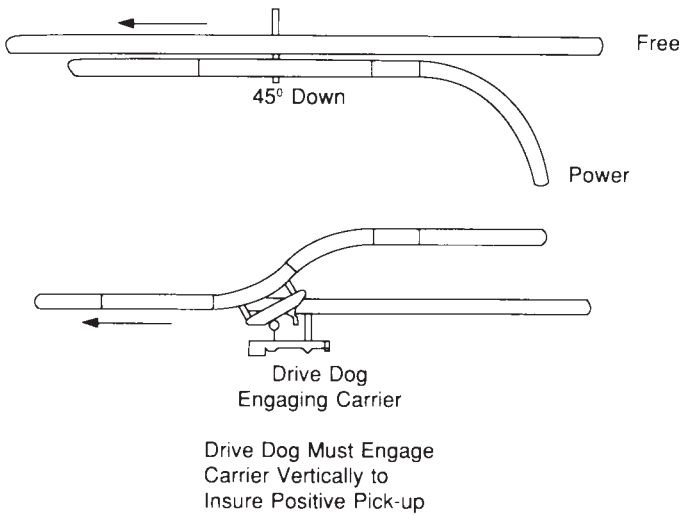
(Continued)

B. Take-ups

Refer to Power-only system layout guideline step 2.B

When a Power & Free Conveyor requires exact spacing of conveyor drive dogs, a take-up having 36" of travel should be used. Total chain take-up capacity is two times the "travel" specification of the take-up; i.e., a take-up have 36" of travel will accommodate 72", or 6 feet, of chain between minimum and maximum extension.

Take-ups for Power & Free conveyors should be located in a crossover or return line with the drive.



C. Inspection Section and Carrier Insert Section

The inspection section should be installed right after the chain lubricator to permit checking the chain for proper lubrication. The inspection section is also used to remove slack chain from the conveyor. Long conveyors should have a minimum of one inspection section every 250 feet.

In Free-only and Power & Free systems, the inspection section is also used as a carrier insert section. It should be installed at a low point in the conveyor where there will be ample room for inserting, removing and handling carriers.

One should be installed in both the Power & Free lines on each level of a multiple level installation.

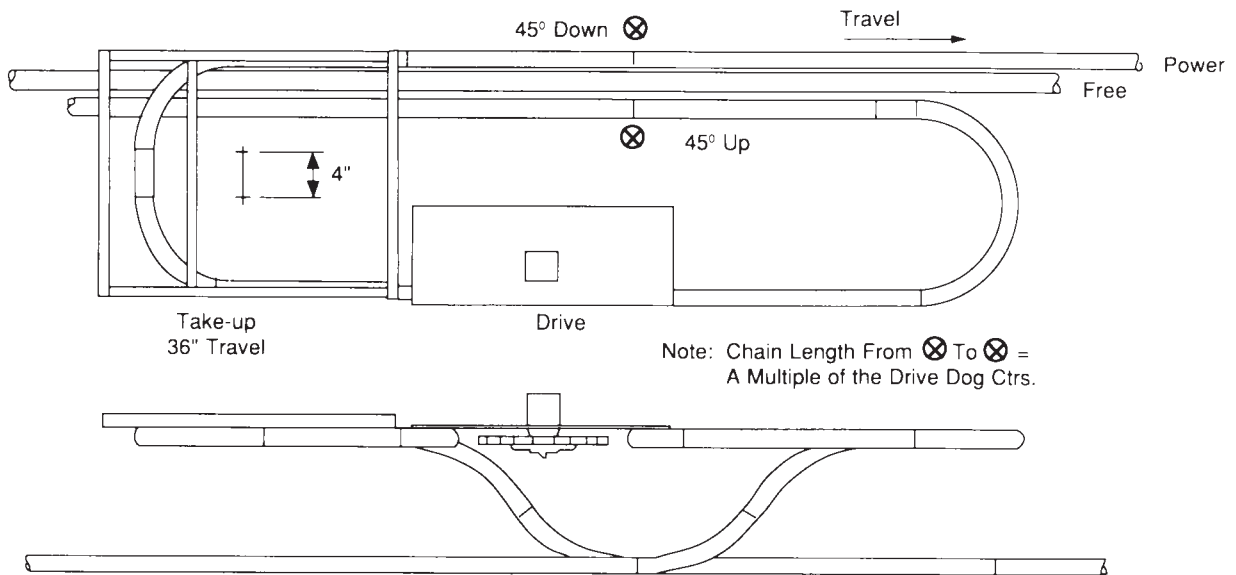
D. Chain Lubricator (Power Line)

The chain lubricator should be placed near the input end of the drive to permit some of the oil carried by the conveyor chain to be imparted to the drive sprocket.

Applications involving power washers, where overspray can wash the lubricant off, and ovens, should have the lubricator positioned so the chain will be relubricated right after having passed through the process.

NOTE: Allow some space after an oven for the chain to cool.

Oil flow to the chain is manually adjusted by a needle valve on the unit which should be set to apply a light film of oil. Flow is controlled by an electrically operated solenoid valve. The lubricator should always be **OFF** when the conveyor is not running.



Drive and Take-up Arrangement W/Transfer
- Power Line is Transferred to Opposite Side of Free Line -



E. Carrier Lubricator (Free Line)

The Free carrier lubricator is similar in design to the Power chain lubricator except for an additional brush assembly. This lubricator should be installed in a section of the Free system having a large amount of carrier traffic.

The lubricator control circuit should be wired into the motor controls of the conveyor that will be transporting the carriers through the lubricator and operated by a limit switch positioned to detect the presence of a free carrier.

F. Switches and Frogs

Switches and frogs are used only in Free, and Power & Free systems for controlling carrier traffic in the free line.

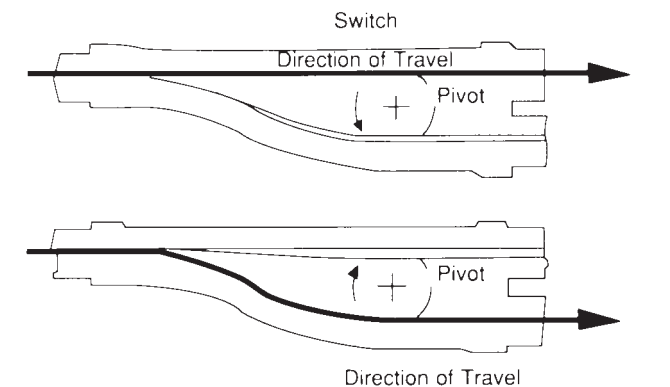
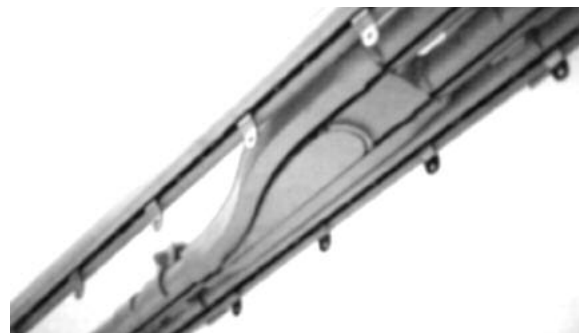
A **SWITCH** is used for diverging operations and requires a manually operated pull chain or an air cylinder to position the tongue. Tongue position determines which path the carrier will take.

As a carrier approaches a switch, a decision to divert the carrier or allow it to pass is needed. The decision can be made by a worker (manual) or by sensing devices (automatic). Manual operation requires an operator to be present, observing each approaching carrier and operating the switch via a pull chain, push-button or air valve to divert the correct carriers.

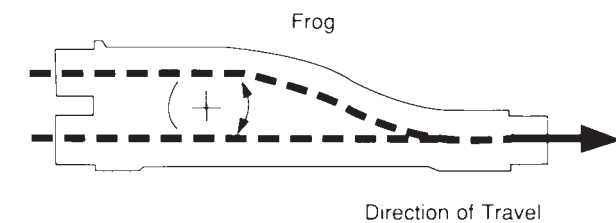
Automatic operation requires a means of identifying carriers, such as a mechanical or magnetic code that can be detected by the appropriate sensor mounted near the switch.

A **FROG** is used for converging or merging operations and does not require any separate control.

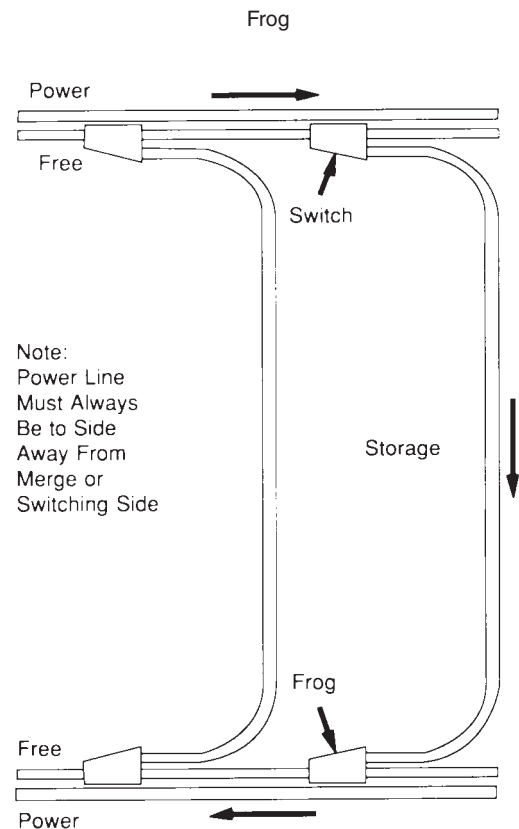
As a carrier approaches a frog, a decision to merge or stop is needed to prevent a collision. Again, the decision may be manual or automatic. Manual operation requires the operator controlling the carrier to make sure the path is clear before pushing his carrier through the frog. Automatic operation requires a sensing device to detect an oncoming carrier and a stop mechanism to hold the converging carrier until the path is clear.



Switch tongue must be in the correct position before the carrier arrives.



Frog tongue is shifted to the correct position by the carrier passing through.





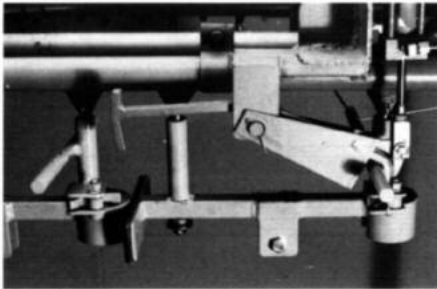
Step 2. Locating Components

(Continued)

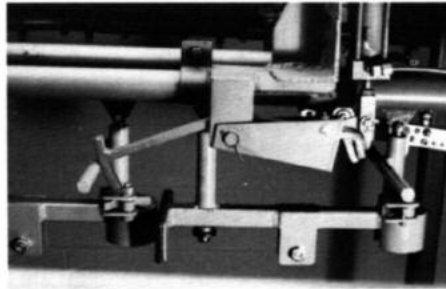
G. Stops and Escapements

Stops and escapements are used in Free-Only and Power & Free systems to control the flow of carriers from accumulation, at work stations and at merges. Stops and escapements differ, in that escapements allow only one carrier to be released each time it is cycled, while a stop will allow carriers to discharge for as long as the stop is held open. The photo sequence; below, shows an escapement in operation.

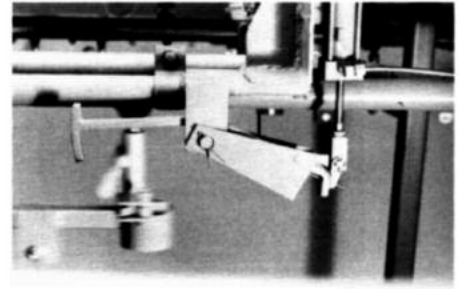
Escape Sequence



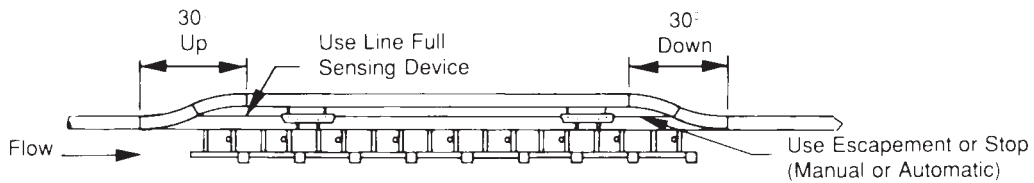
Escapement holds back free carriers



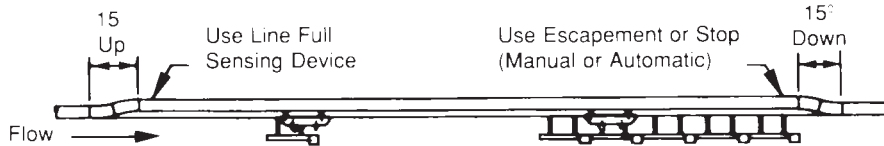
Releases only one carrier at a time



Resets to allow carriers to move forward to holding position



Gravity Accumulation
Power Line Raised 2"
Uses Non-Overriding Drive Dogs



Inline Accumulation
Power Line Raised 1"
Uses Overriding Drive Dogs



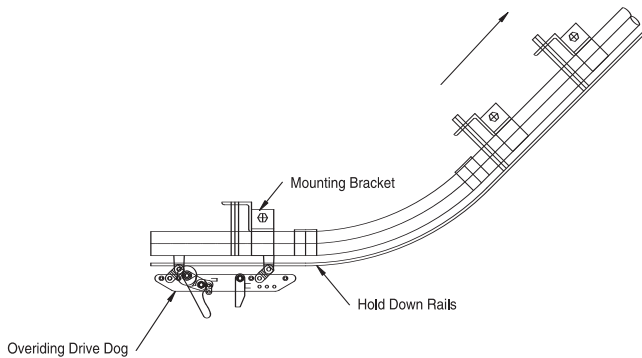
H. Sensing Devices

Limit switches and photo eyes are most frequently used as sensing devices in Power & Free systems to detect carriers, drive dogs, and carrier codes.



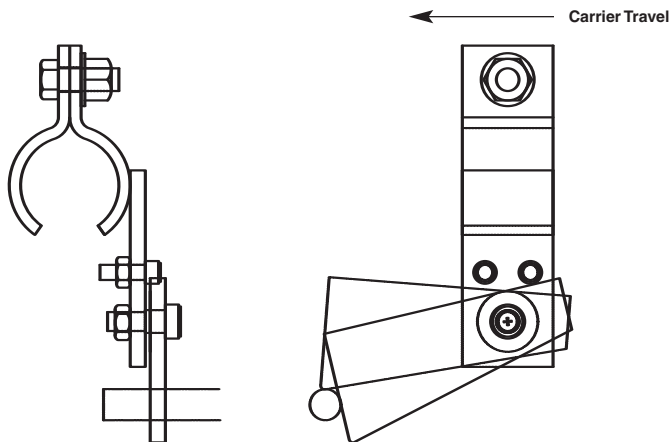
I. Hold Down Rail

Hold down rails are required along all power track inclines on systems using overriding drive dogs. They prevent the drive dog wheels from popping up and releasing a carrier which could free-wheel back down the incline.



J. Anti-Roll Back

Anti-roll back devices are used on free track inclines to prevent loose carriers from running back down the incline.



K. Power Feeders

Power feeders are used at points where carriers are to be automatically moved into or out of the main free line for pick up by a drive dog.

Step 3. Chain Pull Calculations

Use the Long-Form Method as outlined in Power-Only guideline Step 3 with the following exceptions:

Load Spacing is considered same as drive dog spacing.

*Empty Carrier is equal to 8-wheel carrier plus product carrier.

Therefore:

A. Determine the Dead Load per foot (DL)

$$DL = \text{Chain (lbs/ft)} + \frac{\text{*Empty Carrier (lbs.)}}{\text{Drive Dog Spacing (ft.)}}$$

B. Determine the Total Load per foot (TL)

$$DL = \text{Chain (lbs/ft)} + \frac{\text{*Empty Carrier + Product (lbs.)}}{\text{Drive Dog Spacing (ft.)}}$$

Step 4. Determine Support Spacing

Refer to Power-Only system layout guideline Step 4.

Step 5. Preparing the Bill of Material

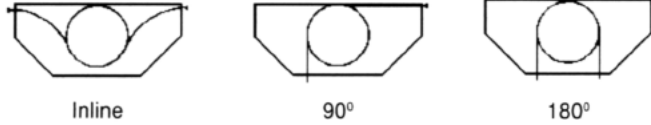
Refer to Power-Only system layout guideline Step 5.



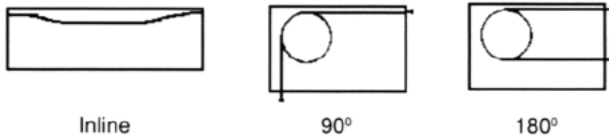
Typical Layou Symbols

Drives

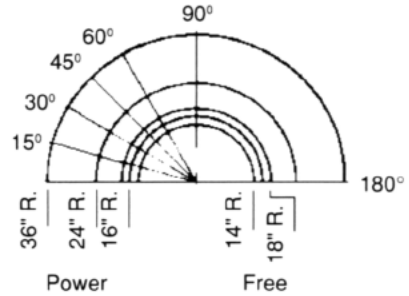
200 Series



300 Series



Curves



Components

Lubricators

L = Chain Lubricator
C = Carrier Lubricator

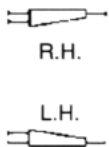


Inspection Section

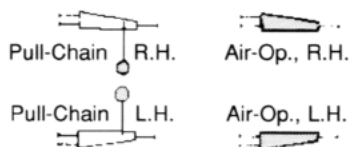


Power & Free

Frogs



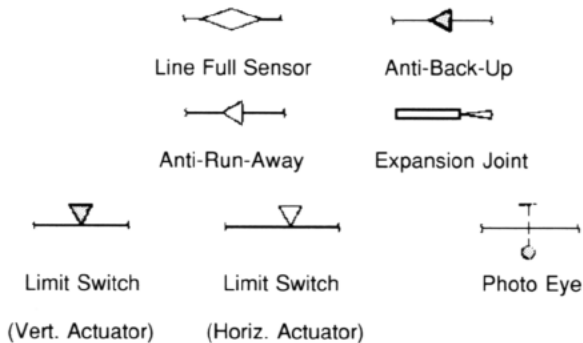
Switches



Stops & Escapements

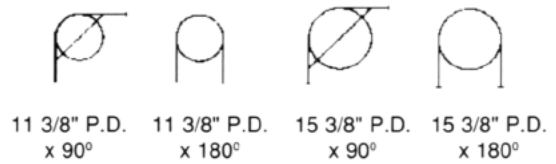


Miscellaneous

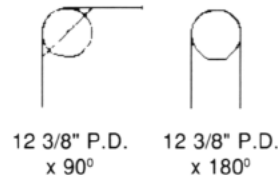


Sprocket Turns

200 Series

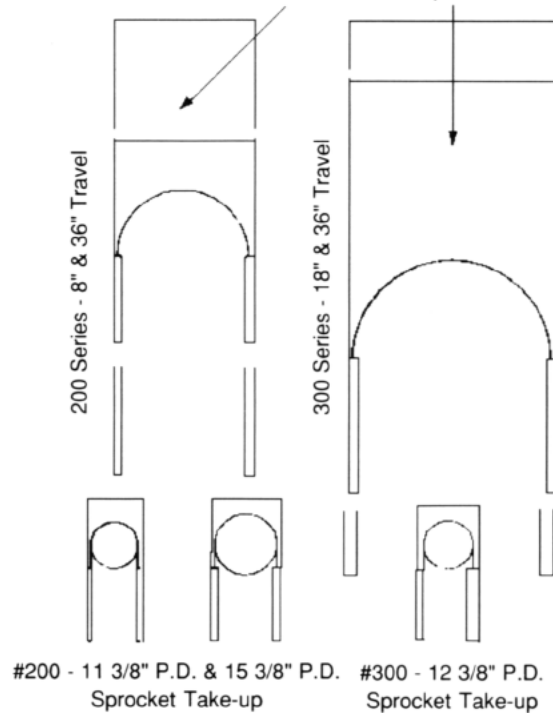


300 Series



Take-ups

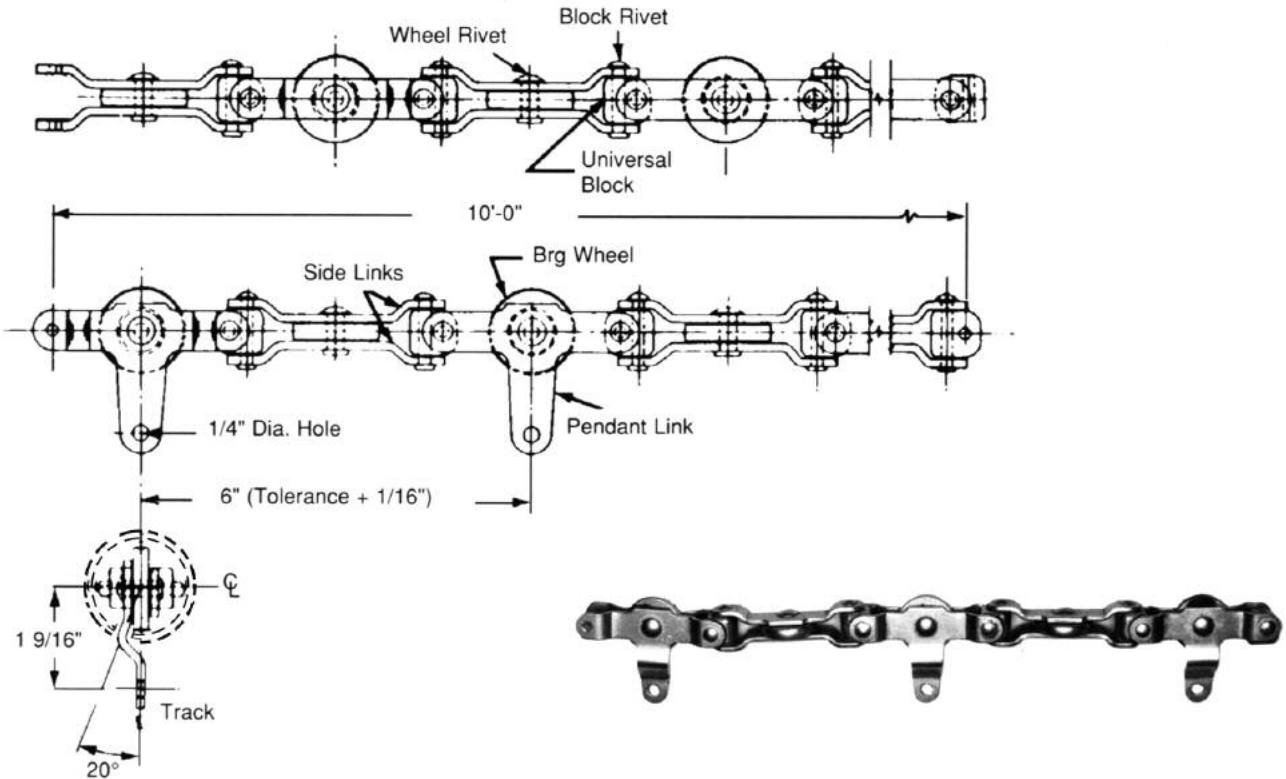
SP = Spring-Op.
CW = Counter Wt.
SC = Screw-Op.





200 Power

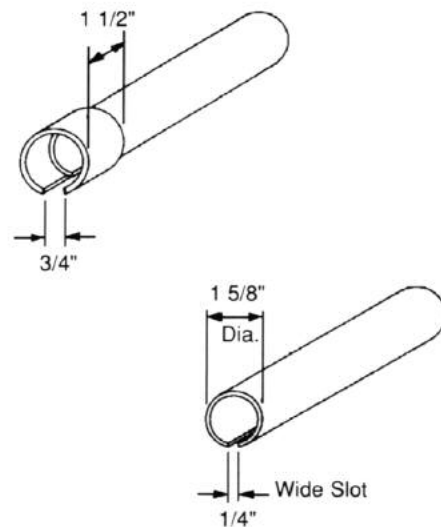
Chain



Part No.	Description	Wt.
2020900	Chain 10 ft. long	13
2020901	Chain 10 ft. long, hand packed with grease	13

Capacity: 30 lbs. per pendant
 Chain Pull: 600 lbs. maximum
 Tensile Strength: 3000 lbs.
 Maximum operating temperature 450°F

Track



Part No.	Description	Wt.
2010019	Track 10 ft. long	20
2010900	Track 10 ft. long with Weld Sleeve One End	20.5

How To Specify:

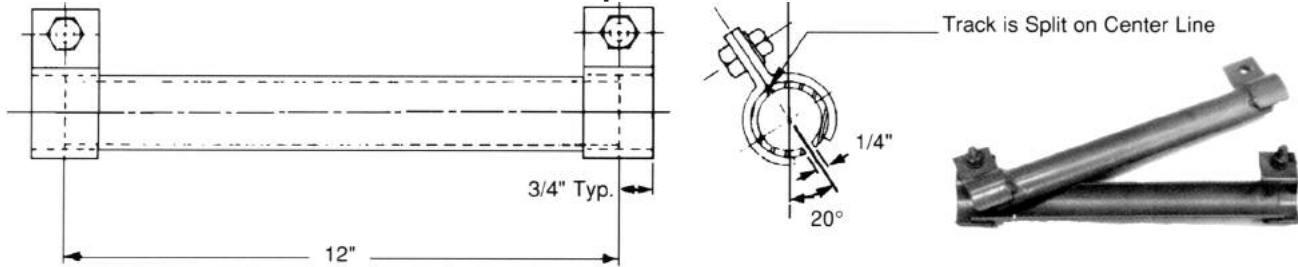
Qty.	Part No.	Description

1 5/8" dia. x .120" wall rolled tubing with 1/4" open seam



200 Power

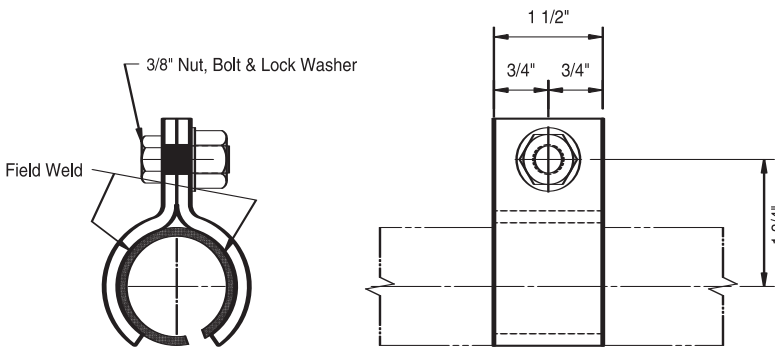
Inspection Section



Required for installation and maintenance of chain. It is recommended inspection sections be located not more than 250 feet apart and one on each level of a multiple level installation.

Part No.	Description	Wt.
2011900	Track Inspection Section	3.5

Track Hanger

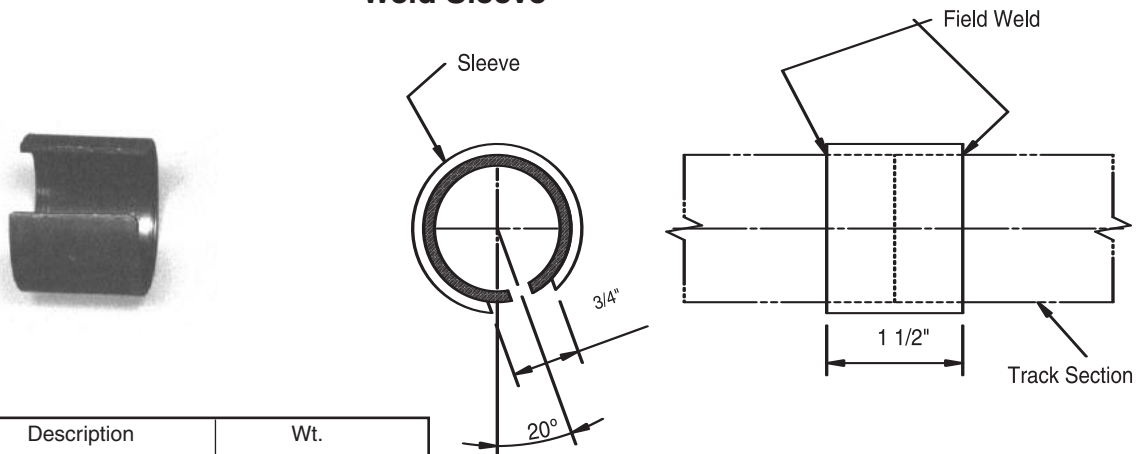


Hanger Spacing: (Max. 10'0" Centers)
 10'-0" centers up to 20 lbs./ft. load
 7'-0" centers 21 to 50 lbs./ft. load
 5'-0" centers 51 to 60 lbs./ft. load
 Plus 1 hanger within 1" tangent of curve
 Plus 1 hanger in middle of 180° curve

Part No.	Description	Wt.
2050900	Track Hanger	0.5

*Should be welded to track after locating in place

Weld Sleeve

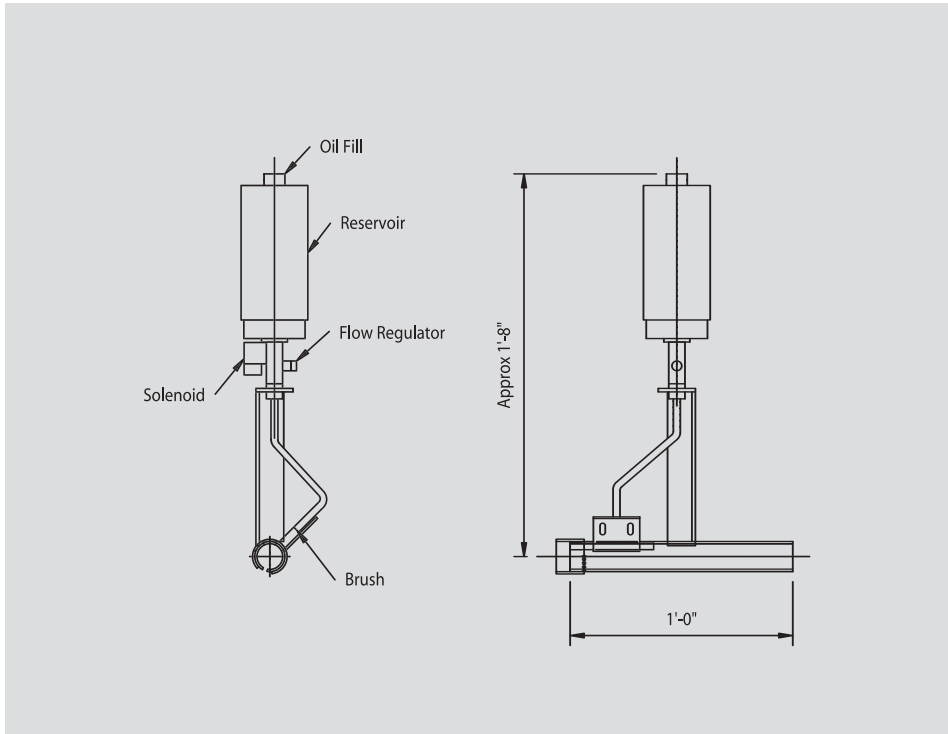


Part No.	Description	Wt.
2055900	Weld Sleeve	0.5

Required at each junction of track, curve, drive, take-up, etc.



Lubricator (Automatic Brush Type)



– Requires Field Assembly

– Lubricator should be located before the drive or after every oven, washer or degreaser the chain passes through.

When used with oven applications, lubricator should be located approximately 20 ft. after oven to allow the chain to cool

– Proper lubrication is important in extending the life of overhead conveyors.

Many factors affect lubrication recommendations; e.g., oven temperature (if any), ambient temperature and humidity, atmospheric contaminants (dust, lint, paint, overspray, etc.), speed of chain, load on chain, and length of chain.

Part No.	Description	Coil Voltage	Weight
2040900	Lubricator	110 Volt	8 lbs.
2040901	Lubricator	230 Volt	8 lbs.
2040902	Lubricator	460 Volt	8 lbs.
2040903	Lubricator	208 Volt	8 lbs.

How to Specify:

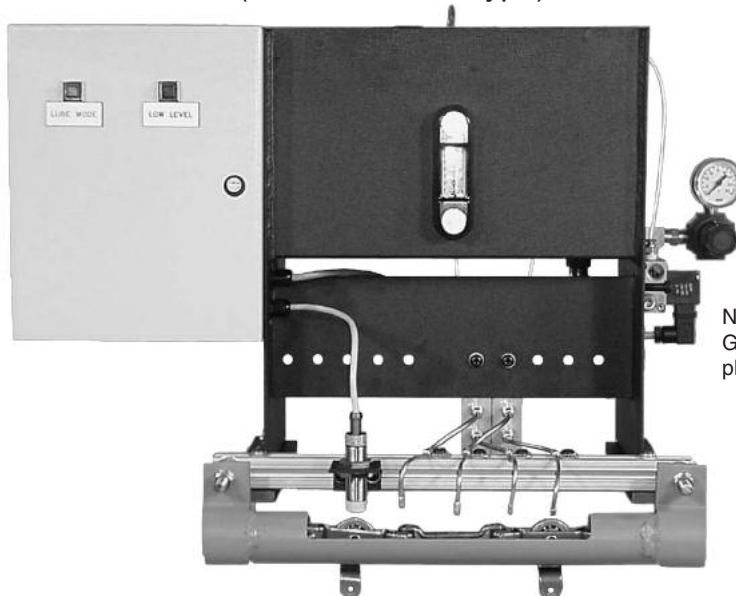
Qty.	Part No.	Description	Voltage
		Lubricator	

GREGORY-ADAMS, INC. does not recommend any specific lubricant or manufacturer of lubricants. A qualified lubrication engineer should be contacted to determine the best lubricant for each application.



200 Power

Conveyor Lubricator (Enclosed Track Type)



NOTES: Chain is not included.
Guard has been removed for photo.

- Requires Field Assembly
- Squirts measured shots of lubricant into chain wheels and universal joints while conveyor is running.
- Reduces downtime and manual labor in lubricating trolleys.
- Eliminates surging caused by unlubricated and worn conveyor.
- Reduces drive power requirements.
- Lubricates in either direction.
- Reduces waste and contamination. 1,000 ft. of conveyor chain can be lubricated with 6.08 oz. of lubricant.
- Eliminates product sway, reducing possibility of injury.
- Has Programmable Count Controller (PCC) for precise automatic lubrication.
- Extends the life of chain.
- Uses almost any lubricant.

How to Specify:

Part No.	Description	Voltage	Wt.
2041900	Lubricator, Airless Shot type	110V	45

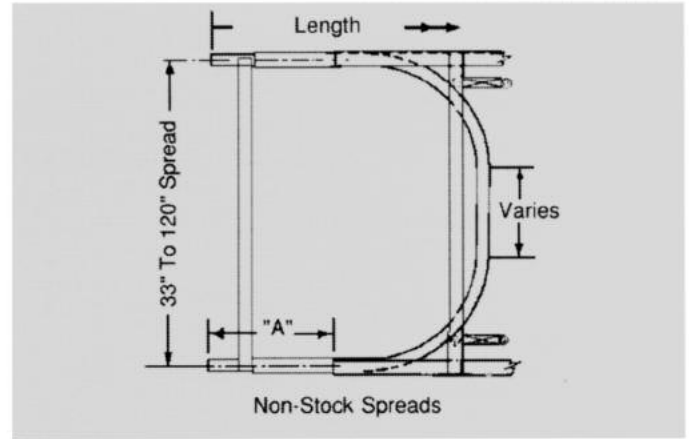
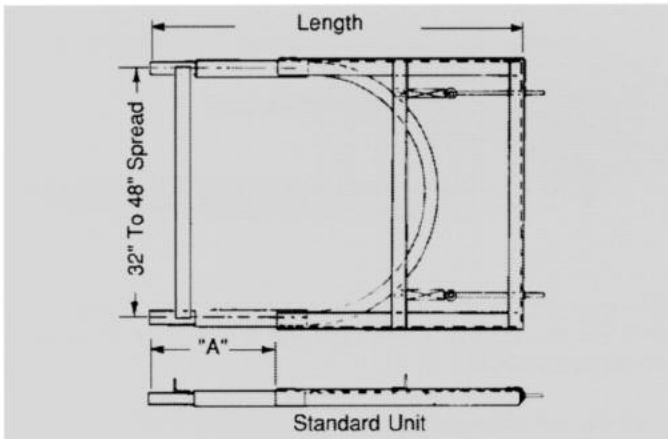
Proper lubrication is important in extending the life of overhead conveyors.

Many factors affect lubrication recommendations; e.g., oven temperature (if any), ambient temperature and humidity, atmospheric contaminants (dust, lint, paint, overspray, etc.), speed of chain, load on chain, and length of chain.

GREGORY-ADAMS, INC. does not recommend any specific lubricant or manufacturer of lubricants. A qualified lubrication engineer should be contacted to determine the best lubricant for each application.

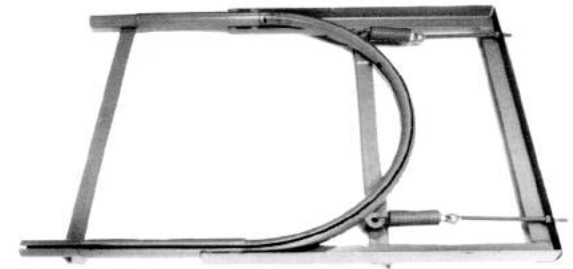


200 Power



180° Curve Take-ups Denotes Stock Spring-Loaded Only

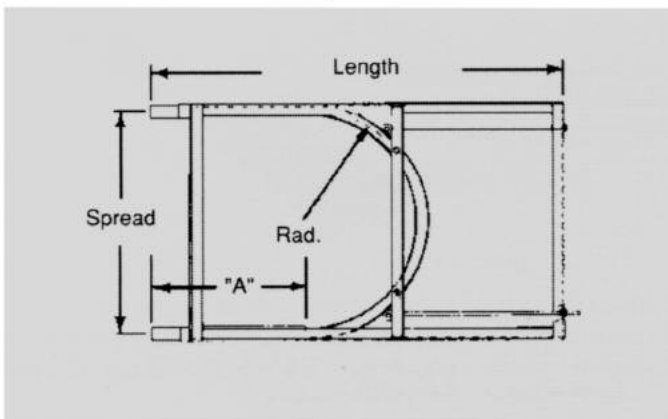
Part No.	Spread	Radius	Travel	Slot	"A"	Wt.	Length
2200900 2201900	32"	16"	8"	#1 #2	1'-5"	46	4'-1 3/4"
2204900 2205900	32"	16"	36"	#1 #2	4'-2"	66	9'- 4"
2202900 2203900	33" to 60"	16"	8"	#1 #2	1'-5"	70	4'-1 3/4"
2212900 2213900	61" to 120"	16"	8"	#1 #2	1'-8"	115	5'- 3"
2220900 2221900	48"	24"	8"	#1 #2	1'-9 1/2"	55	4'-10 1/2"



Spring-loaded take-ups are used on non-reversing conveyors. Units with 36" travel are used when carrier spacing requires exact centers.

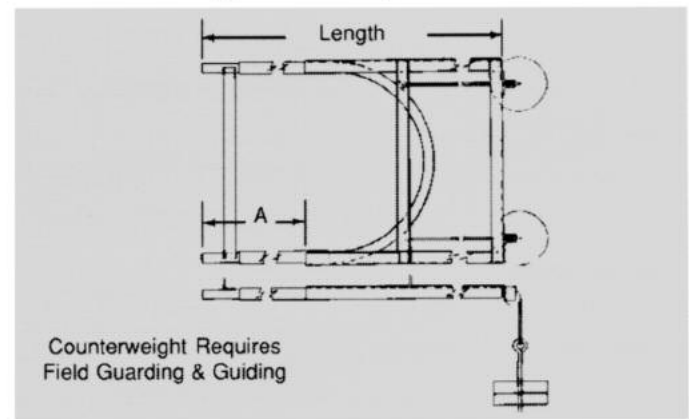
Take-ups are available as spring loaded, counterweighted or screw type. Specify type. For slot position see page 37.

180° Curve Screw Take-up



Screw take-ups are required on reversing systems.

180° Counterweighted Take-up



Counterweighted take-ups are used on conveyors with dual drives and on conveyors that have excessive expansion and contraction due to variations in temperature.

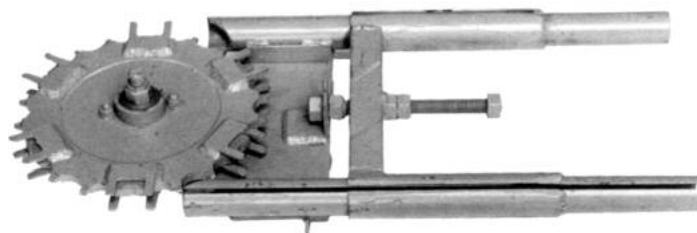
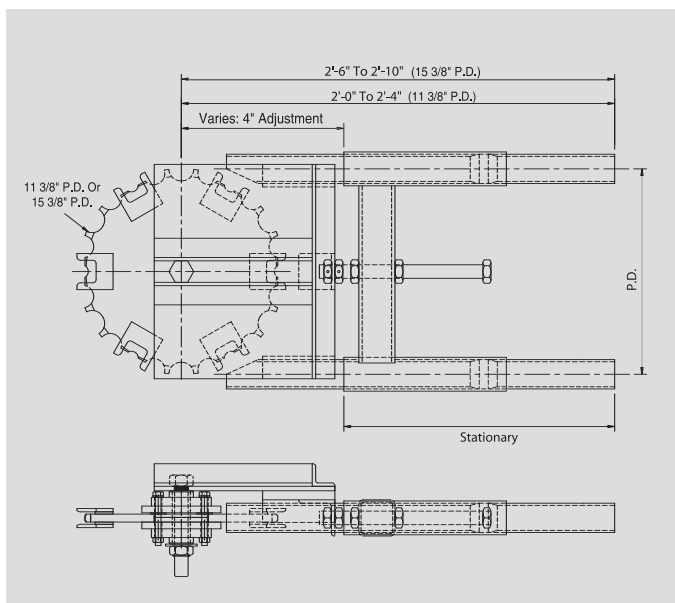
How to Specify:

Qty .	Part No.	Description	Type	Spread	Radius	Travel	Slot
		180° Curve Take-up					



200 Power

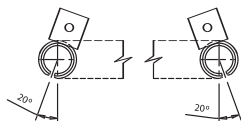
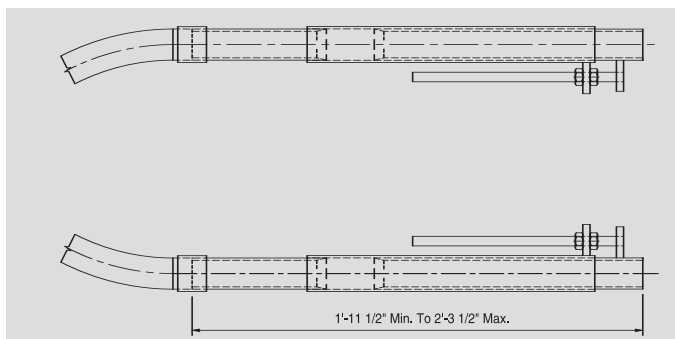
180° Sprocket Turn-Screw Take-up



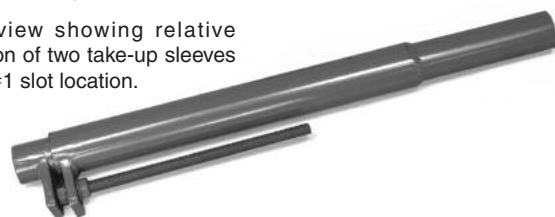
180° Sprocket Turn - Screw Take-up

Part No.	Description	Pitch Diameter	Radius	Travel	Slot	Wt.
2234900	180° Sprocket Turn - Screw Take-up	11 3/8" P.D. Horizontal	5 11/16"	4"	#1	45
2233900		11 3/8" P.D. Horizontal			#2	
2235900		11 3/8" P.D. Vertical			#3	
2244900	180° Sprocket Turn - Screw Take-up	15 3/8" P.D. Horizontal	7 11/16"	4"	#1	45
2243900		15 3/8" P.D. Horizontal			#2	
2245900		15 3/8" P.D. Vertical			#3	

Take-up Sleeve



End view showing relative position of two take-up sleeves for a #1 slot location.



Take-up Sleeve

Part No.	Description	Travel	Wt.
2250900	1 Take-up Sleeve	4"	20

Take-up sleeves are used on conveyors where standard take-up units cannot be used because of conveyor configuration or clearance limitations.

They can also be used effectively on very small, lightly loaded systems.

Normal installation requires two take-up sleeves.

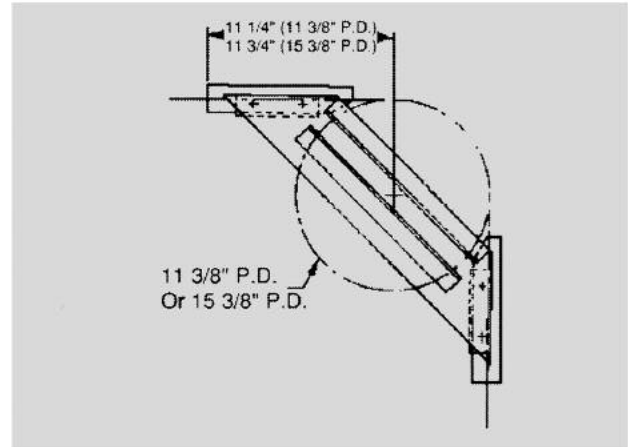
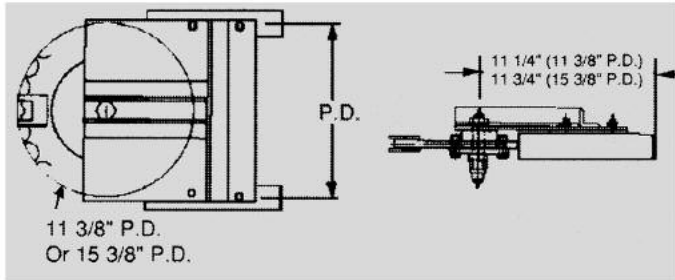
How to Specify:

Qty.	Part No.	Description	Pitch Diameter (P.D.)	Slot



200 Power

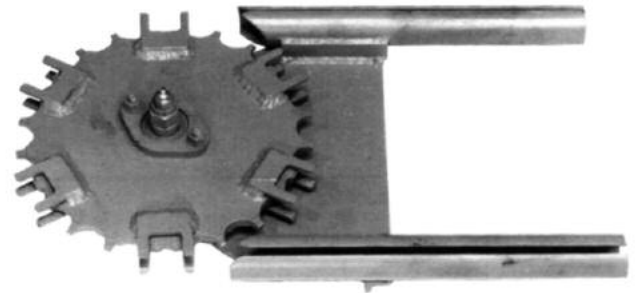
Idler Sprocket turns



Part No.	Pitch Diameter	Type	Degree	Slot	Wt.
2230900	11 3/8"	Horiz.	180°	#1	34
2231900		Horiz.		#2	
2232900		Vert.		#3	
2238900	11 3/8"	Horiz.	90°	#1	34
2237900		Horiz.		#2	
2239900		Vert.		#3	
2240900	15 3/8"	Horiz.	180°	#1	42
2241900		Horiz.		#2	
2242900		Vert.		#3	
2246900	15 3/8"	Horiz.	90°	#1	42
2247900		Horiz.		#2	
2248900		Vert.		#3	

Idler sprocket turns used on conveyors requiring small radius turns.

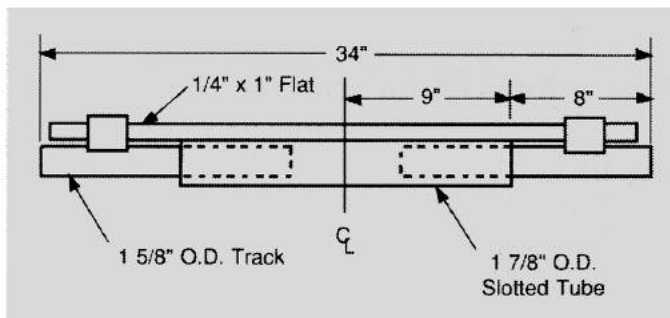
Does not add chain pull. Maximum temperature 450° F. For slot positions see page 37.



How to Specify:

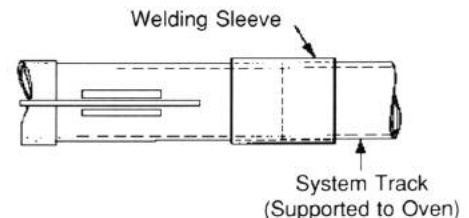
Qty.	Part No.	Description	Pitch Diameter	Type	Degree	Slot
		Idler Sprocket Turn				

Expansion Joint



Expansion joint must be installed with slot in position with main track

Use welding sleeve at each end (2 required) to mount expansion joint



Part No.	Description	Wt.
2060900	Expansion Joint	20

How to Specify:

Qty.	Part No.	Description
		Expansion Joint

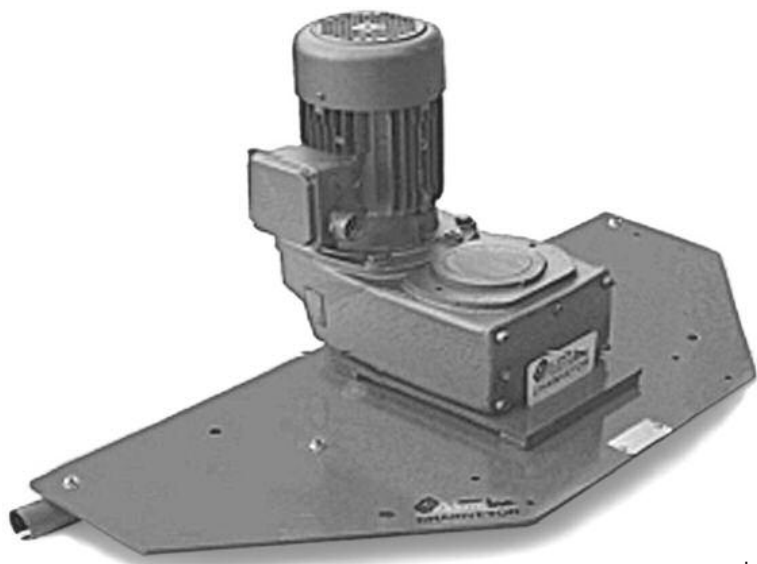
Expansion joints should be located in each conveyor pass which crosses the expansion joint of an oven.

Centerline of expansion joint must be located on centerline of oven expansion joint.



200 Power

Drives – 600 Lb Chain-Pull



- Inline drive is preferred over corner drive because location is more flexible.
- Position of drive determines the slot location for the entire system.
- Drives include 1/4 or 2 HP TEFC Inverter Duty Integral Mount or optional C-Face motor, parallel helical gear reducer, drive sprocket, power tubes and mounting plate.
- VFD Controller required for each drive. Select appropriate controller from list below. Contact factory for assistance with multi-drive applications. Optional remote pad and DIN rail kits are available.

Please contact factory for the power requirements or C-Face motor applications.

Speed Selection Chart in FPM

Description	1/4 HP	2 HP
Vertical Inline		
Horizontal Inline	0.8-13.0	7-100
180 Deg. Corner		
90 Deg. Corner		

Drives

Part No.	Description	HP	Slot #	Wt.
2150910	Vertical Inline Drive	1/4		236 lbs.
2150930		2		
2150911	Horizontal Inline Drive	1/4		236 lbs.
2150931		2		
2161910		1/4	1	
2161930	90 Deg. Corner Drive	2	1	
2162910		1/4	2	
2162930		2	2	
2171910	180 Deg. Corner Drive	1/4	1	236 lbs.
2171930		2	1	
2172910		1/4	2	
2172930		2	2	

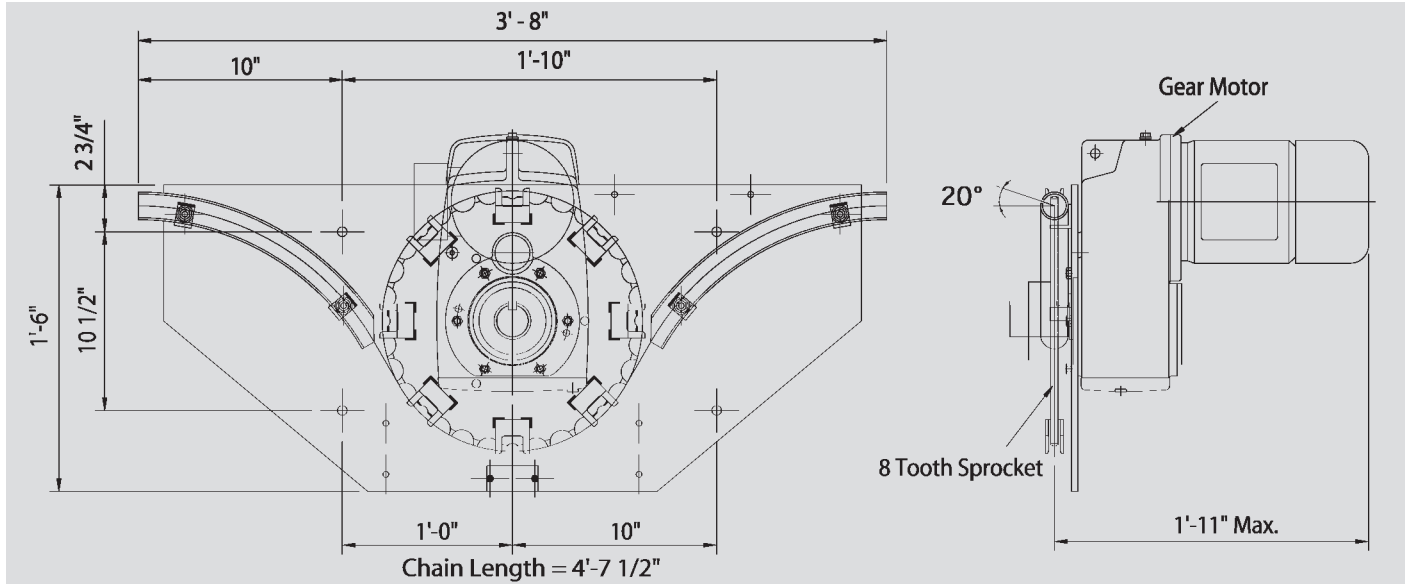
Controls

Part No.	Description	HP	Voltage
2130001	VFD Controller, Panel Mount	1/4	200-230v/3ph/50-60hz
2130002	VFD Controller, Panel Mount	2	200-230v/3ph/50-60hz
2130003	VFD Controller, Panel Mount	1/4	380-460v/3ph/50-60hz
2130004	VFD Controller, Panel Mount	2	380-460v/3ph/50-60hz
2130005	Remote Keypad, NEMA 4 w/10' Cable		
2130007	DIN Rail Kit	1/4	230v
2130006	DIN Rail Kit	2	1/4 & 2 hp 460v

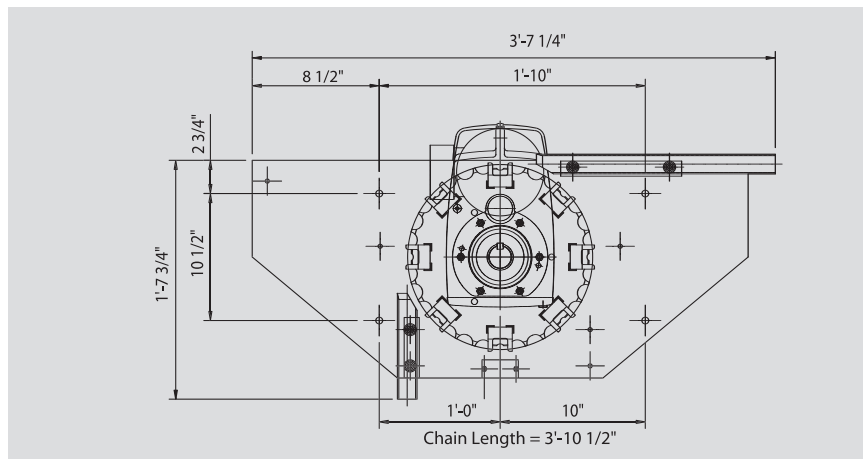


200 Power

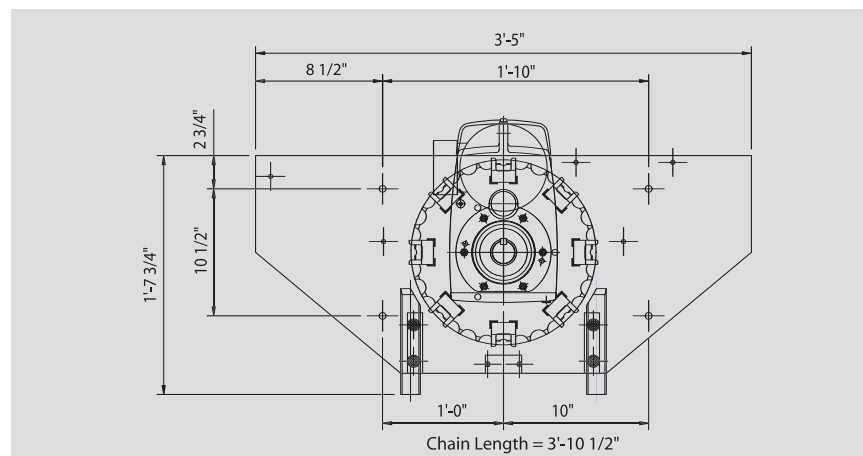
Series 200 Power Horizontal Drives use a common base plate with standard motor base and gear reducer locations. The different types of drives have specially designed bolt on power tubes. Dimensions shown on this page are for layout assistance and mounting hold locations.



Inline Drive



90° Corner Drive



180° Corner Drive



200 Power

Curves

Material Specifications

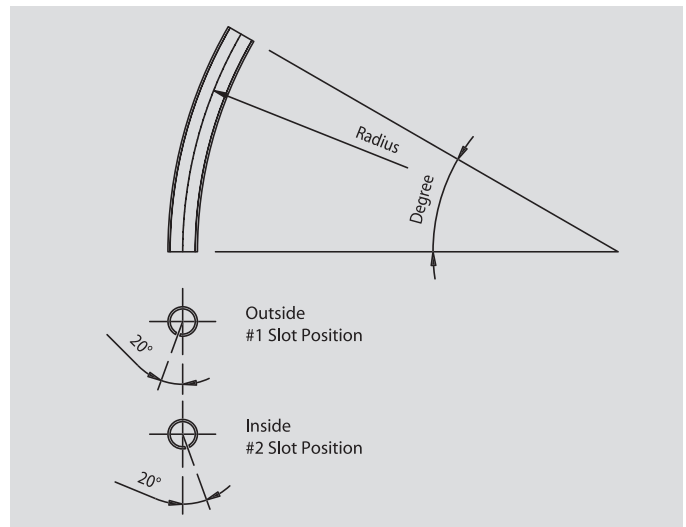
All 200 Series Power Curves are fabricated from 1 5/8" O.D. x .120" wall STAINLESS STEEL designed to work harden through use. Stock curves are available in 16", 24" and 36" radii with stock degrees of 15°, 30°, 45°, 90°, and 180°. Other degree and radius curves available upon request.



Horizontal Power Curves

Outside		Inside		Radius	Degree	Wt.
Part No.	Slot	Part No.	Slot			
2316181		2316182		16"	180°	8.0
2316901	#1	2316902	#2		90°	4.0
2316601		2316602			60°	3.0
2316451		2316452		16"	45°	2.0
2316301	#1	2316302	#2		30°	1.5
2316151		2316152			15°	1.0
2324181		2324182		24"	180°	12.0
2324901	#1	2324902	#2		90°	6.0
2324601		2324602			60°	4.0
2324451		2324452		24"	45°	3.0
2324301	#1	2324302	#2		30°	2.0
2324151		2324152			15°	1.0
2336181		2336182		36"	180°	18.0
2336901	#1	2336902	#2		90°	9.0
2336601		2336602			60°	6.0
2336451		2336452		36"	45°	4.0
2336301	#1	2336302	#2		30°	3.0
2336151		2336152			15°	1.5
2348181	#1	2348182	#2	48"	180°	22.0

Horizontal Curves

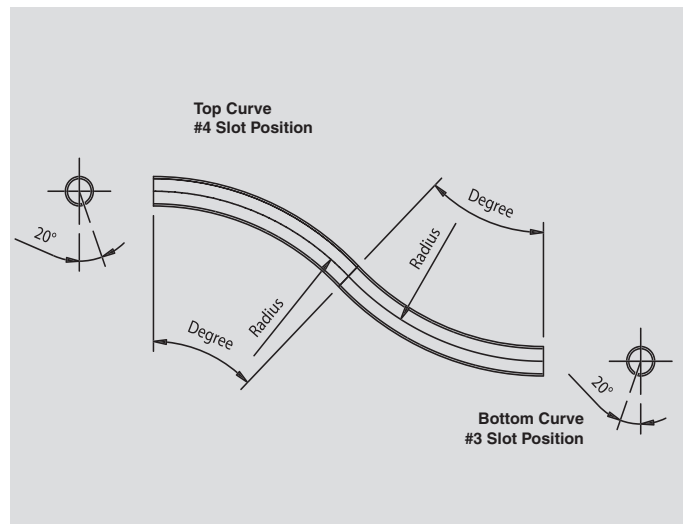


Vertical Power Curves

Bottom Curve		Top Curve		Radius	Degree	Wt.
Part No.	Slot	Part No.	Slot			
2316183		2316184		16"	180°	8.0
2316903	#3	2316904	#4		90°	4.0
2316603		2316604			60°	3.0
2316453		2316454		16"	45°	2.0
2316303	#3	2316304	#4		30°	1.5
2316153		2316154			15°	0.8

Degrees other than shown available. Larger radius curves available.

Vertical Curves



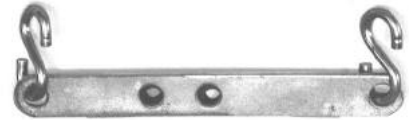
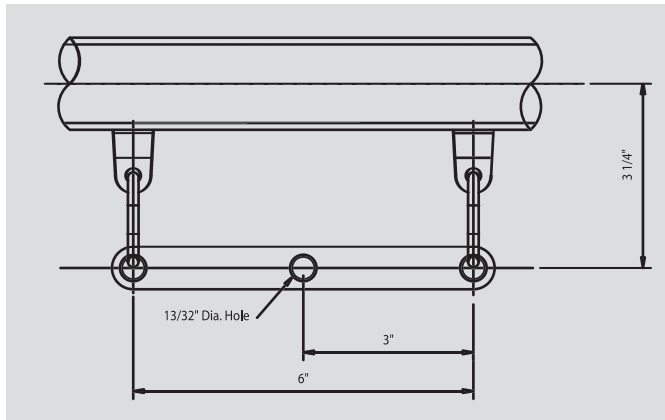
How To Specify:

Qty.	Part No.	Description	Radius	Degree	Slot
		Curves			

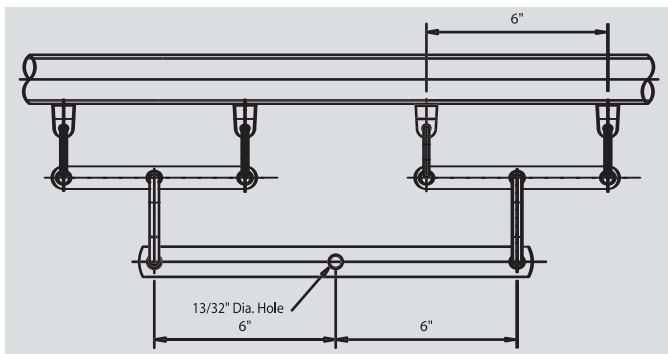


200 Power

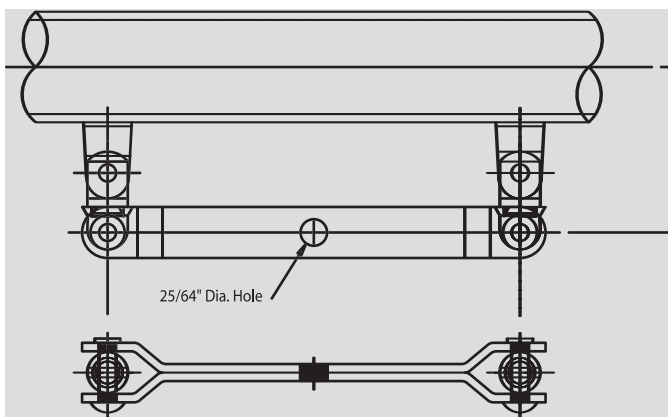
Single Crossbar Carrier



Double Crossbar Carrier



Single Crossbar Carrier with Universals



Single crossbar carriers with universals are used in place of single crossbar carriers with "S" hooks when side sway of unit loads is objectionable.

Part No.	Description	Wt.
2400900	Single Crossbar Carrier with "S" Hooks - 60 lbs. Capacity	0.3
2401900	Double Crossbar Carrier with "S" Hooks - 120 lbs. Capacity	2.0
2430900	Single Crossbar Carrier with Universals - 60 lbs. Capacity	0.5

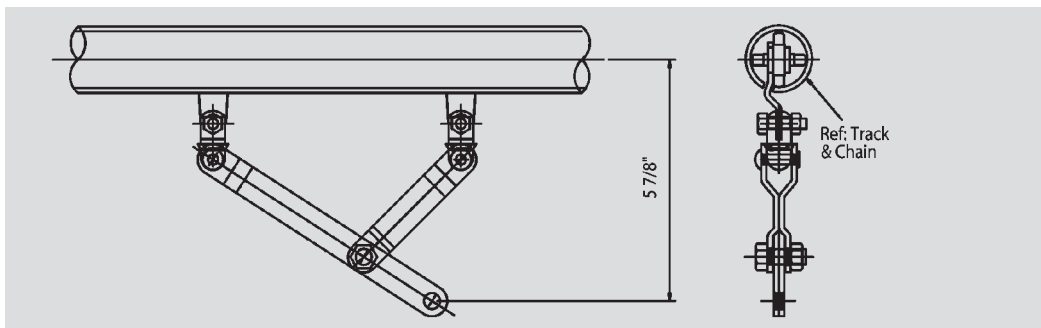
How To Specify:

Qty.	Part No.	Description
		Carriers*



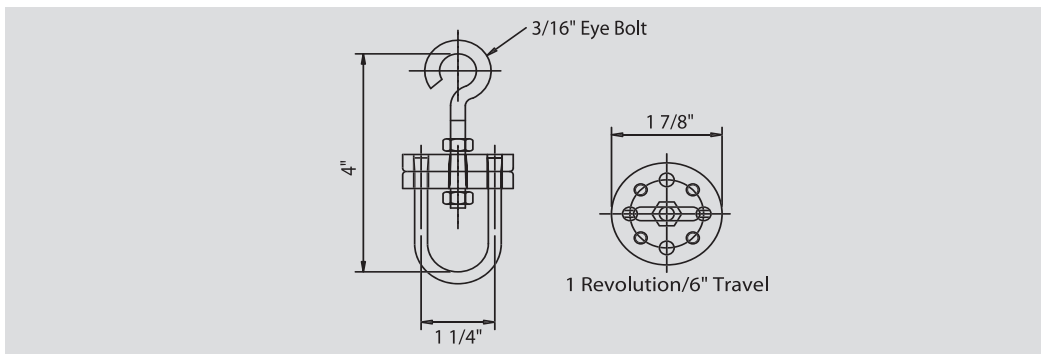
200 Power Carriers

"V" Carrier with Universals

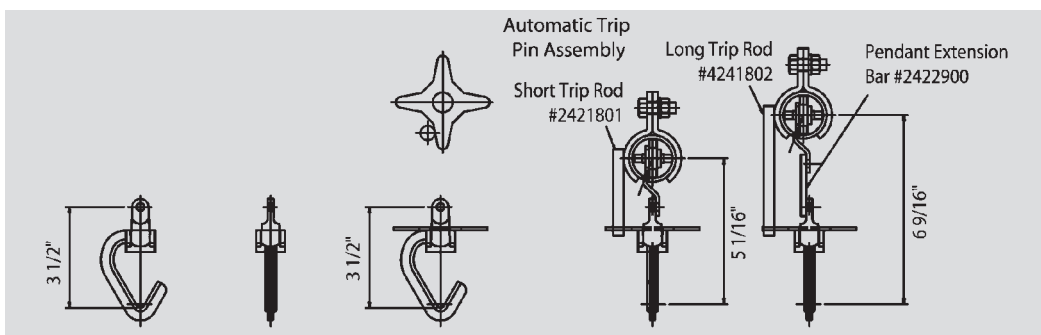


"V" carriers with universals are used for track clearance of unit loads on sharp vertical rises.

Rotating Carrier



Indexing Hook



Indexing Hook Assembly
4 Position #2420900

(For Vert. Changes Less Than 40°)

(For Over 40°)

Indexing Hook With Star Assembly

Part No.	Description	Wt.
2432900	* "V" Carrier with Universal - 60 lbs. Capacity	0.5
2411909	Rotating Carrier 1 7/8" Dia. with Hooks and "U" Bolt - 60 lbs. Capacity	0.5
2420900	Indexing Hook - Four Position - 30 lbs. Capacity	0.5
2421900	Indexing Hook with Star - Four Position - 30 lbs. Capacity	0.8
2421801	** Indexing Hook Trip Rod Assembly - Short Rod	0.8
2421802	*** Indexing Hook Trip Rod Assembly - Long Rod	0.8

How To Specify:

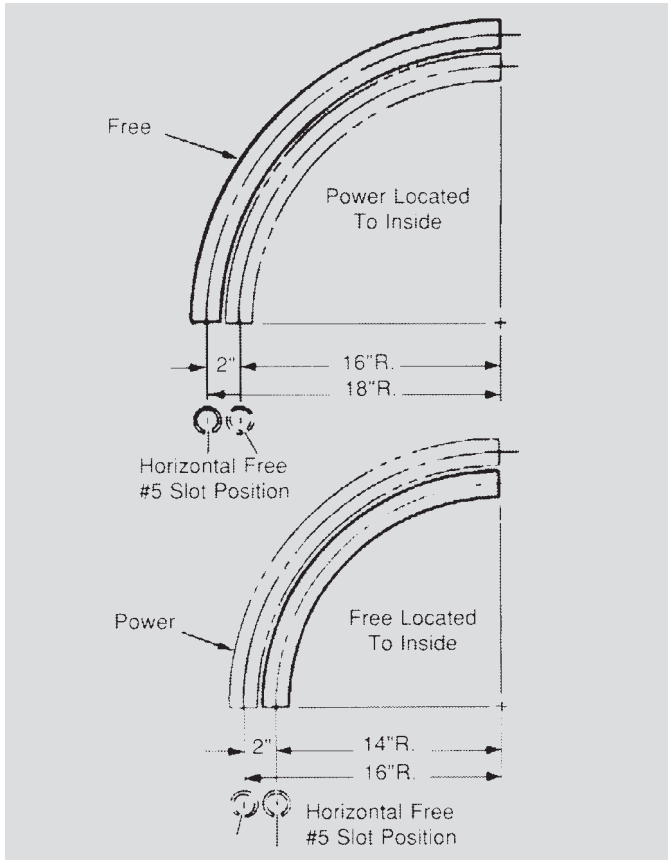
Qty.	Part No.	Description

*40 lbs. w/vertical movement on 45° or greater incline
 **Used when indexing hooks are installed on chain
 ***Used when indexing hooks are installed on chain having pendant extension bars

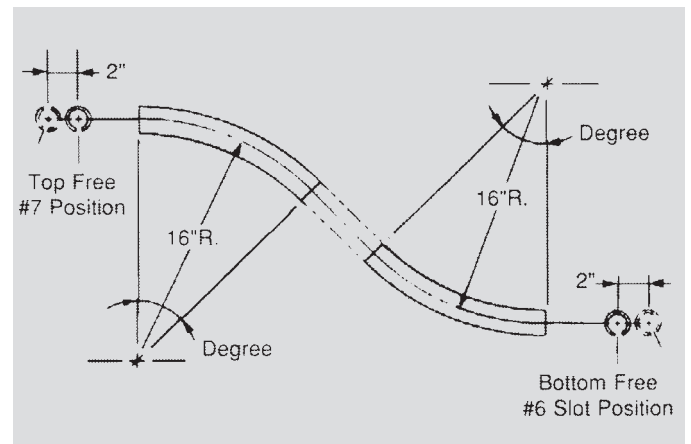


Curves

Horizontal Free Curves



Vertical Free Curves



Material Specifications:

Curves are fabricated from 1 5/8" O.D. x .120" wall mild steel.

Horizontal Free Curves

Part No.	Radius	Part No.	Radius	Degree	Slot	Wt.
2314185	14"	2318185	18"	180°	#5	8
2314905		2318905		90°		4
2314605		2318605		60°		3
2314455	14"	2318455	18"	45°	#5	2
2314305	14"	2318305	18"	30°	#5	1.5

Vertical Free Curves

Bottom Curve		Top Curve		Radius	Degree	Wt.
Part No.	Slot	Part No.	Slot			
2316186	#6	2316187	#7	16"	180°	8
2316906		2316907			90°	4
2316606		2316607			60°	3
2316456	#6	2316457	#7	16"	45°	2
2316306		2316307			30°	1.5
2316156		2316157			15°	0.8

Degrees other than shown available. Larger radius curves available.

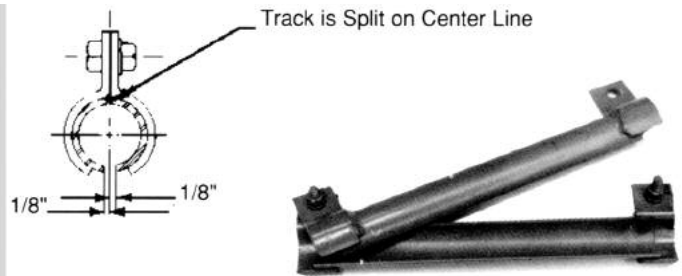
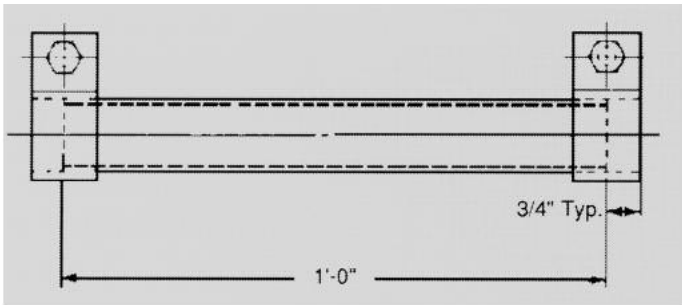
How To Specify:

Qty.	Part No.	Description	Radius	Degree	Slot



200 Free

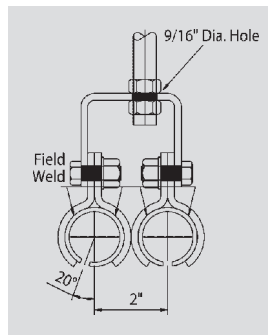
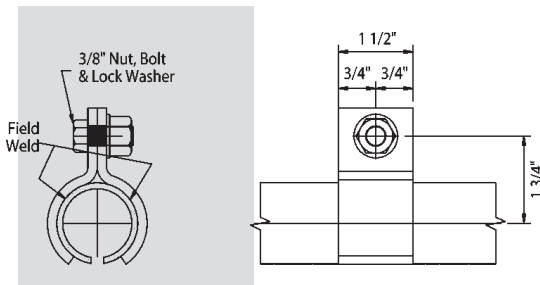
Inspection Section



Required for installation and maintenance of chain. It is recommended inspection sections be located not more than 250' apart and one on each level of a multiple level installation.

Part No.	Description	Wt.
2011900	Track Inspection Section	3.5

Track Hanger



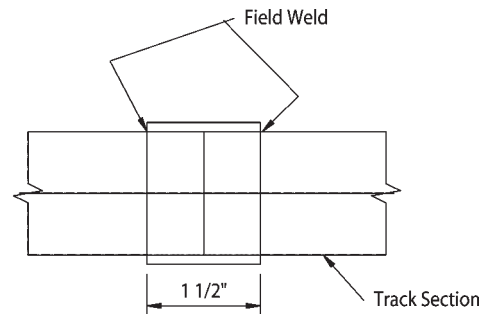
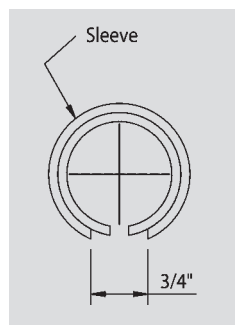
Single Track Hanger

Double Track Hanger

Part No.	Description	Wt.
2050900	Track Hanger, Single	0.5
2051900	Track Hanger, Double	1.5

Hanger Spacing: (Max. 10'0" Centers)
 10'-0" centers up to 20 lbs./ft. load
 7'-0" centers 21 to 60 lbs./ft. load
 5'-0" centers 61 to 120 lbs./ft. load
 Plus 1 hanger within 1" tangent of curve
 Plus 1 hanger in middle of 180° curve

Weld Sleeve



Part No.	Description	Wt.
2055900	Weld Sleeve	0.5

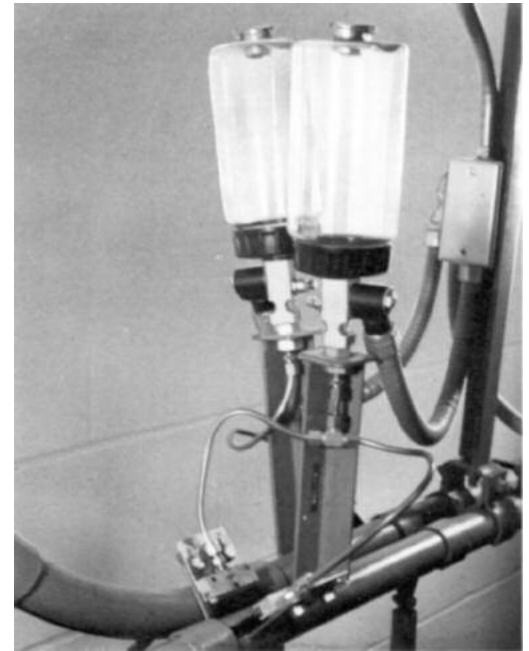
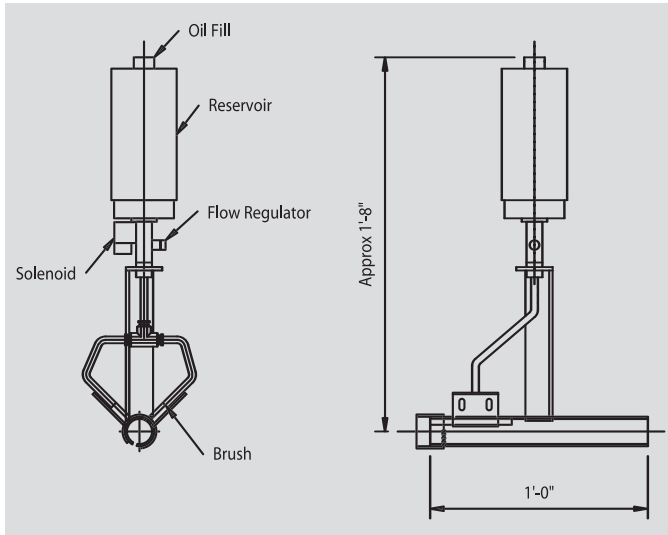
How to Specify:

Qty.	Part No.	Description

Required at each junction of track, curve, drive, take-up, etc.



Lubricator



Part No.	Description	Coil Voltage	Weight
2046900	Lubricator	110 Volt	10 lbs.
2046901	Lubricator	230 Volt	10 lbs.
2046902	Lubricator	460 Volt	10 lbs.
2046903	Lubricator	208 Volt	10 lbs.

How to Specify:

Qty.	Part No.	Description	Voltage
		Lubricator	

- Requires Field Assembly

- Lubricator should be located after every oven, washer or degreaser each free carrier passes through.

When used with oven applications, lubricator should be located approximately 20 ft. after oven to allow carriers to cool.

- Proper lubrication is important in extending the life of overhead conveyors.

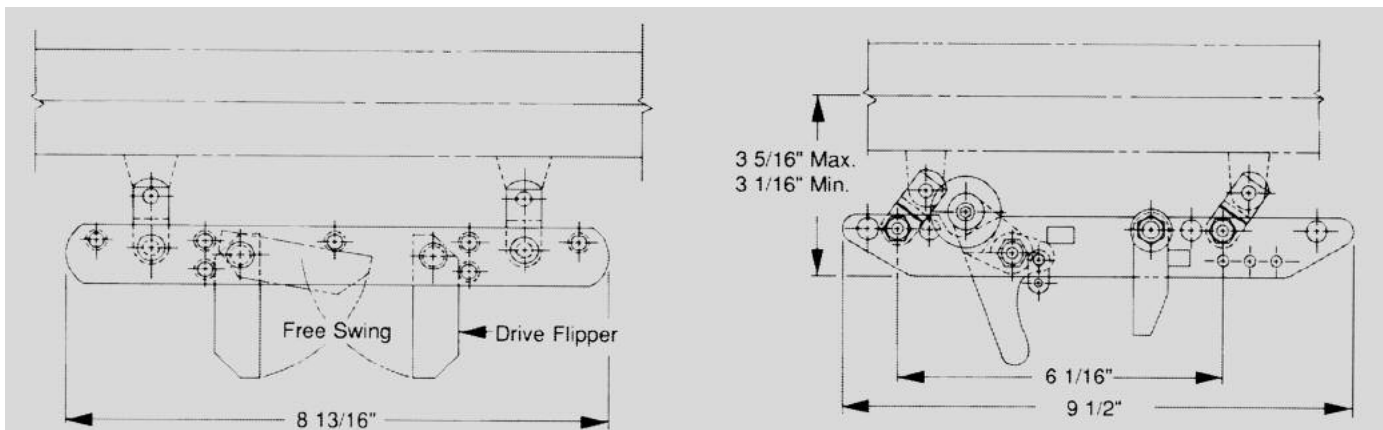
Many factors affect lubrication recommendations; e.g., oven temperature (if any), ambient temperature and humidity, atmospheric contaminants (dust, lint, paint, overspray, etc.), speed of carriers, load on carriers, and number of carriers.

- **GREGORY-ADAMS, INC.** does not recommend any specific lubricant or manufacturer of lubricants. A qualified lubrication engineer should be contacted to determine the best lubricant for each application.



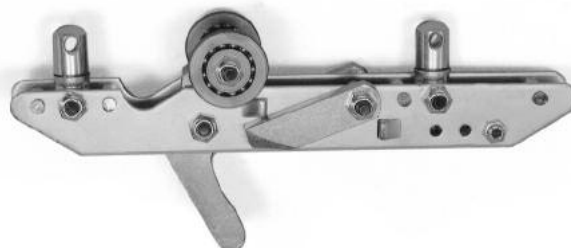
200 Free

Drive Dogs



Non-Overriding Drive Dog

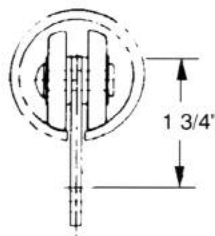
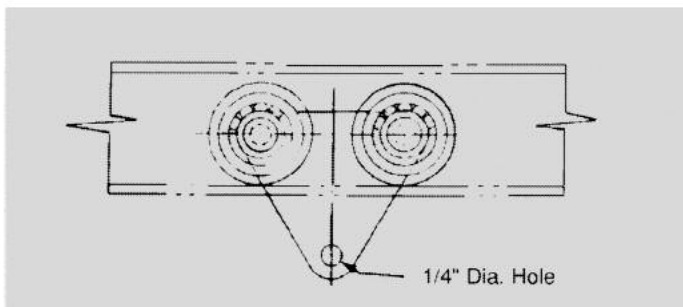
Overriding Drive Dog



Drive Dogs are attached to chain and propel carriers in free track.

Part No.	Description	Wt.
2460900	Drive Dog - Non Overriding	1.5
2469902	Drive Dog - Overriding	1.5

4 Wheel Trolley



4 wheel trolleys are used to support unit loads or carrier from free track

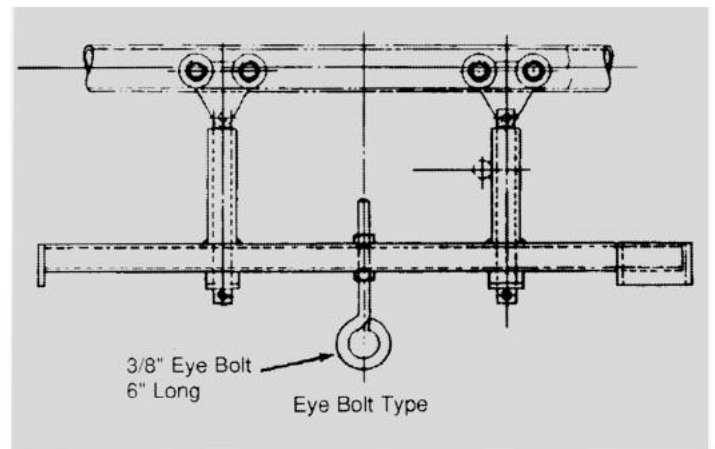
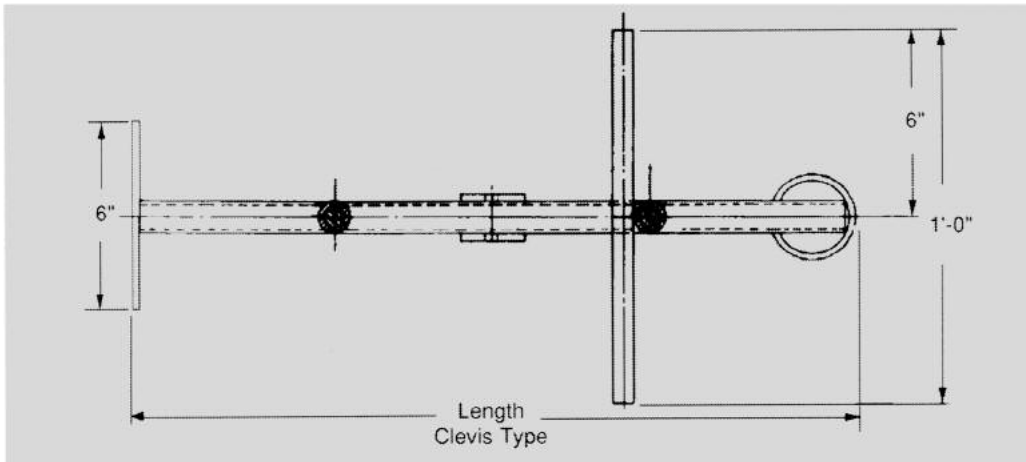
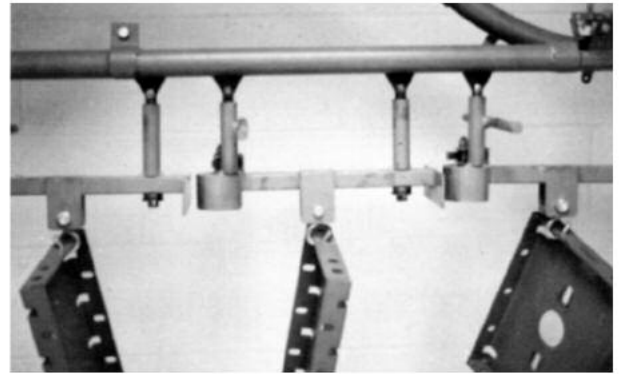
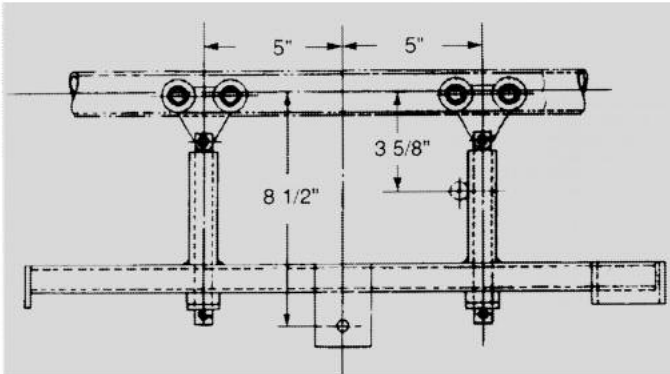
Part No.	Description	Wt.
2600900	Trolley - 4 Wheel 120 lb. Capacity	0.4

How To Specify:

Qty.	Part No.	Description



Carriers



Carriers - 120 Lbs. Capacity

Part No.	Description	Avg. Wt.
2602900	Carrier - Clevis Type	10
2602901	Carrier - Eye Bolt Type	10

Other features such as hooks, connecting bars, indexers and carrier identification equipment available

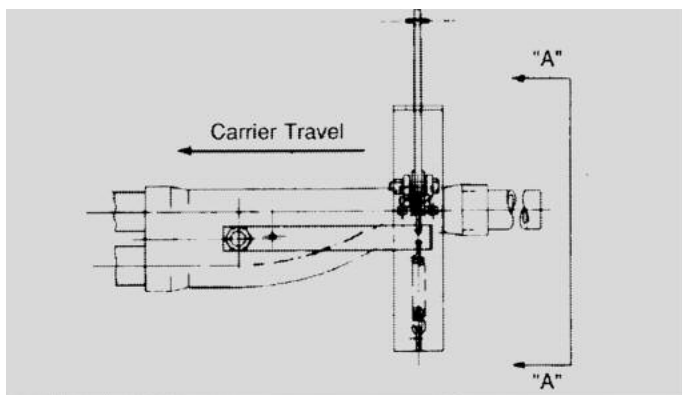
How To Specify:

Qty.	Part No.	Description	Length

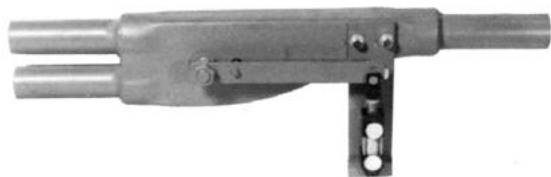


200 Free

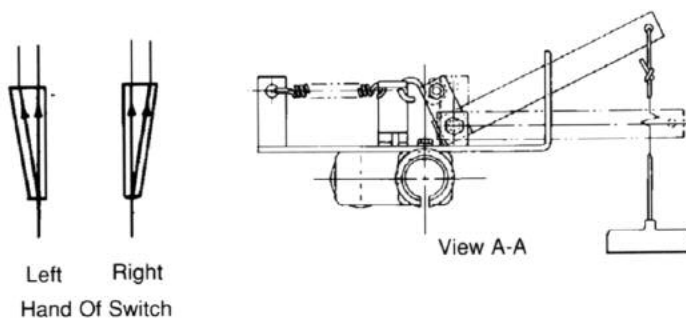
Switches (Divert)



Manual Switch, Left Hand Shown

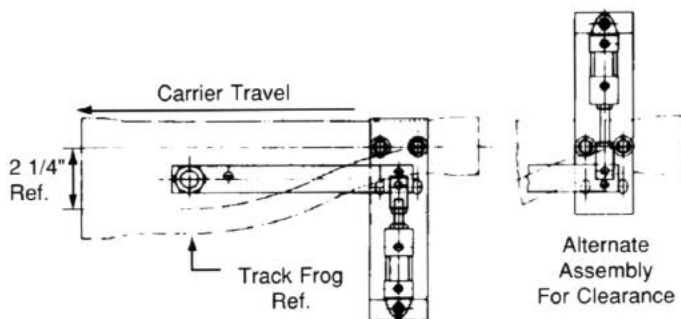


Used For Diverting Of Free Lines



Left Right
Hand Of Switch

View A-A

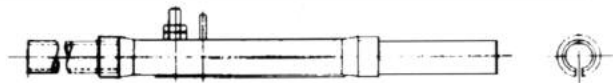
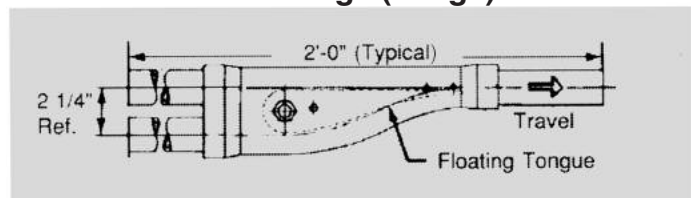


Air Operated Switch, Left Hand Shown

How To Specify:

Qty.	Part No.	Description	Hand

Frogs (Merge)

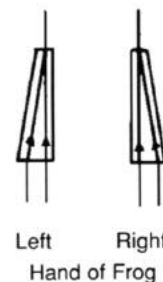


Frog, Right Hand Shown



Used For Merging of Free Lines

Part No.	Description	Wt.
2732900	Switch, Cast, Manually Pullchain Operated - Right Hand	18
2733900	Switch, Cast, Manually Pullchain Operated - Left Hand	
2712900	Switch, Cast, Air Operated - Right Hand	
2713900	Switch, Cast, Air Operated - Left Hand	
2700900	Frog, Cast, Right Hand Entering	12
2701900	Frog, Cast, Left Hand Entering	



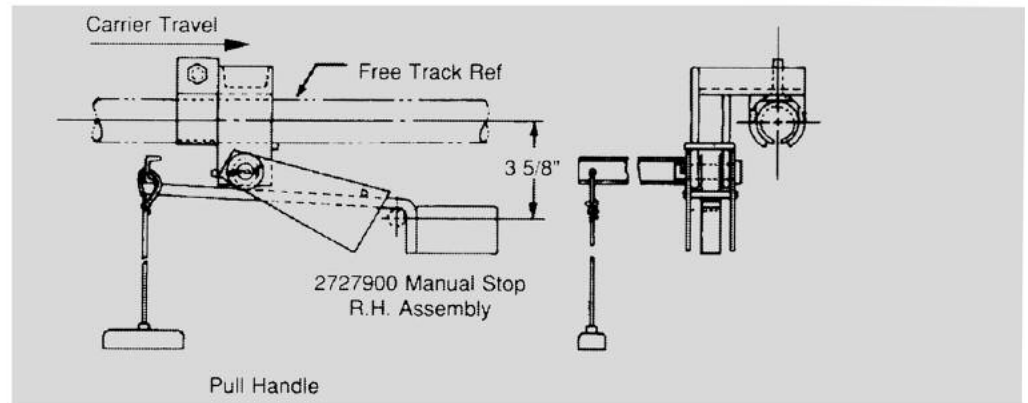
Left Right
Hand of Frog

How To Specify:

Qty.	Part No.	Description	Hand

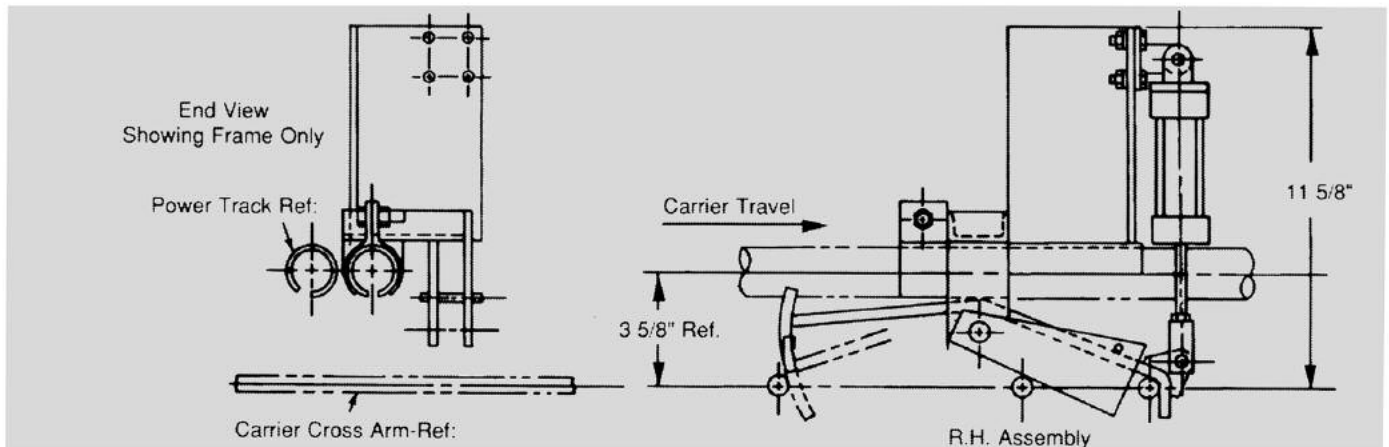
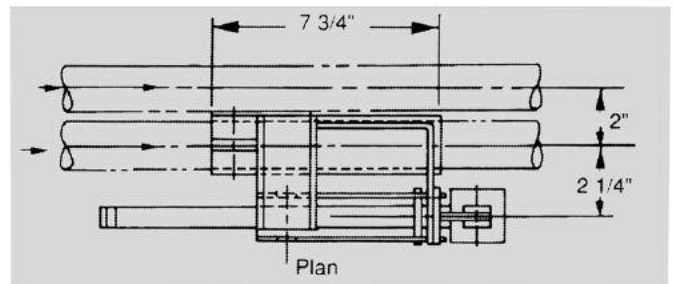
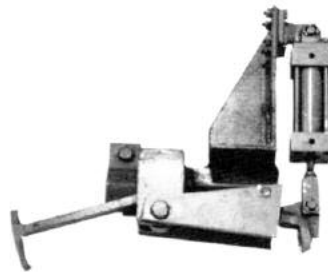


Manual Stop



Used any place in free system to stop carrier

Air Operated Escapement



Used any place in free system to stop carriers

Part No.	Description	Wt.
2727900	Manual Stop Unit, Pullchain Operated - Right Side Mount	8
2728900	Manual Stop Unit, Pullchain Operated - Left Side Mounted	8
2726900	Escapement Unit, Air Operated - Right Side Mounted	8
2725900	Escapement Unit, Air Operated - Left Side Mounted	8

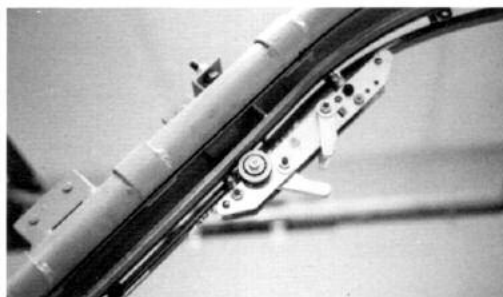
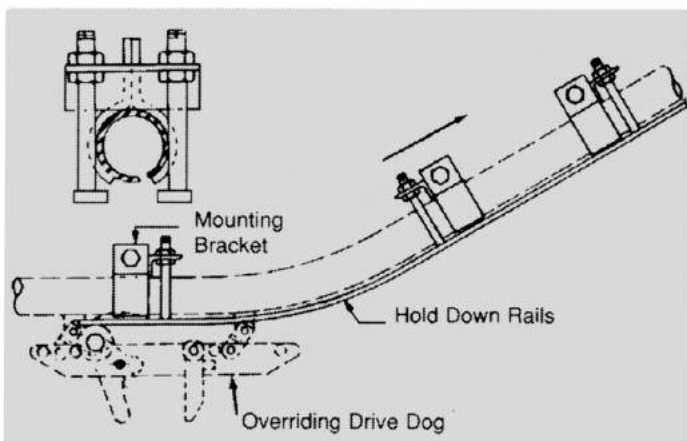
How To Specify:

Qty.	Part No.	Description



200 Free

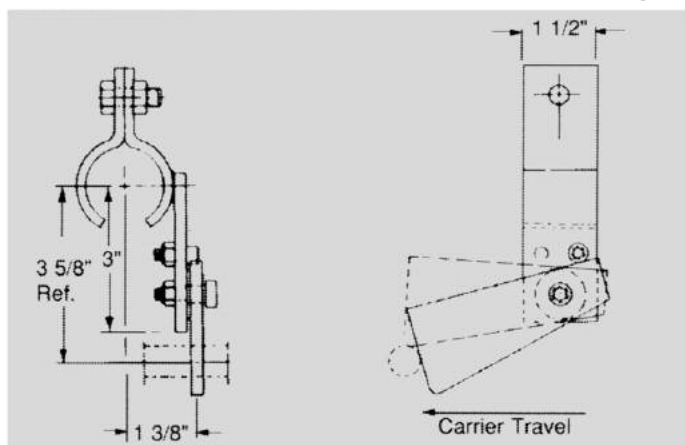
Hold Down Rails



Hold Down Rails are required on power line inclines in Power & Free systems using overriding type drive dogs.

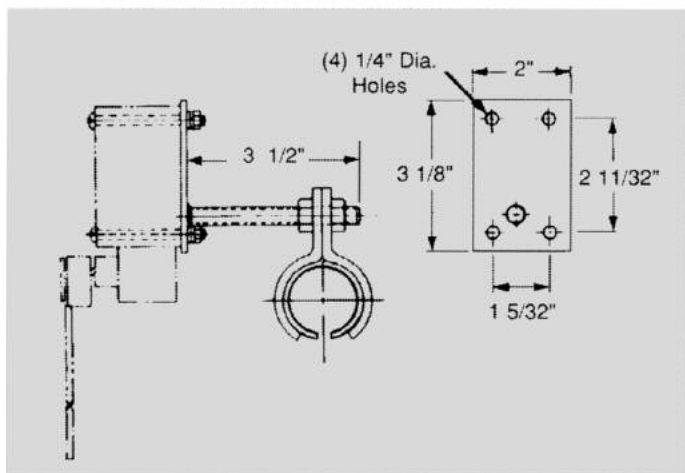
Due to varying elevation changes and curve radii, hold down rails are manufactured to order.

Anti-Roll Back



Anti-Roll Back units are used on Free track inclines to prevent a carrier running "free" back down an incline if the carrier becomes disengaged from the drive dog.

Limit Switch Bracket



Limit Switch Brackets attach to Power or Free track to hold limit switch for detecting presence of carrier or drive dog.

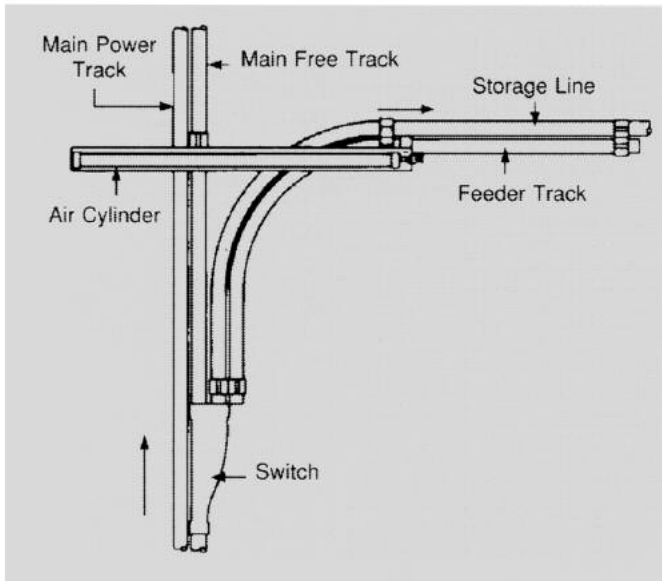
How To Specify:

Qty.	Part No.	Description

Part No.	Description	Wt.
2741900	Anti-Roll Back	1
2750800	Limit Switch Bracket	1.5

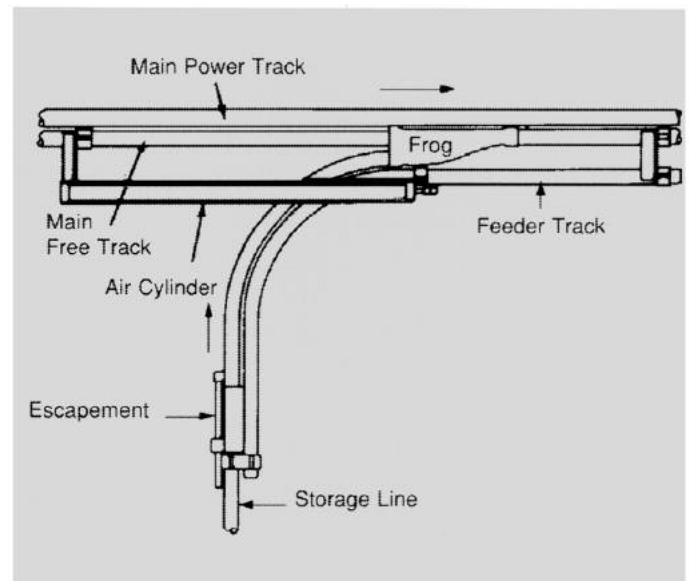


Power Feeder



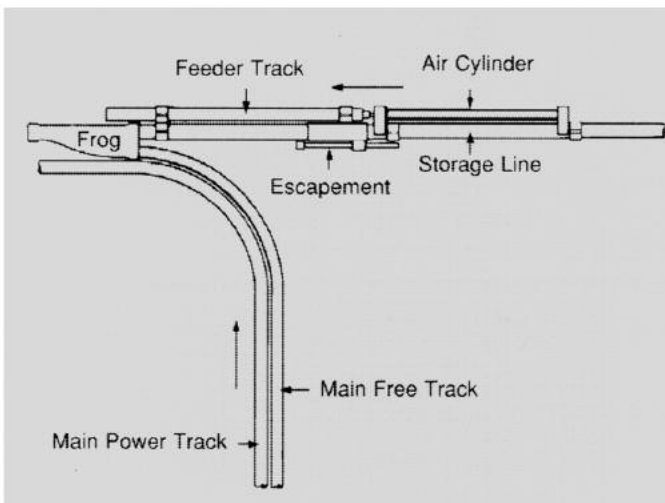
Model PFD
90° Positive Feed Unit — Diverging
Field Assembled

Carrier is left in Curve of Storage Line by Drive Dog on Main Power Track.



Model PFM
90° Positive Feed Unit — Merging
Field Assembled

Feeder Stroke Places Carrier from Storage Line into Position for Pick-up by Drive Dog on Main Power Track.



Model PDI
Inline Positive Feed Unit — Merging
Field Assembled

Feeder Stroke Places Carrier from Storage Line into Position for Pick-up by Drive Dog on Main Power Track.

Power feeders are used on free lines to feed carriers automatically into or out of free storage lines to the main free transportation line where they are engaged with a drive dog on the main or other power lines.

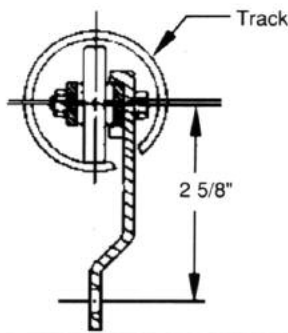
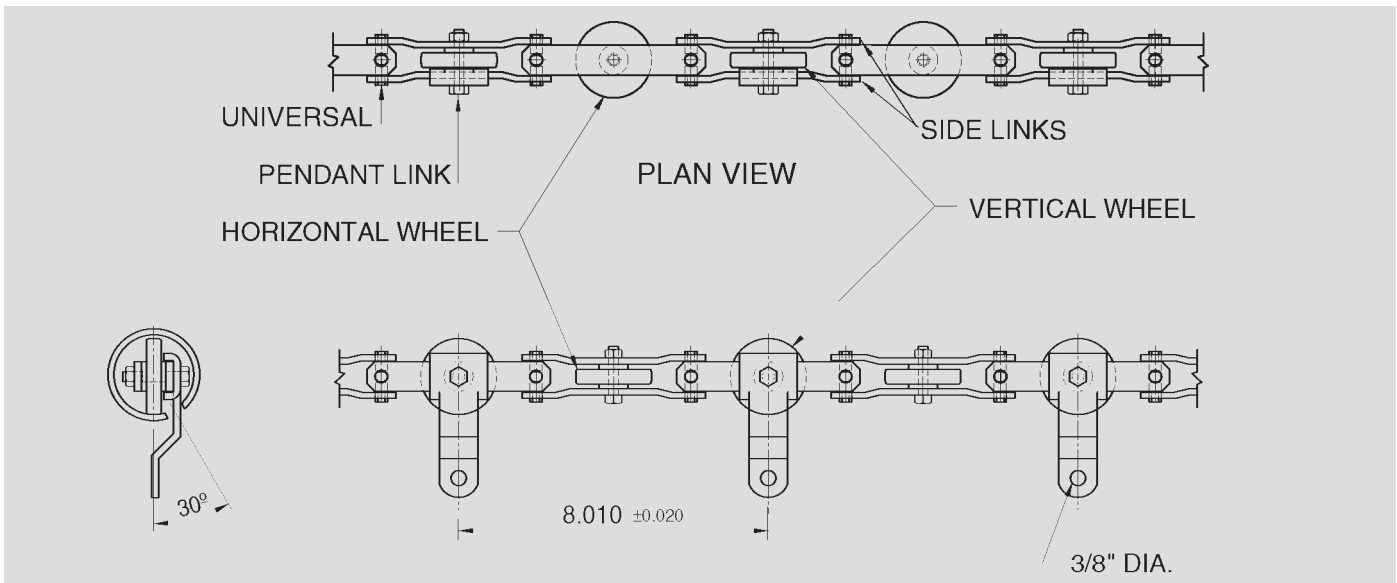
Cylinder stroke and escapement location is dependent upon carrier length and clearance requirements for passing carriers on main line.

Due to the varying requirements of any particular application, Power Feeders are designed to order.



300 Power

Chain

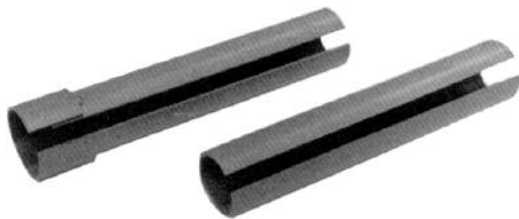


Part No.	Description	Wt.
3021901	Chain 1 ft. Long*	3

Capacity: 100 lbs. per pendant
 Chain Pull: 1000 lbs. maximum
 Tensile Strength: 7500 lbs.
 Maximum operating temperature 450°F

*Shipped in 50'0" lengths.

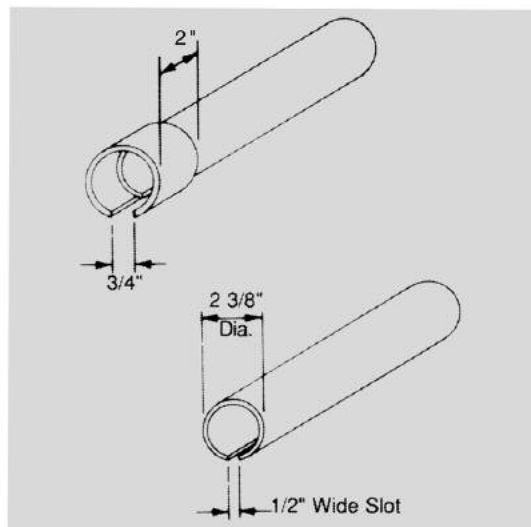
Track



Part No.	Description	Wt.
3010019	Track 10 ft. Long	35
3010900	Track 10 ft. Long with Weld Sleeve One End	36

How To Specify:

Qty.	Part No.	Description

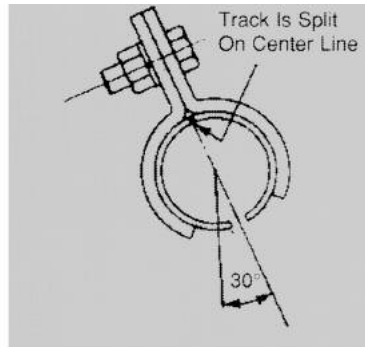
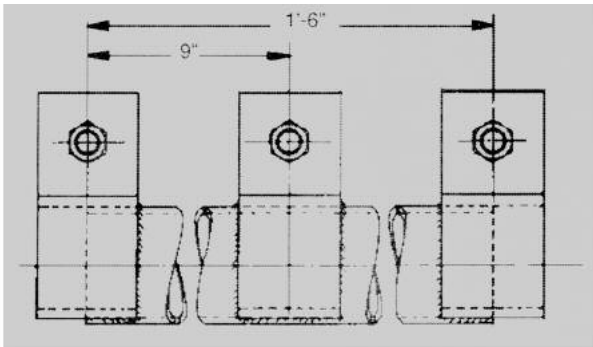


2 3/8" dia. x 5/32" wall rolled steel tubing with 1/2" open seam



300 Power

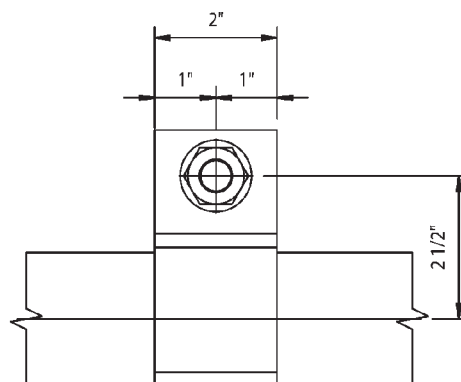
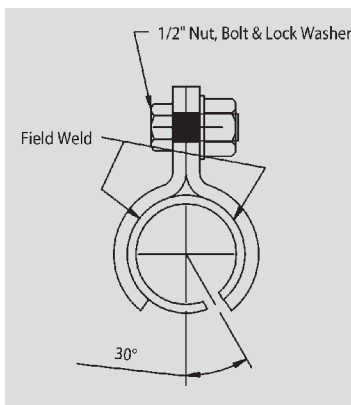
Inspection Section



Part No.	Description	Wt.
3011900	Track Inspection Section 1' 6" Long	0.5

Required for installation and maintenance of chain. It is recommended inspection sections be located no more than 250 feet apart and on each level of a multiple level installation.

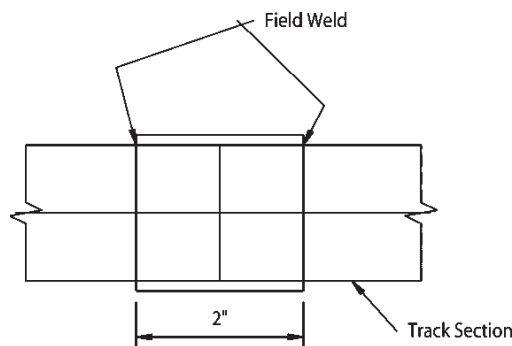
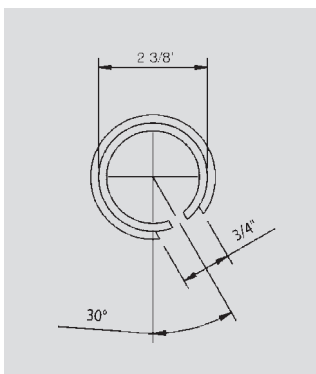
Track Hanger



Part No.	Description	Wt.
3050900	Track Hanger	0.5

Hanger Spacing: (Max. 10'0" Centers)
10'-0" centers up to 50 lbs./ft. load
7'-0" centers 51 to 125 lbs./ft. load
5'-0" centers 126 to 150 lbs./ft. load
Plus 1 hanger within 1" tangent of curve
Plus 1 hanger in middle of 180° curve

Weld Sleeve



Required at each junction of track, curve, drive, take-up, etc.

How to Specify

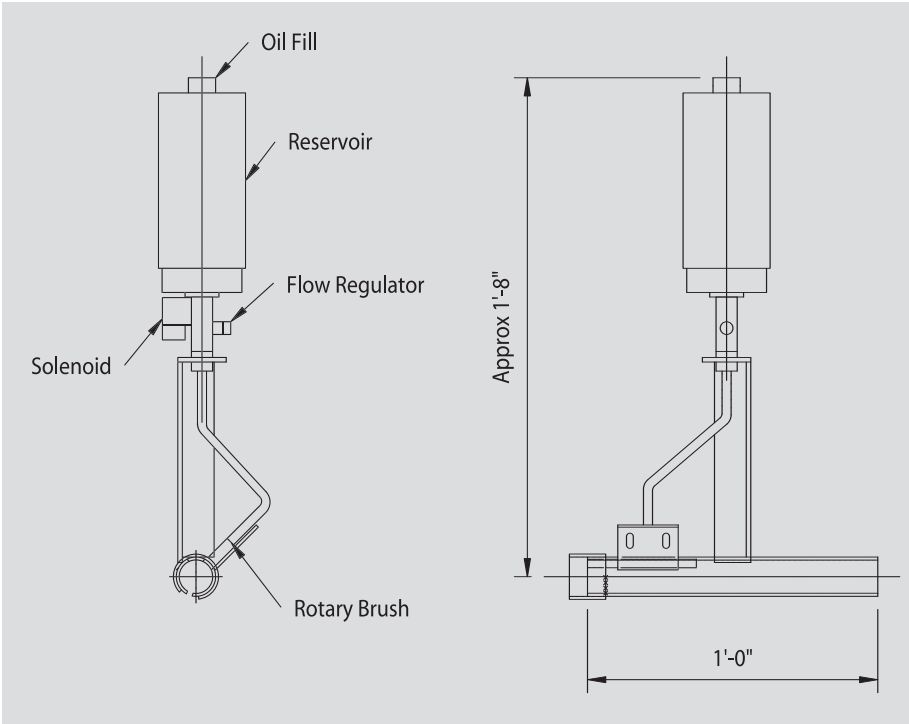
Qty.	Part No.	Description

Part No.	Description	Wt.
3055900	Track Weld Sleeve	1



300 Power

Lubricator



Part No.	Description	Coil Voltage	Weight
3040900	Lubricator	110 Volt	10 lbs.
3040901	Lubricator	230 Volt	10 lbs.
3040902	Lubricator	460 Volt	10 lbs.
3040903	Lubricator	208 Volt	10 lbs.

How to Specify:

Qty.	Part No.	Description	Voltage
		Lubricator	

– Requires Field Assembly

– Lubricator should be located after every oven, washer or degreaser the chain passes through.

When used with oven applications, the lubricator should be located approximately 20 ft. after oven to allow the chain to cool.

– Proper lubrication is important in extending the life of overhead conveyors.

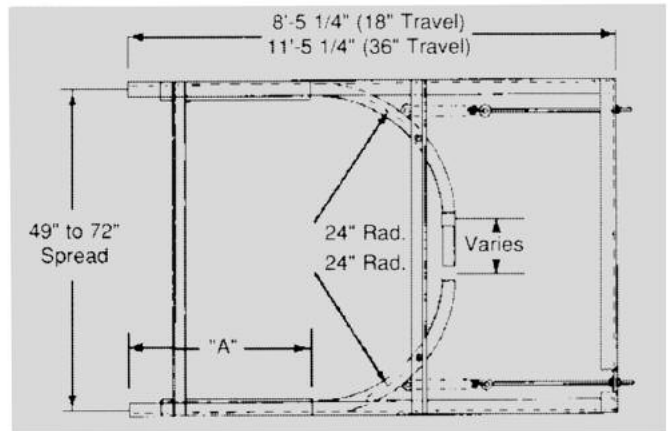
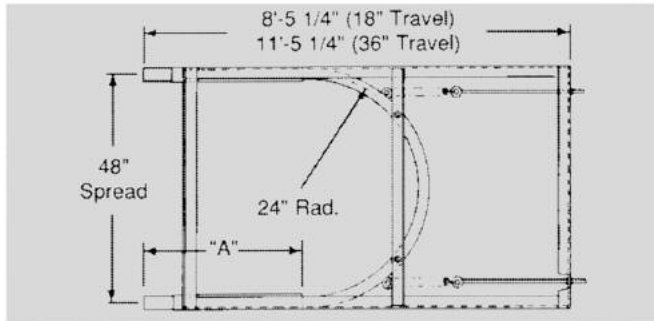
Many factors affect lubrication recommendations; e.g., oven temperature (if any), ambient temperature and humidity, atmospheric contaminants (dust, lint, paint, overspray, etc.), speed of chain, load on chain, and length of chain.

– **GREGORY-ADAMS, INC.** does not recommend any specific lubricant or manufacturer of lubricants. A qualified lubrication engineer should be contacted to determine the best lubricant for each application.



300 Power

180° Curve Spring-Loaded Take-Up

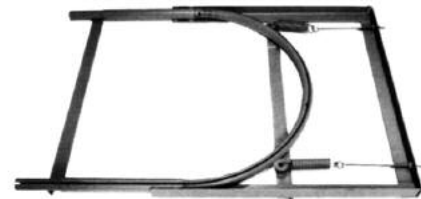


180° Curve Take-ups Denotes Stock Spring-Loaded Only

Part No.	Spread	Radius	Travel	Slot	"A"	Wt.
3200900	48"		18"	#1	2' 10 1/2"	125
3201900	48"		18"	#2		125
3202900	49" to 72"	24"	18"	#1	4' 7 1/2"	150
3203900	49" to 72"		18"	#2		150
3206900	48"	36"	#1	150		
3207900	48"	36"	#2	150		
3204900	49" to 72"	36"	#1	175		
3205900	49" to 72"	36"	#2	175		

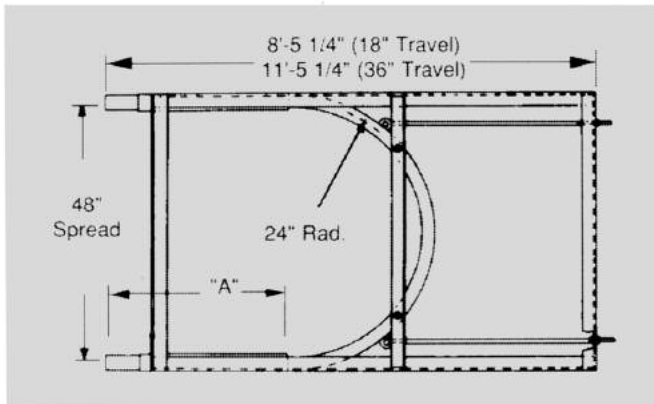
Take-ups are available as spring-loaded, counterweighted or screw type. Specify type.

For slot position see page 57.



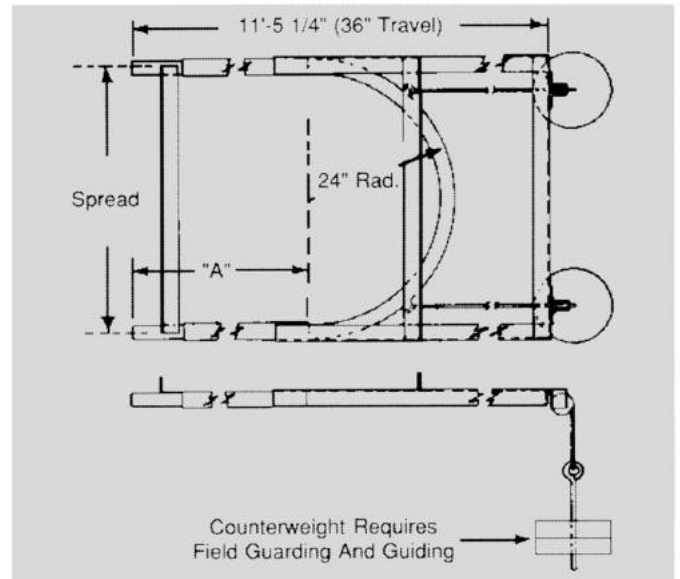
Spring-loaded take-ups are used on non-reversing conveyors. Units with 36" travel are used when carrier spacing requires exact centers.

180° Curve Screw Take-Up



Screw take-ups are required on reversing systems.

180° Curve Counterweighted Take-Up



Counterweighted take-ups are used on conveyors with dual drives and on conveyors that have excessive expansion and contraction due to variations in temperature.

How To Specify:

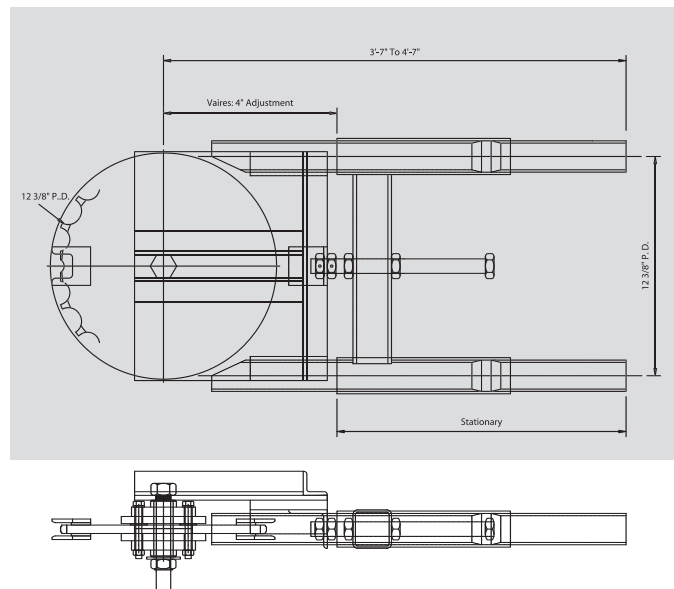
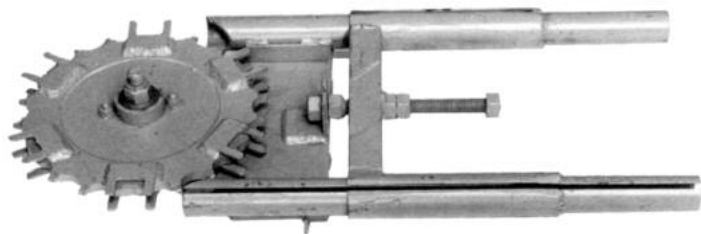
Qty.	Part No.	Description	Type	Spread	Radius	Travel	Slot
		180° Curve Take-up					



CHAINVEYOR®

300 Power

180° Sprocket Turn – Take-Up



Sprocket take-ups are used on conveyors requiring small radius turns and on conveyors less than 150 ft. long. Can be used on reversible conveyors.

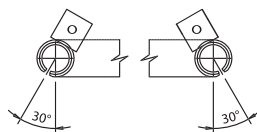
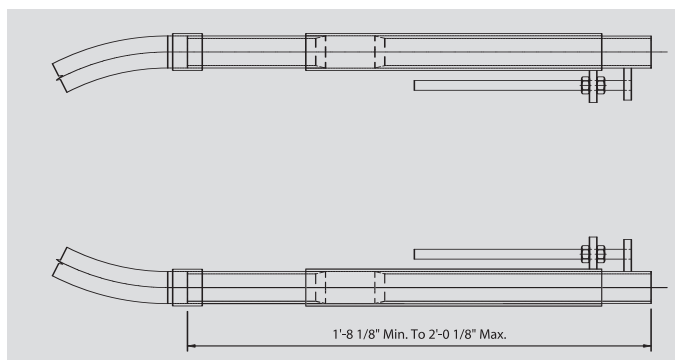
Does not add chain pull.

Maximum temperature 450°F.

For slot position see page 57.

Part No.	Description	Pitch Diameter	Radius	Travel	Slot	Wt.
3230900	180° Sprocket Turn-	12 3/8" P.D. Horizontal			#1	
3231900	Screw Take-Up	12 3/8" P.D. Horizontal	6 3/16"	12	#2	70
3232900		12 3/8" P.D. Horizontal			#3	

Take-up Sleeve



End view showing relative position of two take-up sleeves for a #1 slot location



Take-up sleeves are used on conveyors where standard take-up units cannot be used because of conveyor configuration or clearance limitations.

They can also be used effectively on very small, lightly loaded systems.

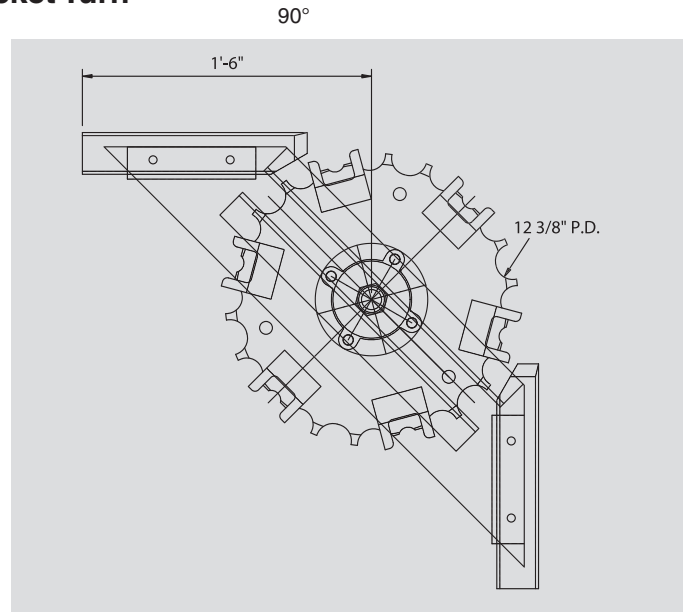
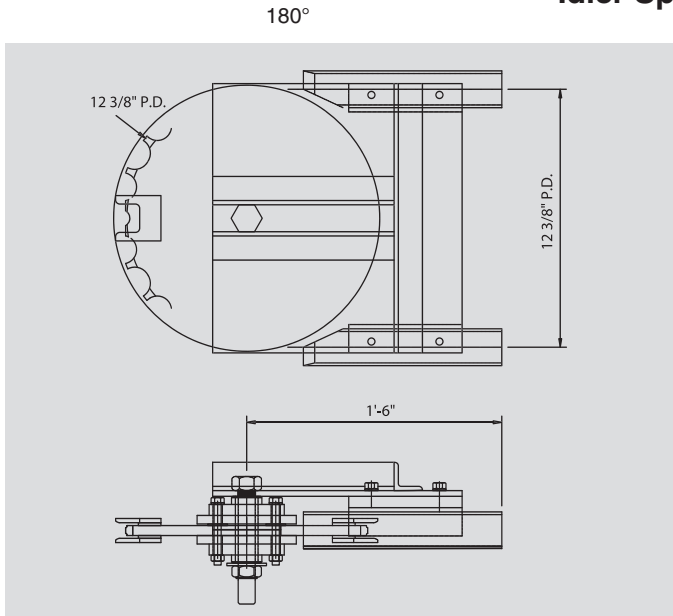
Normal installation requires two take-up sleeves

Part No.	Description	Travel	Wt.
3250900	1 Take-up Sleeve	8 1/4"	20



300 Power

Idler Sprocket Turn



Sprocket

Part No.	Pitch Diameter	Type	Degree	Slot	Wt.
3240900	12 3/8"	Horiz.	180°	1	55
3241900		Horiz.		2	
3242900		Vert.		3	
3220900	12 3/8"	Horiz.	90°	1	55
3221900		Horiz.		2	
3222900		Vert.		3	

Idler sprocket turns are used on conveyors requiring very small radius turns.

Idler sprocket turns do not add chain pull.

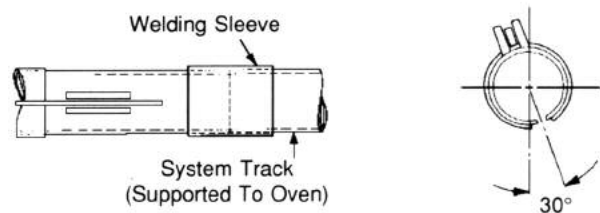
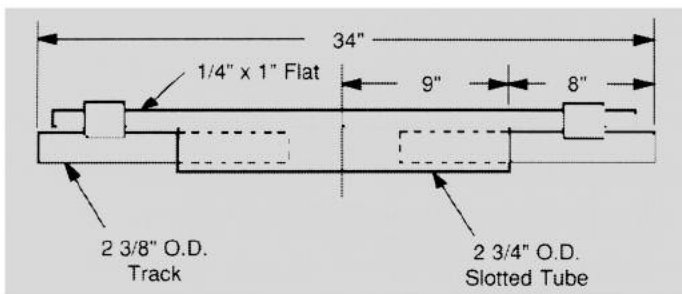
Maximum temperature = 450°F.



How to Specify:

Qty.	Part No.	Description	Type	Degree	Slot
		Idler Sprocket Turn			

Expansion Joint



Part No.	Description	Wt.
3060900	Expansion Joint	28

Expansion joint must be installed with slot in position with main track.

Use welding sleeve at each end (2 required) to mount expansion joint.

Expansion joints should be located in each conveyor pass which crosses the expansion joint of an oven.

Centerline of expansion joint must be located on centerline of oven expansion joint.

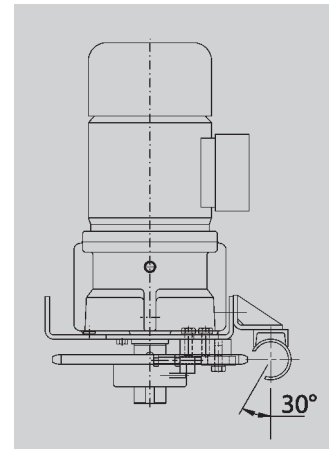
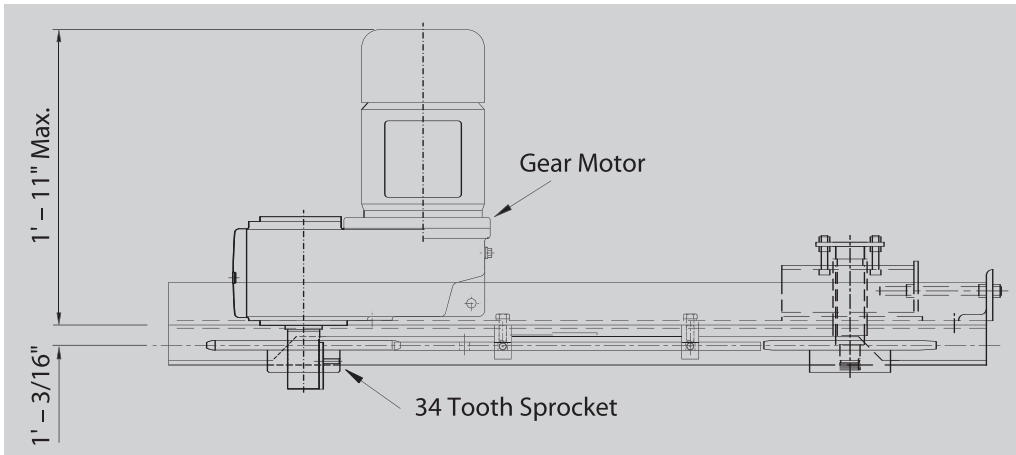
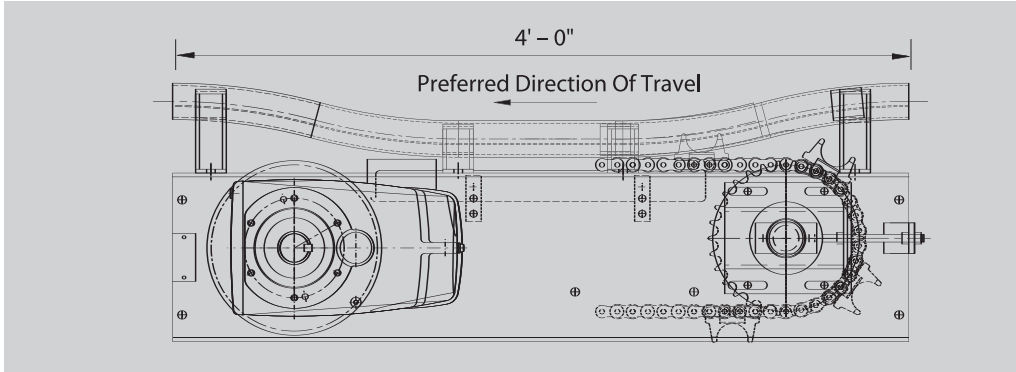
How To Specify:

Qty.	Part No.	Description
		Expansion Joint



300 Power

Inline Drive-1000 lbs. Chain Pull



Inline drive is preferred over corner drive because location is more flexible.

Position of inline drive in system determines the slot location for the system.

Drive includes 1/4 or 2 TEFC Inverter Duty Integral Mount or optional C-Face motor, parallel helical gear reducer, drive sprocket, power tubes and mounting plate.

VFD Controller required for each drive. Select appropriate controller from list. Contact factory for assistance with multi-drive applications. Optional remote key pad and DIN rail kits are available.

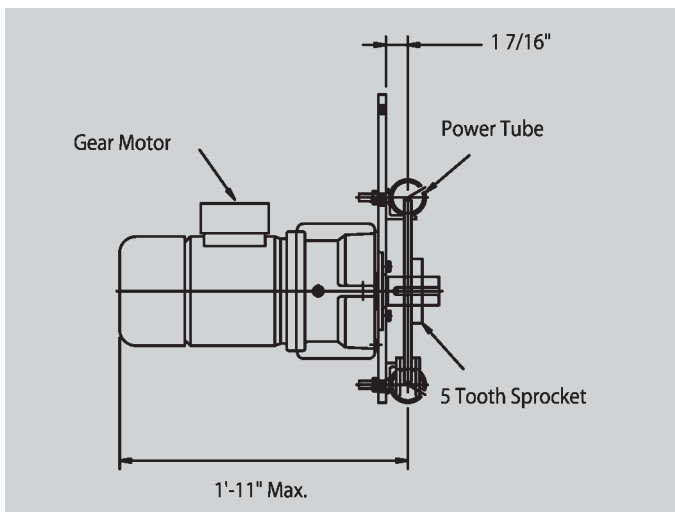
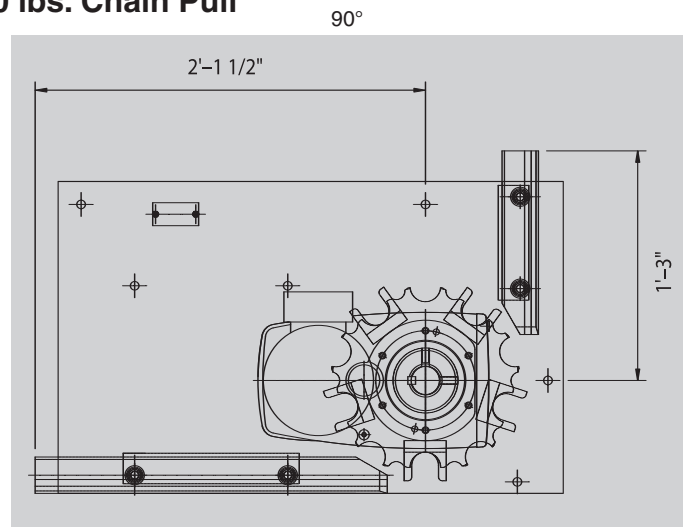
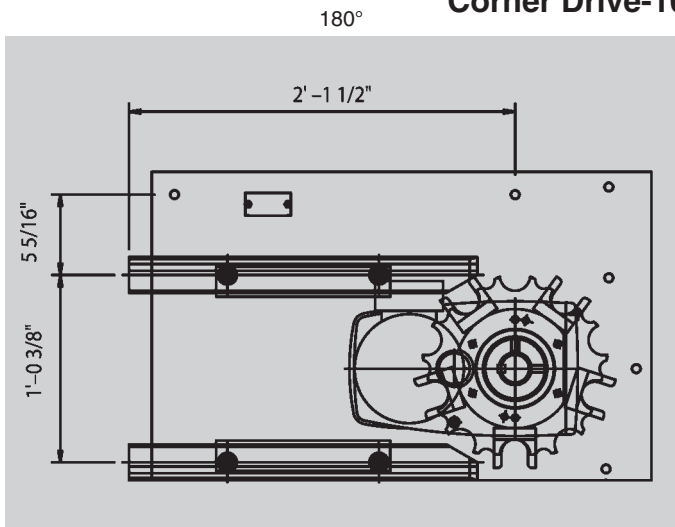
Drives

Part No.	Description	HP	Slot #	Speed	Wt.
3150911 3150931	Horizontal Inline Drive	1/4 2		.6 - 8.0 6.0 - 64	400 lbs.
3161910 3161930 3162910 3162930	90 Deg. Corner Drive	1/4 2 1/4 2	1 2	.6 - 8.0 6.0 - 64 .6 - 8.0 6.0 - 64	400 lbs.
3171910 3171930 3172910 3172930	180 Deg. Corner Drive	1/4 2 1/4 2	1 2	.6 - 8.0 6.0 - 64 .6 - 8.0 6.0 - 64	400 lbs.



300 Power

Corner Drive-1000 lbs. Chain Pull



Corner drive should not be used when unit loads are in excess of 200 lbs.

Inline and Corner Drives include 1/4 or 2 HP TEFC Inverter Duty Integral Mount or optional C-Face motor, Parallel helical gear reducer, drive sprocket, power tubes and mounting plate.

Controls

Part No.	Description	HP	Voltage
2130001	VFD Controller, Panel Mount	1/4	200-230v/3ph/50-60hz
2130002	VFD Controller, Panel Mount	2	200-230v/3ph/50-60hz
2130003	VFD Controller, Panel Mount	1/4	380-460v/3ph/50-60hz
2130004	VFD Controller, Panel Mount	2	380-460v/3ph/50-60hz
2130005	Remote Keypad, NEMA 4 w/10' Cable		
2130007	DIN Rail Kit	1/4	230v
2130006	DIN Rail Kit	2	1/4 & 2 hp 460v



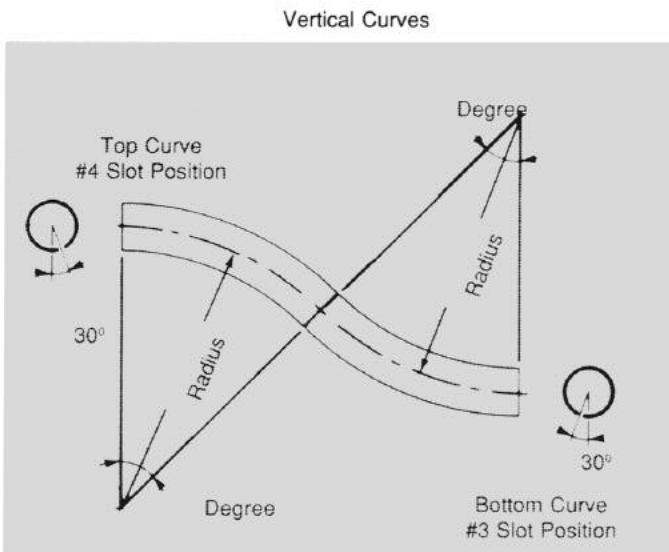
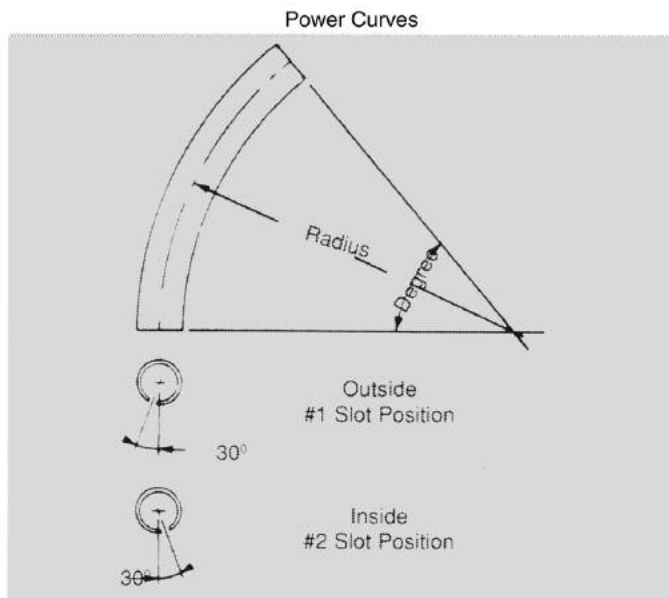


300 Power

Curves

Material Specifications

All Series 300 Power Curves are fabricated from 2 3/8" O.D. x 5/32" wall **STAINLESS STEEL** designed to work harden through use. Stock curves are available in 24" and 36" radii with stock degrees of 15°, 30°, 45°, 90°, and 180°. Other degree and radius curves available upon request.



Horizontal Power Curves

Outside		Inside		Radius	Degree	Wt.
Part No.	Slot	Part No.	Slot			
3324181		3324182		24"	180°	20
3324901	#1	3324902	#2		90°	10
3324601		3324602			60°	7
3324451		3324452		24"	45°	5
3324301	#1	3324302	#2		30°	3
3324151		3324152			15°	1
3336181		3336182		36"	180°	20
3336901	#1	3336902	#2		90°	10
3336601		3336602			60°	7
3336451		3336452		36"	45°	5
3336301	#1	3336302	#2		30°	3
3336151		3336152			15°	1

Vertical Power Curves

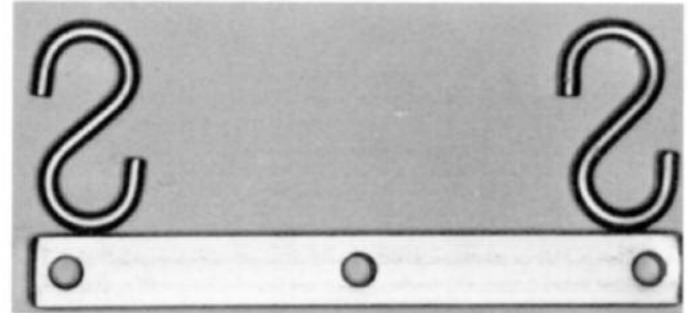
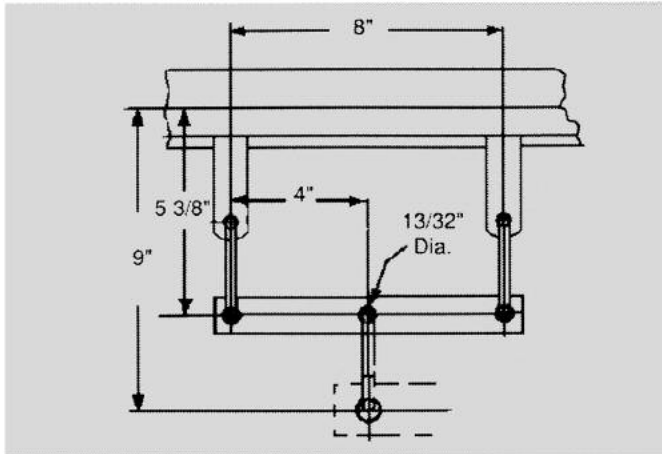
Bottom Curve		Top Curve		Radius	Degree	Wt.
Part No.	Slot	Part No.	Slot			
3324183		3324184		24"	180°	20
3324903	#3	3324904	#4		90°	10
3324603		3324604			60°	7
3324453		3324454		24"	45°	5
3324303	#3	3324304	#4		30°	3
3324153		3324154			15°	1

How To Specify:

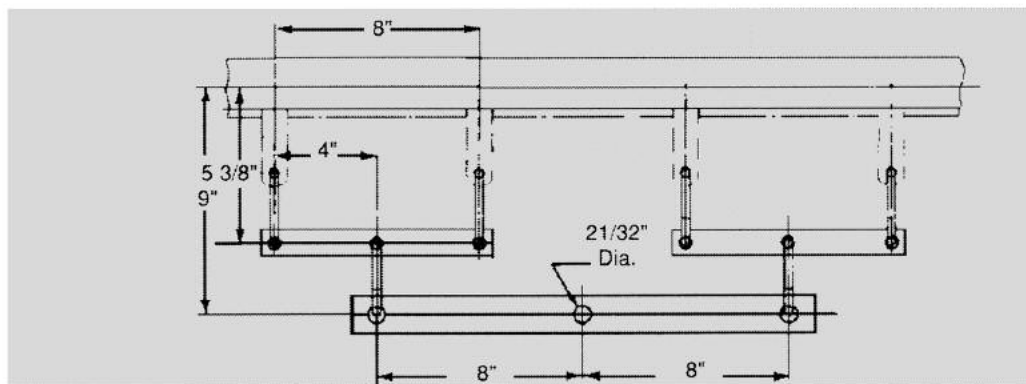
Qty.	Part No.	Description	Radius	Degree	Slot
		Curves			



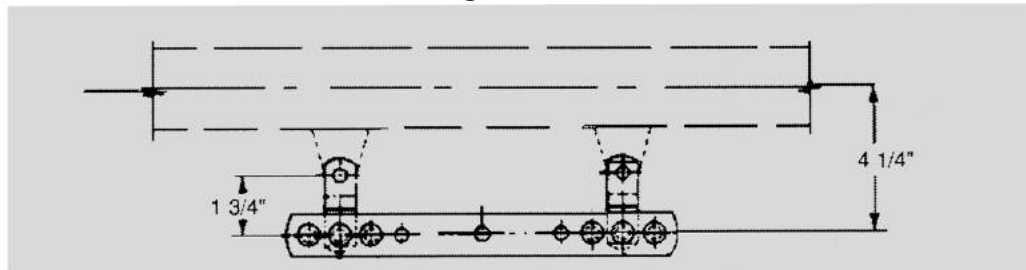
Single Crossbar Carrier



Double Crossbar Carrier



Single Crossbar Carrier with Universals



Single crossbar carriers with universals are used in place of single crossbar carriers with "S" hooks when side sway of unit load is objectionable.

Part No.	Description	Wt.
3400900	Single Crossbar Carrier with "S" Hooks - 200 lbs. Capacity	2
3401900	Double Crossbar Carrier with "S" Hooks - 400 lbs. Capacity	7
3440900	Single Crossbar Carrier with Universals - 200 lbs. Capacity	3

How To Specify:

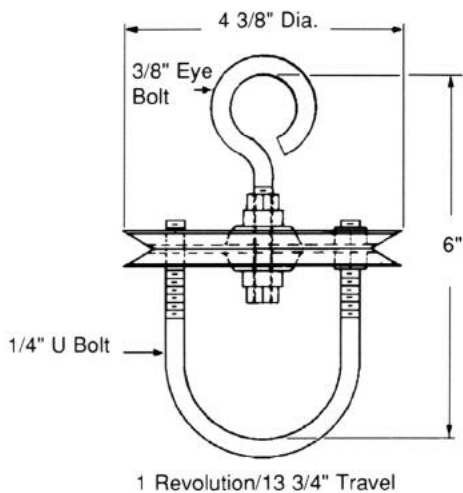
Qty.	Part No.	Description
		*Carriers

*Single, Double, W/Universals



300 Power

Rotating Carrier



How To Specify:

Qty.	Part No.	Description

Part No.	Description	Wt
3410900	Rotating Carrier 4 3/8" Dia. — 200 lbs. Capacity	2



NOTES



CHAINVEYOR®

NOTES



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