

# INSTALLATION, OPERATION, MAINTENANCE MANUAL



XenoROL®

XR40 and XR48

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## PURPOSE

It is the intent of MHS Conveyor, through this manual, to provide information that acts as a guide in the installation, operation and maintenance of MHS Conveyor XenoROL conveyors.

This manual describes basic installation practices, assembly arrangements, preventive maintenance, repair procedures, troubleshooting, service internals and assists in replacement parts identification.

If additional copies of this manual are needed or if you have any question concerning the conveyor, please contact your distributor or the MHS Conveyor Customer Service at (231) 798-4547 or Fax .(231) 798-4146.

## EQUIPMENT WARRANTY

MHS Conveyor warrants that the material and workmanship entering into its equipment is merchantable and will be furnished in accordance with the specifications stated.

MHS Conveyor agrees to furnish the purchaser without charge any part proved defective within 2 years from date of shipment or before the equipment has forty-one hundred (4100) hours of running use, whichever period is shorter, provided the purchaser gives MHS Conveyor immediate notice in writing and examination proves the claim that such materials or parts were defective when furnished. For drive components specific to XenoROL® (i.e. Xeno belts, slave Xeno belts, drive spools, standard and speed-up, and spacers), this warranty shall be extended to five years or ten thousand (10,000) hours of running use, whichever period is shorter, provided the conveyors are applied, installed and maintained in accordance with MHS Conveyor published standards. Other than the above, there are no warranties which extend beyond the description on the face hereof. Consequential damages of any sort are wholly excluded.

The liability of MHS Conveyor will be limited to the replacement cost of any defective part. All freight and installation costs relative to any warranted part will be at the expense of the purchaser. Any liability of MHS Conveyor Systems under the warranties specified above is conditioned upon the equipment being installed, handled, operated, and maintained in accordance with the written instructions provided or approved in writing by MHS Conveyor.

The warranties specified above do not cover, and MHS Conveyor makes no warranties which extend to, damage to the equipment due to deterioration or wear occasioned by chemicals, abrasion, corrosion or erosion; Purchaser's misapplication, abuse, alteration, operation or maintenance; abnormal conditions of temperature or dirt; or operation of the equipment above rated capacities or in an otherwise improper manner.

All equipment and components not manufactured by MHS Conveyor carry only such warranty as given by the manufacturer thereof, which warranty MHS Conveyor will assign or otherwise make available to Purchaser without recourse to MHS Conveyor, provided that such warranty is assignable or may be made available.

### **IMPORTANT**

For service on motors, reduction units, electrical components, controls, air or hydraulic cylinders, contact the local authorized sales and service representative of respective manufacturer. If none is available in your locality, contact the MHS Conveyor representative. MHS Conveyor will not be responsible for units that have been tampered with or disassembled by anyone other than the authorized representative of the respective manufacturer.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXTENDING BEYOND THOSE SET FORTH IN THIS STATEMENT OF WARRANTY.

Rev 04/08/2009

## WARNINGS & SAFETY INSTRUCTIONS

**Failure to follow the instructions, warnings, and cautions throughout this book, and warning labels on the conveyor may result in injury to personnel or damage to the equipment.**

Your MHS Conveyor is powered by a motor and can be stopped only by turning off electrical power to the motor. As with all powered machinery, the drive related components including sprockets, chains, shafts, universal joints and pneumatically actuated devices present a danger. We have installed or provided guards to prevent inadvertent contact with these components along with warning labels to identify the hazards.

Special attention must be paid to the following areas of this manual:

### **WARNING**

This is a notice which, if not followed, could result in serious injury or death.

### **CAUTION**

This is a notice, which if not followed, could result in damage to equipment

**NOTE:** This is where you will be notified of helpful information.

After maintenance, REPLACE guards immediately. Keep ALL warning labels clean and clear of any

obstructions. Never remove, deface or paint over WARNING or CAUTION labels. Any damaged label will be replaced by MHS Conveyor at no cost by contacting the Customer Service Department.

It is very important to instruct personnel in proper conveyor use including the location and function of all controls. Special emphasis must be given to emergency stop procedures. It is important to establish work procedures and access areas which do not require any part of a person to be under the conveyor. It should be required that long hair is covered by caps or hair nets. Walking on or riding moving conveyor is prohibited. Lock out power before removing any guarding. **Loose clothing, long hair, and jewelry must be kept away from moving equipment.**

Maintain enough clearance on each side of all conveyor units for safe adjustment and maintenance of components. Provide crossovers or gates at sufficient intervals to eliminate the temptations to climb over or under any conveyor. Prohibit riding or walking on conveyor by anyone.

Remove all unused coupler sprockets. At open ends (termination) of XenoROL conveyors, add the set collar provided to the end of the line-shaft and install the line-shaft end cover. The set collar and orange end cover are found in the loose parts box.



# Package Conveyors



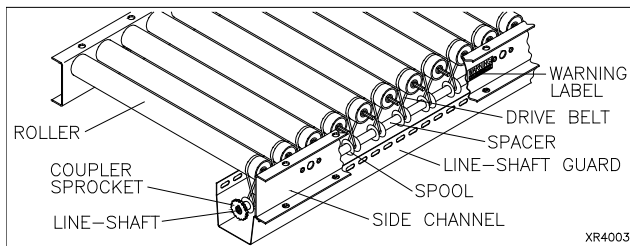
 <p>Do Not Climb, Sit, Stand, Walk, Ride, or Touch the Conveyor at Any Time</p>	 <p>Do Not Perform Maintenance on Conveyor Until Electrical, Air, Hydraulic and Gravity Energy Sources Have Been Locked Out and Blocked</p>	 <p>Operate Equipment Only With All Approved Covers and Guards in Place</p>
 <p>Do Not Load a Stopped Conveyor or Overload a Running Conveyor</p>	 <p>Ensure That All Personnel Are Clear of Equipment Before Starting</p>	 <p>Allow Only Authorized Personnel To Operate or Maintain Material Handling Equipment</p>
 <p>Do Not Modify or Misuse Conveyor Controls</p>	 <p>Keep Clothing, Body Parts and Hair Away from Conveyors</p>	 <p>Remove Trash, Paperwork and Other Debris Only When Power is Locked Out</p>
 <p>Ensure That ALL Controls and Pull Cords are Visible and Accessible</p>	 <p>Know the Location and Function of All Stop and Start Controls</p>	 <p>Report All Unsafe Conditions</p>

POST IN PROMINENT AREA

# Introduction To XenoROL

## XENOROL CONCEPT

**XenoROL rollers are driven by pretensioned polyurethane belts which pull the drive spools against the line-shaft. Each spool delivers a fixed amount of torque from the line-shaft to the rollers. This torque is based on the drive belt tension and coefficient of friction between the spool and line-shaft. If the torque requirement to drive the load on the rollers exceeds the fixed torque of the spool, the spool slips on the line-shaft like a clutch.**



XenoROL conveyor allows unequaled versatility with high speed, complete reversibility and minimum pressure accumulation. A major benefit of XenoROL line-shaft driven conveyor is the ability to power straight sections and curves plus auxiliary devices from a single drive. Auxiliary equipment includes: transfers, spurs, adjoining parallel sections, merges, switches, sortation devices, powered guard rails, etc.

## PRECAUTIONS

**TEMP. RANGE (AMBIENT):** 35°F to 100°F. For temperature applications outside this range, consult the Distributor Services Department.

**ULTRAVIOLET RAYS:** Avoid exposure of polyurethane belts to sunlight.

**OILY OR WET CONDITIONS:** Will impair frictional drive characteristics between spool and line-shaft.

**CORROSIVE OR ABRASIVE SUBSTANCES:** Will adversely affect various components, voiding the warranty

## DEFINITION OF TERMS

**Accessory** - A device that receives power from and contributes to the horsepower requirement of the line-shaft.

**Accumulation (Minimum Pressure)** - Act of queuing, holding, or backing up of product on a conveyor.

**Carrying Roller** - The conveyor roller upon which the object being transported is supported. It has a circumferential groove near one end to allow the drive belt to ride below the carrying surface.

**Coefficient of Friction** - A numerical expression of the ratio between the force of contact between two surfaces and the resistant force tending to oppose the motion of one with respect to the other.

**Conveyor Width** - The dimension outside to outside of frame rails. For the inside dimension, the abbreviation used is "BF" (between frames).

**Coupler** - A mechanical device which connects segments of the line-shaft.

**Coupler Chain** - A double wide chain, plastic or metal, which performs the function of connecting one sprocket to an adjacent sprocket.

**Coupler Sprocket** - A sprocket located at the extreme end of a line-shaft, positioned to allow connection to a second sprocket on another line-shaft by using a coupler chain.

**Crossmember** - Structural member which is assembled between two side channels of a conveyor bed.

**Drive** - An assembly of mechanical, electrical, and structural components to provide power to line-shaft.

**Drive Belt** - An endless round belt manufactured from elastic material, typically urethane, connecting spools to carrying rollers for transmitting rotation of line-shaft.

**Drive Sprocket** - The sprocket which propels the chain or synchronous belt.

**Driven Sprocket** - The sprocket which is propelled by the chain or synchronous belt.

**Frame** - The structure which supports the components of a conveyor bed consisting of formed channel rails bolted together with square tubing crossmembers.

**Guard Rail** - Members paralleling the path of a conveyor and limiting the unit loads to movement in a defined path.

**Jump Chain** - A drive chain or belt which transmits power from one line-shaft to an adjacent parallel line-shaft. A crossover between adjacent line-shafts within a common conveyor frame is called an internal jump chain. A crossover between a line-shaft in one conveyor frame and a line-shaft in an adjacent parallel conveyor frame is called an external jump chain.

**Line-shaft** - Shaft which runs longitudinally within line-shaft conveyor to provide power transmission to carrying rollers and accessory equipment.

**Line-shaft Bearing** - The pillow block style bearings in which the line-shaft rotates.

**Line-shaft Curve** - A curved conveyor section equipped with a line-shaft segmented with universals to change the direction of product travel horizontally. The curve radius is measured to the inside face of the inside frame rail.

**Line-shaft Guard** - Provided to prevent entanglement in rotating parts.

**Roller Centers** - Distance between center lines of adjacent rollers. For curves, roller centers are measured at the inside radius.

**Roller Groove** - The groove that is fabricated into the carrying roller to provide a seat for the drive belt below the carrying surface.

**Speedup Spool** - (See spool) A spool of larger diameter than adjacent spools assembled to the line-shaft. The difference in diameters causes those carrying rollers powered by the speedup spools to rotate faster than those driven by the smaller spools when driven by the same line-shaft.

**Spool (Pulley)** - A sheave or concave cylinder assembled on the line-shaft with slip fit to provide friction drive to carrying rollers but also “slip” in case of stalled carrying rollers. Also contains and protects drive belt.

**Sprocket Ratio** - The ratio of the number of teeth of the driven sprocket to the drive sprocket.

**Tapered Roller** - A conical conveyor roller for use in a curve with end and intermediate diameters proportional to their radius.

**Universal Joints** - A device used to connect two intersecting line-shafts whose axes are not in a straight line.

**XenoBRAKE®** - Pneumatically operated pad mounted below the conveyor rollers used to stop the carrying rollers upon signal by a sensor.

## CAPACITY OF ROLLERS/FRAME

DRIVE PER ROLLER BY TYPE OF BOTTOM					
Product Bottom	Drive Capacity per Roller (lbs.)				
(Conveying Surface)	XR40			XR48	
				1-4" Dia. Belts	
	3/16" Std.	5/32" Option	1/8" Option	12-3/4" Std.	13-1/2" Option
Soft, weak bottom, load unbalanced, uneven bottom, with noticeable bumping. Ex.: plastic totes, wire or steel baskets, lightweight corrugated (always use 3" centers).	15	10	6	30	25
Slight indentation, less than even loading. Ex.: normal corrugated and plastic totes (includes most applications).	20	14	9	40	34
Firm, flat bottom and uniform loading. Ex.: heavy wall corrugated, double wall corrugated and stiff treated materials	25	17	11	50	42
Hard & flat bottom, retaining some flexibility, uniform load distribution. Ex.: plywood and fiberboard.	30	20	13	60	50
Note: Optional bearings with seals may reduce the roller drive capacity. If product conveys hard against the guard rail (ex. where a transfer is used to square product against the guard rail), reduce the capacity by 25%.					

FRAME CAPACITY						
Frame Channel Depth	Support Centers (lbs./ft.)					
	10'	9'	8'	7'	6'	5'
XR40 4-1/2" Deep	60#/ft.	90#/ft.	145#/ft.	235#/ft.	395#/ft.	710#/ft.
XR40/XR48 9" Deep	215#/ft.	305#/ft.	450#/ft.	670#/ft.	1115#/ft.	1960#/ft.
Note: The 4-1/2" deep frame has more capacity when supported on 8' centers than XR40 roller drive capacity. The 9" deep frame has more capacity when supported on 9' centers than XR40 or XR48 roller drive capacity.						

### MINIMUM PRESSURE ACCUMULATION

When conveyed product is stopped, the friction between the product and the roller stops the roller, drive belt and spool. Though the shaft continues to turn, only minimal friction exists between the inner surface of the spool and the line-shaft surface. The pressure of accumulated product is independent of its weight and is determined by the belt tension.

Average lbs. Pressure per roller

XR40			XR48	
3/16" Std.	5/32" Option	1/8" Option	1/4" x 12-3/4" Std.	1/4" x 13-1/2" Option
1#	0.7#	0.5#	2#	1.7#

Long lengths of accumulated product must be zoned with stop devices. This reduces the total line pressure into several smaller increments. Stopping devices are also used to accumulate product prior to the curves. Air or electrical sensor controls can be supplied to activate the stop device. Always consult the Distributor Services Department.

### REDUCTION OF LINE PRESSURE

Pressure of accumulated articles can be reduced by removing belts at specified intervals on the conveyor. For example, accumulated pressure can be reduced 25% by removing every fourth belt. CAUTION: THE DRIVE CAPACITY IS ALSO REDUCED 25%.

OPTIONAL BELTS: Consider the optional drive belts for lighter loads. This will increase conveyor length on a single drive while reducing horsepower requirements.



## RECEIVING & SITE PREPARATION

### GENERAL

XenoROL® line-shaft driven live roller conveyors are shipped in subassemblies. These subassemblies are packaged to guard against damage in shipment.

Examination immediately following unloading will show if any damage was caused during shipment. If damage is evident, claims for recovery of expenses to repair damage or replace components must be made against the carrier immediately. While unloading, a check must be made against the Bill of Lading, or other packing lists provided, to confirm full receipt of listed items.

### CAUTION

**TAKE CARE DURING THE REMOVAL OF EQUIPMENT FROM THE CARRIER. Remove small items and boxes first. Pull and lift only on the skid, not on the frame, crossmember or any part of the equipment. Be sure the skid is free of other materials which may be on top of or against the side of the skid to be removed.**

### PREPARATION OF SITE

After the conveyor is received, move it to the installation site or designated dry storage area as soon as possible. Clean up all packing material immediately before parts get lost in it. Loose parts should remain in the shipping boxes until needed.

Prior to starting assembly of the conveyor, carefully check the installation path to be sure there are no obstructions that will cause an interference. Check for access along the path needed to bring in bed sections and components closest to the point where they are needed. It is often necessary to give the area along the system path a general cleanup to improve installation efficiency, access and accuracy.

Ceiling-hung conveyor header steel should be installed well ahead of the conveyor frame installation to minimize congestion.

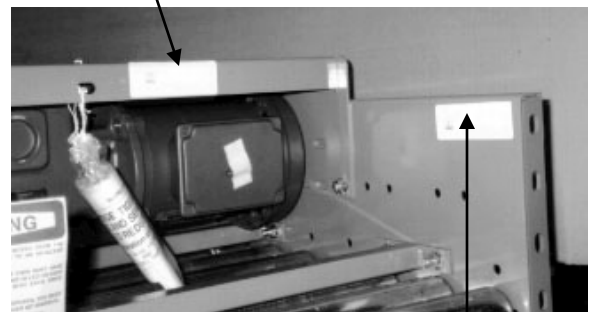
### PARTS INVENTORY & IDENTIFICATION

Each subassembly is shipped completely assembled except typical loose parts which are listed on page 9. Drive assemblies are shipped mounted to the drive conveyor frame.

Segregate the conveyor subassemblies by types for inventory and ease of locating during installation.

An identification label is attached to the inside of one side channel close to one end of each conveyor bed and on all drive packages. (See below.) This label contains: job number, part number, order number, tag number (if specified), assembler's initials and date of manufacture. On supports, the tag is located on the bottom side of the foot. On special devices it is located on a convenient flat surface that is not offensive to the appearance of the equipment but is still accessible for viewing. These numbers can be cross-referenced against the packing list. The illustrations in this manual and the part number stickers will assist you with your inventory.

IT#: 40084360  
DSC: DR,CTR 24XR40 3/4HP 60 B  
JOB: C003325 11/10/96



Identification labels on  
Bed and drive package

IT#: X9503463  
DSC: BED 24XR40-3D-X 10'  
JOB: C003325 11/10/96  
TAG: 101E  
O-RINGS 90530005 90530009

Loose parts are boxed and shipped separately. You should have all conveyor sections and supports for a particular conveyor prior to installation. It is cost-effective to identify and procure any missing parts before they are needed for assembly. Small items like nuts and bolts are weigh-counted and packaged by size and type.

# TYPICAL XenoROL LOOSE PARTS

Part Number	Item	Use	Illustration
41700910	Line-shaft Guard End Cover with Set Collar Kit COVER with Set Collar, Kit	Cover End of Lineshaft at Termination of Conveyor	See WARNING Page 13
90140001	Safety Caps	Cover End of Line-shaft Keyway	See WARNING Page 20
90314510	Line-shaft Guard, 10' straight	Guard Line-shaft	See Page 33
41701000	Attaching Bracket	Fasten Line-shaft Guard	See Page 33
95200001	Spring Clip Nut 1/4 - 20	Fasten Line-shaft Guard	See Page 33
95000021	Hex Head Flange Bolt 1/4-20x3/4	Fasten Line-shaft Guard	See Page 33
95300036	Rubber Washer	Isolate Guard	See Page 33
90480028	U-joint Cover Guard	Horizontal to Incline, Straight Beds	
90140025	Coupler Chain	Line-shaft Coupling Bed to Bed	See Page 20
Varies by Size	Floor Support	Support Conveyor Frames	See Page 14
80400002	KBA Knee Brace	Brace Frame to Support Leg	See Page 15
80400003	KBB Knee Brace	Brace Frame to Support Leg	See Page 15
80400004	KBC Knee Brace	Brace Frame to Support Leg	See Page 15
80700001	Guard Rail Arm	Support Adjustable Channel G.R.	See Page 34
80700006	Guard Rail Upper Bracket	Fasten Adjustable Channel G.R. to Arm	See Page 34
80700007	Guard Rail Lower Bracket	Fasten Arm to Frame	See Page 34
80700011	Guard Rail Splice Angle	Support Rail to Rail Joint	See Page 34
95000027	1/4-20 Bolt x 2" Hex Head	Upper Bracket to Channel G.R.	See Page 34
95000075	3/8-16 x 1" Hex Head Bolt	Lower Bracket to Frame and Brackets to Arm	See Page 34
95000020	1/4-20 x 3/4" Hex Head Bolt	Splice Angle to Channel Guard	See Page 34
95200050	1/4-20 Nuts	Adjustable Channel G.R.	See Page 34
80700112	Spacer Channel	Ceiling Hanger	See Page 16
80700013	V-Bracket	Ceiling Hanger	See Page 16
Varies by Length	Cross Pipe	Ceiling Hanger	See Page 16
80701011	Standhead Connector	Bed Joints	See Page 15
40700051	Butt Bolt Connectors	Bed Joints	See Page 15
	Special Connector Devices	Per Application	
	Electrical Components	Per Application	
	Special Device Parts	Per Application	
95000072	3/8-16 x 3/4 Hex HD Bolts	Butt Bolts, Braces, Supports	
95000074	3/8-16 x 3/4 Truss HD Bolts	Angle Guard Rail	
95200061	3/8-16 Nuts	Angle Guard Rail	
90530009	O-ring Drive Belts	Rollers on discharge end of beds 24" wide or more	
90530005	O-ring Slave Belts	Roller to roller belts at bed joints	
80701002	2" Angle Guard Rail	Straight conveyor	
Varies by width	Inside & Outside Angle G.R.	Curves	
Varies by width	Rollers for beds 24" wide or more*	Carrying rollers mounted holes in hex frame holes	
* Rollers for 30" wide conveyor and wider are shipped as loose parts.			
Components for pneumatic options, including solenoid valves, for pneumatic options, fittings, air lines and mounting brackets are shipped as loose parts.			

## GENERAL PROCEDURES

The following procedures are to be used as guidelines only for conveyor installation. Specific methods will vary somewhat depending on available equipment on site and each installer's preferences based on past experience.

### **WARNING**

**The Installation Supervisor must be experienced with conveyor and qualified in the mechanics of the equipment and enforce safe working procedures for the protection of the crew, customer, and customer's property.**

### **DIMENSIONAL REFERENCE POINTS**

The path of each conveyor in the system is determined by establishing a reference point at each end. The center line of the conveyor is established and a chalk line is snapped between these points.

Conveyors should be installed with the center line of the bed matching the center line of the conveyor path. Locate and mark the center of the crossmembers at each end of the conveyor. Use a plumb line or other acceptable means to ensure accuracy to the chalk line.

Always carry out a thorough check for any obstructions such as building columns, manholes, etc. It may be necessary to reroute the conveyor to avoid the obstruction. In this case it would be advisable to begin installation at this point, using the obstruction as a reference point (Datum), and install the sections in either direction as required.

All conveyor sections must be checked for squareness prior to installation as "racking" or being knocked out of square may have occurred during shipping and handling.

### **ELEVATIONS**

All conveyors should be installed in accordance with the elevations shown on the drawings. In addition, all conveyors must be level across the frame width and length (if horizontal). Leveling of the frames is best done using a rotating laser level or a builder's level.

After the first elevation is established at a critical point, the elevation of all other points shall be relative to this first point. Normal practice is to dimension the layout and measure elevations from the floor at each point of support. As the conveyor system proceeds onto another floor or into another building or room, a new elevation will be measured from the floor at that point. This new elevation will then become the reference for subsequent elevations.

When installing an overhead system, the first elevation is measured from the floor and becomes the reference elevation point until a change in elevation is shown on the layout. Any new elevation is also measured from the floor and becomes the new reference point. The process is

### **CAUTION**

**Consult the building architect or a structural engineer regarding ceiling loading or structural limitations of the building if any conveyor is ceiling hung.**

repeated each time an elevation change occurs.

### **COMPONENT ORIENTATION**

Using your conveyor system layout drawing and the numbers on the I.D. tags on each component, position and orient the conveyor sections. You must know:

- The direction of product flow
- The elevation height
- How the drive is positioned
- Conveyor drive shaft location
- Any speed differential in jump chains
- Drive termination points

Note: IMPORTANT! Use extreme care when initially orienting line-shaft conveyor components. Each line-shaft conveyor section must be properly oriented to ensure correct coupling to the next conveyor section. For example, using the wrong jump chain bed or wrong orientation may cause the following conveyor to run at the wrong speed.

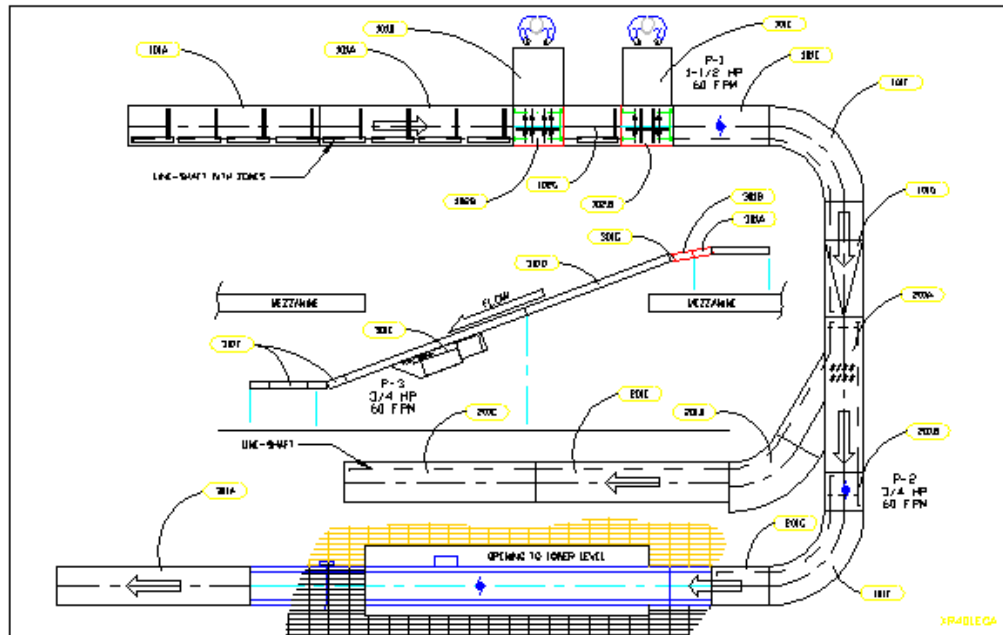
IMPORTANT! Do not make alterations to the equipment without consulting with user's representative and MHS Conveyor. Unauthorized modifications to the equipment may impair its function, create a hazardous condition, affect its useful life and/or void the warranty. IMPORTANT! At drive termination points, the coupler sprockets must be removed before the section is installed.

## TYPICAL LAYOUT/LEGEND

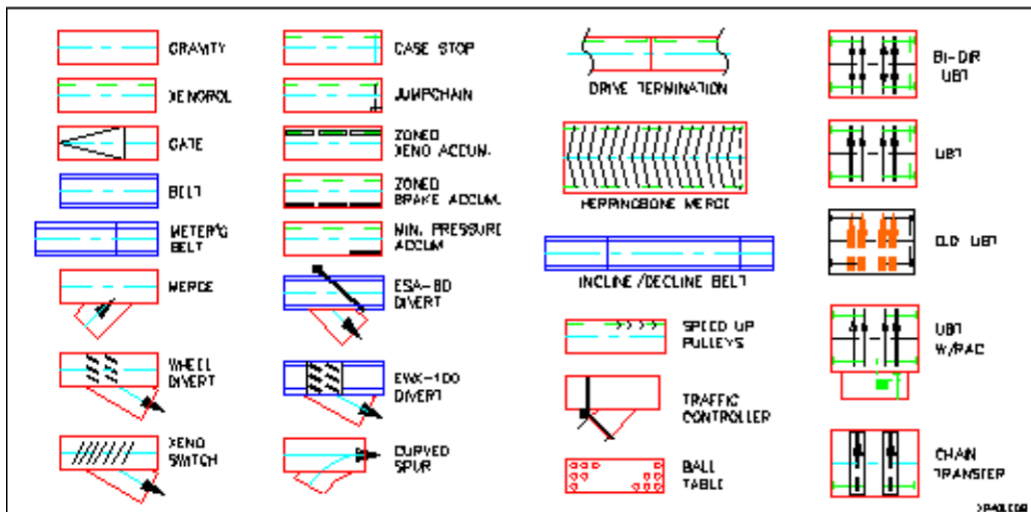
Illustrated below is a hypothetical layout of a MHS Conveyor system. The dimensional data has been left off for clarity. This layout is made up of a combination of symbols from the legend as found on MHS Conveyor' TECAP program layout software. This is typical of a layout that would be received from MHS Conveyor or any distributor using this software.

The layout you have received may or may not have the match mark tag numbers as indicated in the balloons. If your layout is tagged, these ballooned numbers will match the tag number on each bed assembly or device. (If the layout is not match marked, care must be taken to see that the right device or drive, etc. is located properly. Drive information, including horsepower and speed, should be noted on the layout. Also shown symbolically are positions of line-shafts, jump chains, zero pressure zones, transfer flow direction, etc.

## LAYOUT



## LEGEND

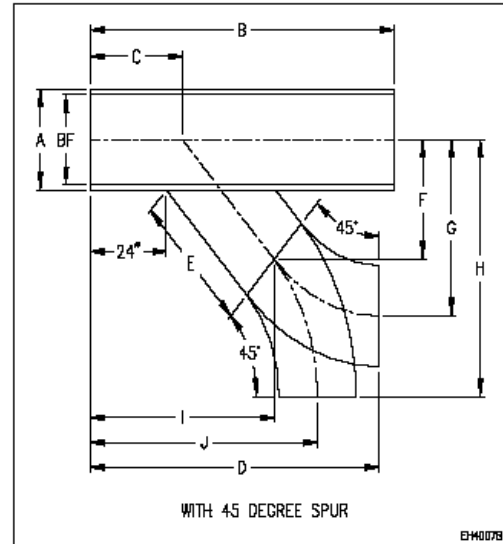
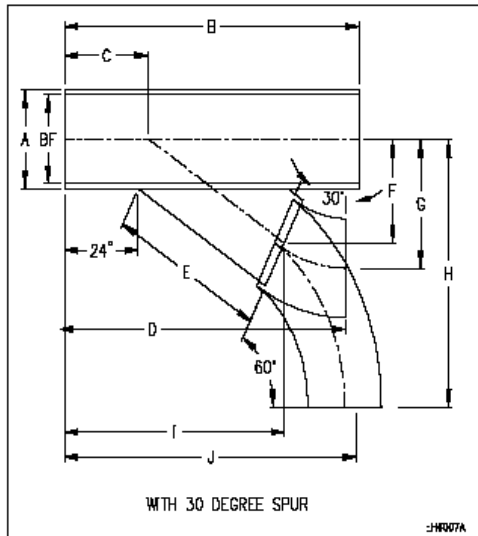


## LAYOUT DIMENSIONS

In laying out the conveyor path, the dimensions shown on this page indicate the relative position between parallel or perpendicular conveyors in utilizing a spur. For example, dimension "G" indicates the center-to-center distance of two parallel conveyors offset through a specific spur degree and width when used with a corresponding curve. As shown in the chart, dimension "E", the length of the spur, is determined by the conveyor width which directly affects dimensions "G" and "D"

or "J" and "H". Normally, merging takes place at 45° while most diverting devices utilize 30°. Reference the overall layout to determine which set of dimensions to use.

Since the original system layout will have already taken these dimensions into account, they are most useful in making future changes to the system. Note: These dimensions do not include the wheel diverter. (Ref. page 26).



30° SPUR DIMENSIONS (In Inches)									
A "	B "	C "	D "	E "	F "	G "	H "	I "	J "
15-1/2	72	26	80-1/4	36	19	24-3/4	56	59	80-1/4
18-1/2	72	26-1/4	81-3/4	36	19-3/4	25	57-3/8	59-3/4	81-3/4
24-1/2	96	27-1/4	95-1/8	48	25-1/2	32	66-1/4	71-1/2	95-1/8
30-1/2	96	28	108-1/2	60	32	38-3/4	75-1/4	83-1/2	108-1/2
36-1/2	120	28-3/4	122	72	38-1/2	45-3/4	84-1/2	95-1/4	122
42-1/2	120	29-3/4	135-3/8	84	44-7/8	52-3/8	93-3/8	107-1/2	135-3/8

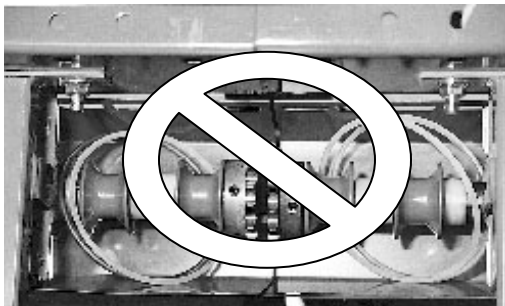
45° SPUR DIMENSIONS (In Inches)									
A "	B "	C "	D "	E "	F "	G "	H "	I "	J "
15-1/2	72	27-1/4	76-1/2	24	19-1/4	31-3/4	49-1/2	46-1/2	59
18-1/2	72	27-3/4	87-1/8	36	28	41	59-1/4	56	69
24-1/2	96	29	91-3/8	36	28-1/4	42-3/4	62-1/4	58-1/4	72
30-1/2	96	30-1/2	104	48	38-1/2	53-1/4	73-3/4	69	83-1/2
36-1/2	120	31-1/2	108-1/4	48	39-1/2	54-3/4	76-3/4	71	86-1/2
42-1/2	120	32-3/4	121	60	48-3/4	65-1/4	88-1/2	81-1/2	97-3/4



## LAYOUT DIMENSIONS

### WARNING

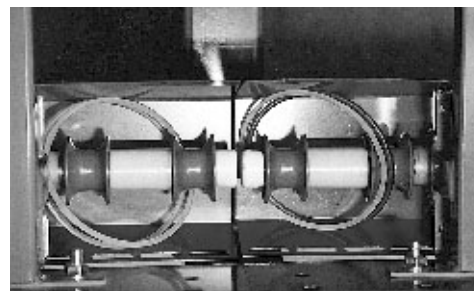
Remove any coupler sprocket which is not coupled to an adjacent sprocket. These sprockets must be removed BEFORE the bed is installed. The white line-shaft safety caps must be installed in place of the sprockets to cover the end of the keyway.



*Never leave unused sprockets on line-shaft.*

### WARNING

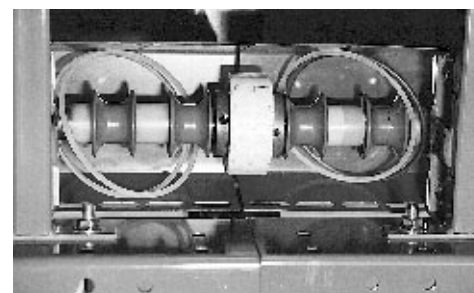
Safety caps are required on ends of all adjoining line-shaft conveyor beds not coupled together.



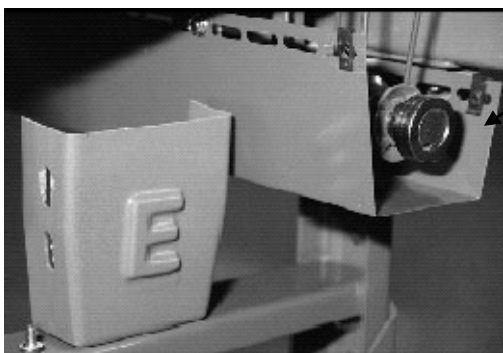
*At joint between adjacent drive units, remove sprockets and add white plastic safety caps.*

### WARNING

At the termination of the XenoROL® line-shaft driven conveyor(s), the open end of the line-shaft guard must be covered with the end cover kit provided in the loose parts. This kit includes instructions, mounting hardware and 1" bore set collar. The set collar replaces the unused coupler sprocket. This end cover must be used at all exposed ends including XenoROL terminations abutting other types of conveyor or machinery

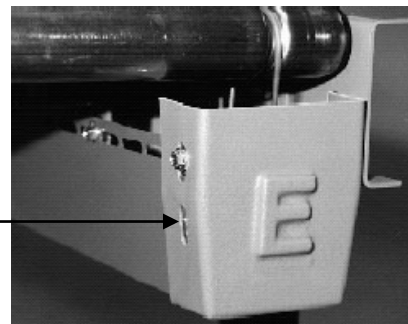


*When continuing drive, install coupler chain per instruction on pages 19 and 20.*



Set  
Collar

End  
Cover in  
position



## SUPPORTING ARRANGEMENTS

### FLOOR SUPPORTS

Install bolts used to attach the standhead to the frame so the nut is on the bottom. Standhead bolts should be left finger tight while the conveyor is being assembled and aligned.

There are various frame rail depths depending on options and accessories. Floor supports are ordered by nominal height range, which is the dimension from the floor to top of the support. Conveyor elevations are shown on the layout by top-of-roller elevations. This difference must be recognized when setting the support elevations. XenoROL® conveyor is 4-7/8" from top-of-support to top-of-rollers with a 4-1/2" deep frame channel.

It is important that conveyor frames be installed level. Floor supports will accommodate normal irregularities in the floor surface. Adjustment for elevation in floor supports is accomplished with metal-on-metal bolt clamping force. To achieve the support's stated load rating; it is necessary to tighten the elevation adjustment bolts (3/8" diameter) to 23 ft.lbs. of torque.

Supports should always be installed in the vertical position, and any variations due to conveyor pitch or floor slope will be compensated for in the pivoting standhead of the support.



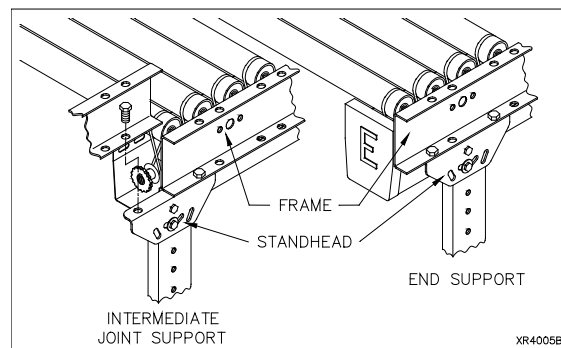
90° curve with true taper rollers. A single support leg is located on the center of the outside channel. Over 18" width should have full support.

### ANCHORING

Anchoring in concrete floors is accomplished by drilling into the floor and inserting the suitable anchor bolt. The hole diameter and depth must be in accordance with the anchor bolt manufacturer's instructions.

Anchor intermediate floor supports with two anchor bolts, one through each support foot plate using minimum 3/8" diameter anchor bolts. For floor supports over 5' high or when supporting drives, use 1/2" diameter anchor bolts.

Stagger anchors from front hole on one side to rear hole on opposite side. Anchor bolts for equipment subject to impact loads should be a minimum of 1/2" diameter.

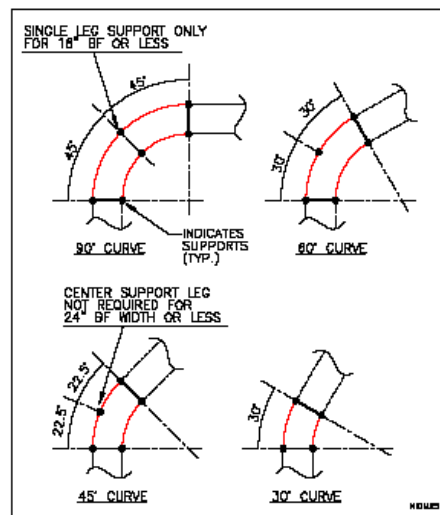


### WARNING

**Place a bolt through the frame and support immediately with finger tight nut. This will prevent the frame from falling off the support, if bumped, and causing injury.**

**CURVE SUPPORT POINTS** - The curve illustration below indicates proper support locations for curves of various degrees and widths. The dots illustrate the support connecting point to the conveyor. The dark line between dots indicates a full support with welded crossmember or ceiling hanger cross tube. A single dot on the outside center of the curve indicates only the outer curve rail is supported with either a ceiling hanger drop at that point or a single leg floor support.

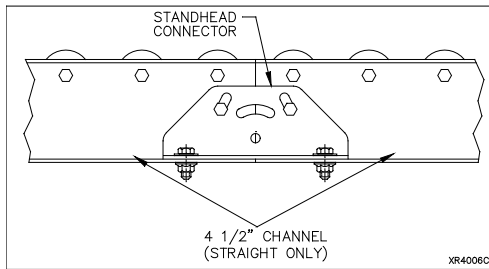
If a full width support with welded crossmember is supplied where only a dot is indicated, use the full support. The illustration below is minimum supporting arrangement.



## CONNECTORS

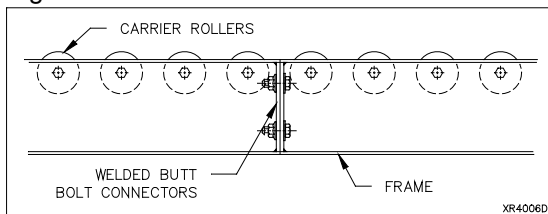
Adjoining beds may be connected using optional stand-head connector plates (one on each side). Connectors are normally used with ceiling hangers when the hanger is not centered on the frame joint. The hanger should be within 1' of the joint while maintaining 10' maximum centers. The beds should be temporarily supported while the support and connectors are installed.

Each standhead connector uses two bolts through the flange of the frame plus two bolts through the vertical leg and conveyor channel web.



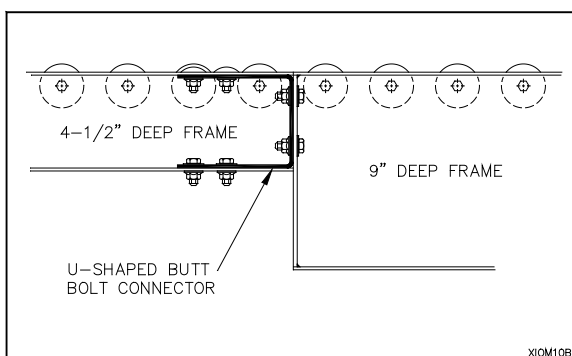
*Beds should be checked for squareness before final tightening of bolts.*

Welded butt bolt connectors may be used to join two straight frames, straight to curve, straight spur or 4-1/2" to 9" deep frame (urethane belt transfers). Welded butt bolt connectors must be ordered on designated bed frames.

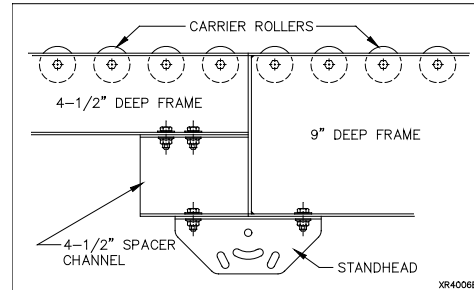


*Welded butt bolt connector available for 4-1/2" deep frames. They are standard with 9" deep frames.*

U-shaped butt bolt connectors are commonly used to connect a 4-1/2" channel frame to a urethane belt transfer which uses a 9" deep frame. The UBT has pre-welded butt bolt plates in each end.



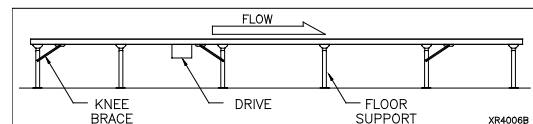
The spacer channel connector kit consists of two formed channels 4-1/2" deep with mounting hardware. This connector is a standard component of ceiling hangers but is also used to allow a support on the frame joint between 4-1/2" and 9" deep channel frames. This is another choice to join a 4-1/2" channel to a UBT frame.



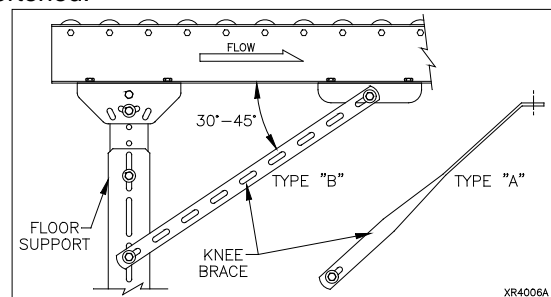
*A 4-1/2" deep spacer channel bolts to bottom flange of 4-1/2" deep bed and standhead of the floor support or a ceiling hanger.*

## KNEE BRACES

Stability along the conveyor length is achieved with knee braces. Braces resist stresses caused by direction of product flow, drives, stops and starts. Every support does not require bracing. Braces are used at the ends of straight runs and approximately every 30' in between. Braces should be located toward the discharge end (DOWNSTREAM) side putting them in tension. Starting the conveyor puts opposite stresses on the supports, which is resisted by installing a brace near the drive toward the receiving end (UPSTREAM).



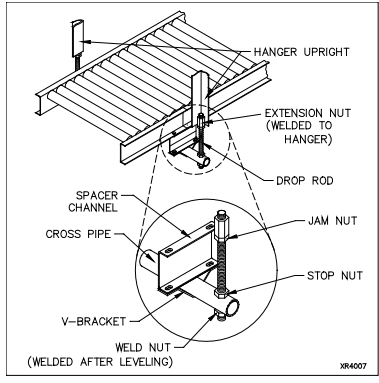
For best results the angle between the knee brace and frame should not exceed 45 degrees, or be less than 30 degrees. On short supports where a small angle results, the knee brace may need to be shortened.



Type "C" braces (not shown) use two type "B" braces overlapped and bolted together for extended length when conveyor height is 48" or more.



## CEILING HANGERS



*Drop rods and nuts are optional. The extension nut is welded into the angle hanger upright during installation.*

### WARNING

**Consult the building architect or a structural engineer regarding ceiling loading or structural limitations of the building for sizing header steel.**

Cross pipes, V-brackets and flat strap connectors are provided with ceiling hangers. Threaded 3/4" rod and attaching nuts are available as an option. Bed connectors are recommended with all ceiling hanger applications.

If hanger uprights are field fabricated, they should be a minimum of 1-1/2" x 1-1/2" x 3/16" angle.

### WARNING

**Consult your distributor or a structural engineer to determine what size hangers should be used to support your maximum anticipated load.**

After hanger uprights are installed and the heavy extension nuts welded to angle hangers, thread the drop rods into the extension nuts. Thread the jam nuts and stop nuts on the drop rods far enough up the rods to allow installation and adjustment of the cross pipe.

While still on the floor, loosely attach cross pipe, V-brackets, flat strap connectors and bed connector to one end of a bed section. Hoist the bed section between the drop rods guiding the rods through the mounting holes in the cross pipe. Thread the weld nuts on the drop rods to support the bed. Weld the weld nuts to the drop rods to prevent loosening. Hoist the next bed section into place and connect it using the flat strap connectors and V-brackets. Level the bed lengthwise and side to side by threading the drop rods up or down by using a wrench on the weld nuts. Tighten the jam nuts against the extension nuts and the stop nuts against the cross pipe. Continue for the length of the conveyor.

### SWAY BRACING (CEILING HANGER)

1. Sway bracing should be a minimum of 1-1/2" x 1-1/2" x 3/16" angle.
2. Sway bracing is secured to the hanger upright near the conveyor support and extended upward at an angle of approximately 30 degrees from the hanger upright. The sway brace angle should not be over 45 degrees to the upright. When hangers are installed adjacent to building columns, a horizontal brace may be installed securely to the column.
3. Hanger uprights over 12'-0" in length must have horizontal bridging angles connected between the upright and the sway brace at approximately the half way point.
4. Sway bracing should be installed on every third hanger (maximum of 30'-0" centers).
5. If sway bracing cannot be placed on the outside of the uprights, alternate X-bracing between every other pair of uprights.
6. Additional bracing should be used:
  - Before and after curves
  - At drives
  - At product diverting points

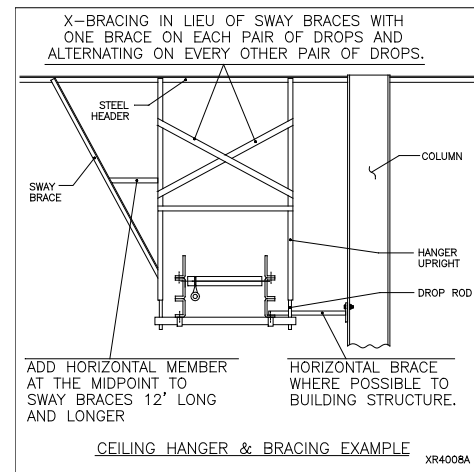
### DIAGONAL SWAY BRACE (FLOOR SUPPORT)

Floor support sway bracing consists of one 1-1/2" x 1-1/2" structural angle and mounting hardware.

**APPLICATION:** Due to natural side to side movement of line-shaft conveyor, a diagonal sway brace has been designed to reduce side movement in the standard floor support. Side movement is most prevalent in long straight lines which are not side braced by adjoining conveyors, curves, etc. or where they cannot be braced to columns, machinery, or other conveyors. This is more noticeable when the conveyor elevation is greater than its width. One brace can be mounted to every third or fourth support diagonally across the support with the low end on the opposite side of every other brace (alternate orientation). The holes in the support uprights need to be field drilled.

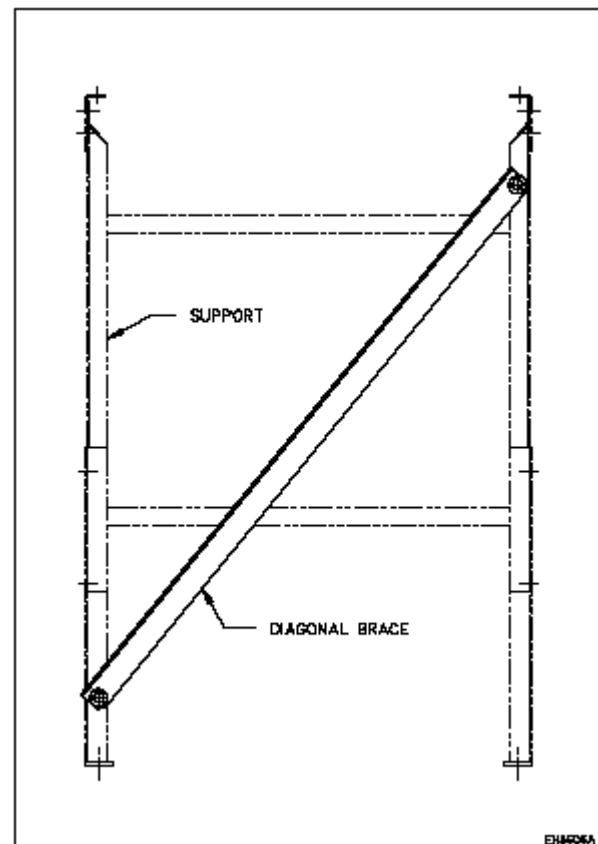
If excessive oscillation persists after bracing has been added, it may be the result of harmonics. This can occur when the conveyor operating speed generates vibrations with a frequency at or near the conveyor's natural frequency of its structure. This rare condition normally occurs between 85 FPM and 120 FPM. It may be minimized by adding more bracing or by either increasing or decreasing conveyor speed.

Sometimes it is better not to add a brace at the drive location. Some experimentation may be required.



### CAUTION

**Before adding X-braces between uprights, check for adequate product clearance.**

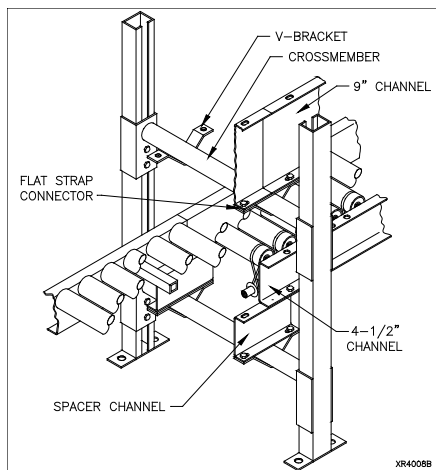


## MULTI-LEVEL XENOROL® SUPPORT

To mount XenoROL to multiple level supports, bolt two V-brackets and two spacer channels to each horizontal crossmember. Measure from the floor to the top of the spacer channels, set the crossmember to the desired elevation minus the distance from the bottom of the frame to the top of the rollers. Tighten the bolts only enough to hold the crossmember in place.

Set up two multiple deck supports and, starting with the lowest line, bolt the ends of a frame to the spacer channels. On the end beds, install one support completely on the frame so that the center of the upright is 6" from the end of the frame. All intermediate supports are installed and centered on the joint.

After three supports and beds are installed, make final elevation adjustments and level the beds lengthwise and side-to-side. Securely tighten the crossmember bolts. Continue for the length of the conveyor.



Note: Flat strap across joint is required when spacer channel is not used.

## METHODS FOR ANCHORING CEILING HANGERS

### Open Building Steel

The following references are from the American Institute for Steel Construction manual (AISC).

*Welding* of auxiliary steel (stringers or headers) to building steel is prohibited.

*Drilling* and bolting to building steel is not recommended and will be done only with the customer's written permission.

*Clamping* of stringers or headers to building trusses will normally be done only at panel points. Specific customer permission and load calculations by a qualified engineer are necessary to safely clamp between panel points.

*Headers* when used for short spans, such as between roof purlins, will be securely clamped to building steel. Stringers, when used between headers, may be welded or bolted to the headers directly or with suitable angle clips.

*Concrete Ceilings:* Accomplish anchoring by drilling into the concrete ceiling and inserting suitable anchor bolts. The hole diameter and depth must be in accordance with the lag bolt manufacturer's instructions.

Anchor each hanger with four bolts (two per upright) minimum size 1/2" diameter. Consult your distributor or structural engineer to determine your needs.

### WARNING

**Do not use explosive type anchors**

For heavier concentrated loads like drives or points where movement or vibration can occur, use 5/8" diameter through bolts with backup plates. If this is not permissible or possible, then header steel must be installed using several anchor bolts to spread the load.

*Wood Joists/Beams:* Hangers may be attached directly to the joists providing the load rating of the building will permit. Attach hangers to the vertical side of the joist in two places, one above the other, on each hanger upright. Anchoring is accomplished by drilling through the joist in the upper position and using a 1/2" diameter through bolt with a backup plate or heavy washer. A 1/2" diameter lag screw may be used in the lower position.

When a header is required to support the load, it must bridge across two or more joists. This header will be attached to each joist in the manner specified in paragraph above. Hanger uprights should then be bolted or welded securely to the headers. Consult a structural engineer to determine which method should be used for your load requirements.

*Concrete/Masonry Walls:* Equipment may be supported from concrete walls through use of suitable bolts and anchors or by bolting through the wall if the condition of the wall or load dictates it. A 1/2" diameter through bolt should be used with a backing plate.

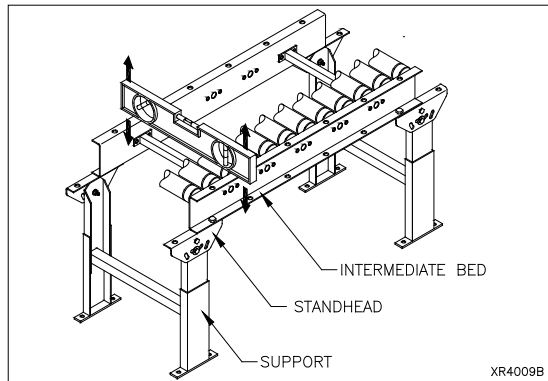
# BASICS OF XenoROL INSTALLATION

## GENERAL



*XenoROL® bed sections stacked on pallets for shipping (7) intermediate beds per side.*

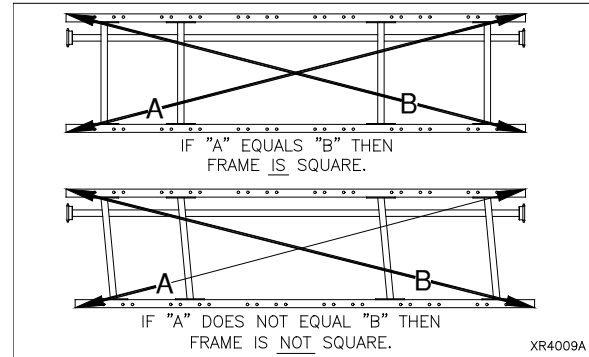
Straight bed sections may be installed using any of the support methods previously described (see SUPPORTING ARRANGEMENTS). As each bed is installed in the system, level it lengthwise and across the bed width on a roller. The supports should also be checked for vertical. A shorter level may be required to check the upright without the level overlapping the lower boot.



If it becomes necessary to shorten a bed frame, cut the end bed where a coupler is not needed, if possible. If the drive must be continued, it is best to disassemble the line-shaft assembly and re-keyway the line-shaft's cut end. If only a small amount of conveyor is driven by the cut bed, the coupler sprocket may be field welded or pinned to the cut end of the shaft.

When joining bed frames it is important to align the rollers and line-shaft. Care must be taken to make sure the rollers are level (carrying surfaces) from bed to bed.

All bed frames should be checked for squareness. To check, measure diagonally from corner to corner. Measure the opposite corners in the same manner. If the bed is square, the two measurements will be the same within 1/16".

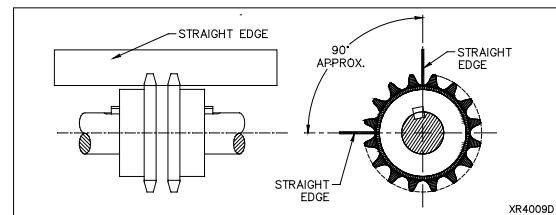


## FRAME ALIGNMENT

Conveyor frames must always be installed in a straight line from end to end as described in GENERAL PROCEDURES. After a number of sections have been installed to the chalk line and leveled, check the alignment of each line-shaft assembly. As the conveyor sections are bolted together, the coupler sprockets may require adjusting. The edge of the 1" diameter line-shaft must be 2" from the frame channel to start.

## COUPLER ALIGNMENT

Check the alignment of each pair of coupler sprockets. Parallel alignment can be checked with a straight edge placed on the two sprockets at the root of the teeth. Alignment should be checked in at least two places, at 90 degree intervals. The straight edge must appear level to the coupler hubs or line-shaft. This will put parallel alignment within the specified .005" limit.

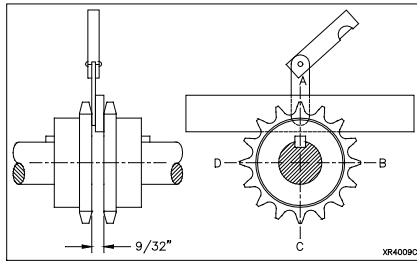


If the coupler sprockets do not align vertically, adjust either or both of the following:

1. Loosen the crossmember mounting bolts of two crossmembers in each bed and adjust the height of the crossmember within the limits of the mounting holes.
2. Insert shims between the bearing housing and the bearing hanger of the crossmember.

**Tip:** Loosen one coupler sprocket and slide it against the other. Adjust the line-shaft for zero gap between sprocket faces and exact mating of teeth. Then move loose sprocket back 9/32" and tighten set screws to 13 ft.lbs.

Angular alignment and gap may be checked by combining a feeler gauge and shim material to check for equal gap of 9/32 every 90 degrees.

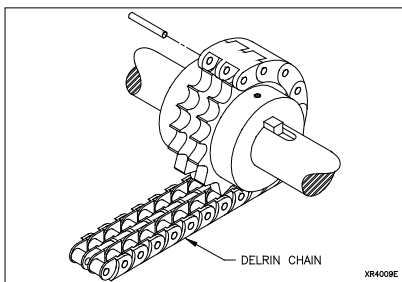


To align horizontally, loosen the bearings on two crossmembers on each bed. Align the coupler sprockets with a gap of 9/32" between sprockets after loosening both set screws in one sprocket. Retighten all 3/8-16 bearing bolts to 23 ft.lbs. and 5/16-18 set screws to 13 ft.lbs.

Coupler misalignment outside these specifications may cause the connecting pins to loosen and/or cracks will appear in the chain links. **NEVER REPLACE A BROKEN COUPLER CHAIN WITHOUT ALIGNING THE SPROCKETS.**

#### COUPLER CHAINS

When the line-shafts and coupler sprockets are properly aligned, the coupler chain will easily wrap around the sprockets to complete the coupling. If the chain does not wrap easily, stop and recheck alignment and spacing. The more accurate the coupler alignment, the longer the service life of the Delrin chain.



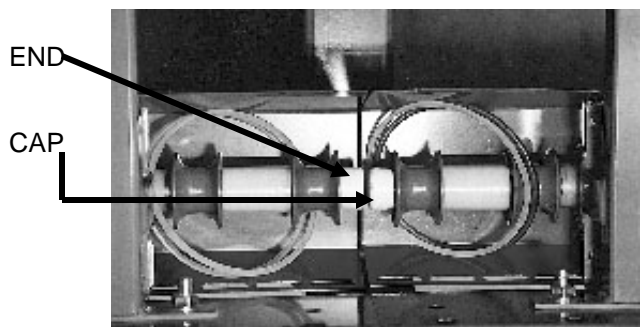
Connecting the coupler chain is accomplished by inserting the serrated pin through the side of the double wide Delrin coupler chain. Care must be exercised when installing the press fit pin to ensure the side link opposite the insertion side is not damaged. Support the chain link by using a C-clamp or similar tool. Start the coupler chain wrap in a position providing the greatest access to the connecting point.

**Tip:** The chain link can be supported by using a channel lock adjustable pliers and squeezing the pin in. This also requires less clearance than using a small hammer and tapping the pin in.

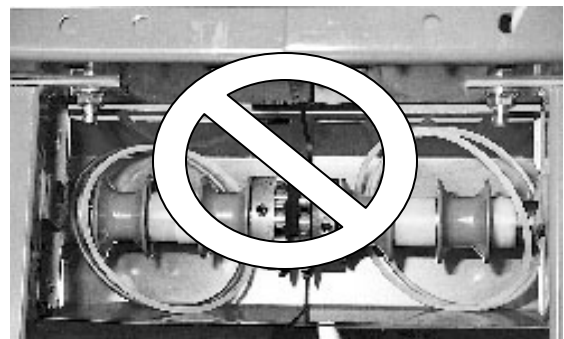
Carefully note from the system layout drawings any bed joint locations which are not to be coupled due to the ending of that conveyor drive. Those coupler sprockets must be removed **BEFORE** the beds are installed. This will also prevent the mistake of putting on all coupler chains before realizing which joints are not to be coupled.

Coupler chains transmit the torque load of that portion of the conveyor located between the coupler and the termination of that conveyor. The highest coupler load will be those located at each end of the drive bed. Excess load will cause premature failure. The maximum load is based on horsepower at a given speed i.e. 1.3 HP maximum at 60 FPM or 1.9 at 90 FPM. Horsepower allowed is directly proportional to the speedup or down.

The substitution of steel coupler chain is not recommended on the standard coupler sprocket. The use of steel chain on standard coupler sprockets will void the warranty. Steel coupler chain also requires periodic lubrication.



*At joint between adjacent drive units, remove sprockets and add white plastic safety caps.*



*Never leave unused sprockets on line-shaft.*

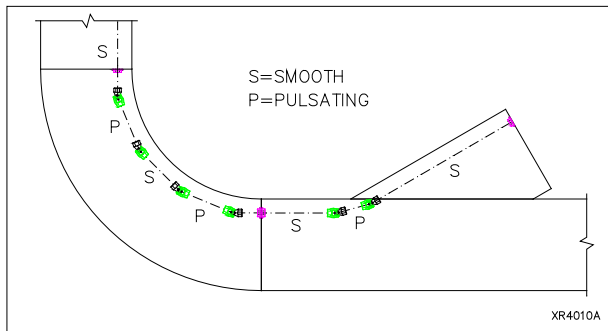
#### WARNING

**Remove any coupler sprocket which is not coupled to an adjacent sprocket. The sprockets must be removed BEFORE the bed is installed. The white line-shaft safety caps must be installed in place of the sprockets to cover the end of the**



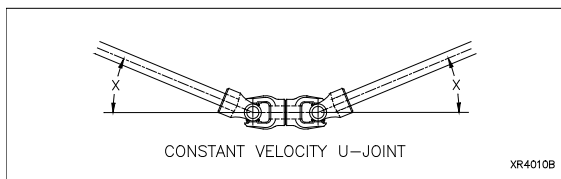
### PULSATING EFFECT OF POWERED CURVES

During the operation of the powered curves, a slight pulsating or jerking effect may be noticed in the rollers driven from that portion of the line-shaft connecting each pair of universal joints (U-joints). This is caused by the intermittent speedup and slowdown effect of U-joints. Pulsing is most noticeable as U-joints approach operation at 30 degrees (as in a 60 degree curve) and virtually unnoticeable as the U-joints approach operation at 0 degrees. This pulsating has NO detrimental effect on the performance of the powered curve. The pulsating effect of one universal joint is eliminated by the reverse effect of the other, provided they are in phase. (See Phasing below.)

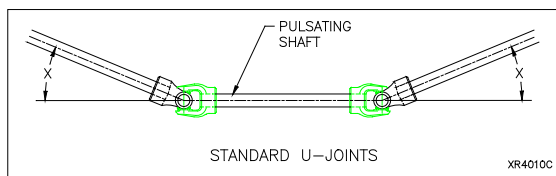


### PHASING - Universal joints

When connecting U-joints in XenoROL® merges, inclines or declines, be sure that the U-joints are installed in phase. To be in phase, both U-joints must be identically situated in-line (symmetrical) on the connecting shaft, have equal angles and in the same plane. If more than one line-shaft bed separates the U-joints, align the U-joints before installing the coupler chain.



Both ends of a constant velocity U-joint must be at the same angle to be phased properly.



To be in phase requires:

1. Equal angles
2. Same plane
3. Shaft keyed in-line (symmetrical) with both ends of connecting line-shaft.

Since U-joints are common and basic to the operation of XenoROL, they are taken for granted. However, if they are not applied or installed correctly, they can cause major problems. The effect of improperly installed U-joints can also have detrimental affects on other components besides the U-joint itself.

When a pulsing shaft is connected by a coupler on an incline/decline, we have potential phasing problems. The U-joint MUST be in line before installing the last coupler chain. No drive may be located between a pair of U-joints, unless they are constant velocity. No jump chain other than 1:1 ratio may be located between a pair of standard U-joints.

**INCLINING XenoROL:** There are instances where it is desirable to make minor elevation changes in the conveyor to obtain clearances, interface with a machine, or obtain proper elevation for a workstation. One of the most important features of line-shaft driven conveyor is the ability to use U-joints to bend the line-shaft both horizontally (curves) and vertically. Vertically bending the line-shaft through U-joints allows inclining or declining XenoROL line-shaft conveyors.

When a standard (not constant velocity) universal is placed at each end of an inclining or declining conveyor, NEVER place a drive between them. Also, if there is a bed joint coupling between the universals, the line-shaft must be rotated to align the universals (part of phasing) before the last coupling is installed.

Inclining XenoROL line-shaft conveyor is less common than declining and must be done with caution. The amount of roller torque (drive) required to lift product is much greater than to move it horizontally. We can compensate for this by reducing the product weight or increasing drive capacity. For example, with 3" of rise over 10' (1-1/2 degrees), the product weight carried per foot must be decreased by 50% or drive doubled. With 6" of rise over 10' (3 degrees), the capacity to move product is only 25% of horizontal capacity.

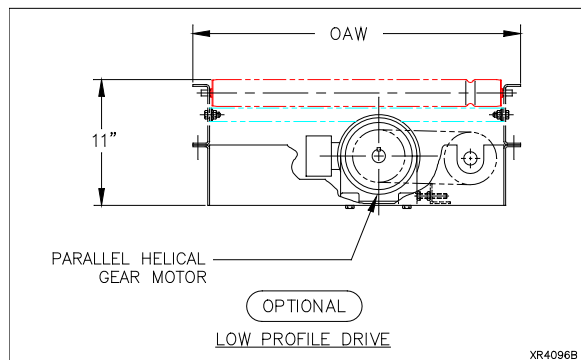
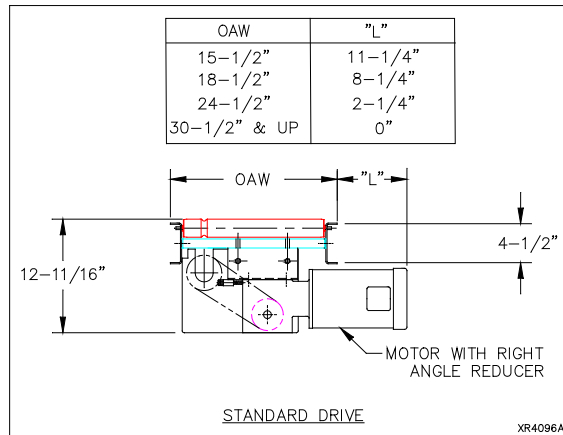
**CAUTION**  
Even minor conveyor inclines (raising product) significantly reduces drive capacity. Always consult the factory before undertaking.

Roller-to-roller traction belts are required at the lower end of both inclining and declining areas for smooth product transition to horizontal. For both inclines and declines, U-joints are required on the line-shaft at the upper and lower transition points. Constant velocity U-joints are recommended to avoid phasing and pulsation problems.

## SUBASSEMBLY INSTALLATION

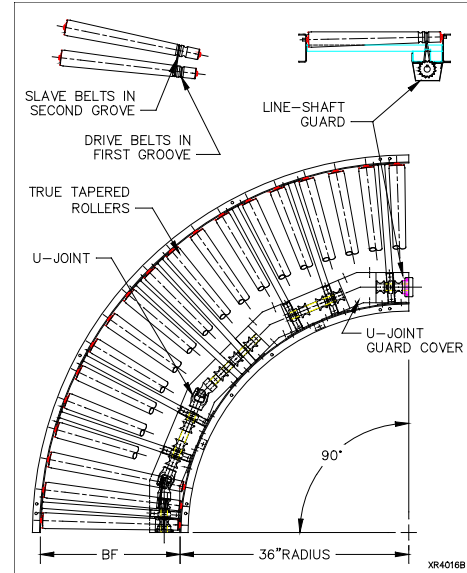
### DRIVES

On drive beds under 24" wide, right angle drive motors will protrude outside the conveyor frame. The narrower the conveyor, the greater the protrusion. Make sure the drive is located where the motor will not cause interference. If there is a problem, an alternate suitable location may need to be found or use the optional low profile drive.



### CURVES

Curves are installed the same as straight sections. In addition to end supports, 90 degree curves should have a support in the center of the outside frame channel. Curve center leg supports are available. If a curve is joined by inclined XenoROL®, a universal is required on a 1' -0" minimum length straight bed installed between the curve and the incline.

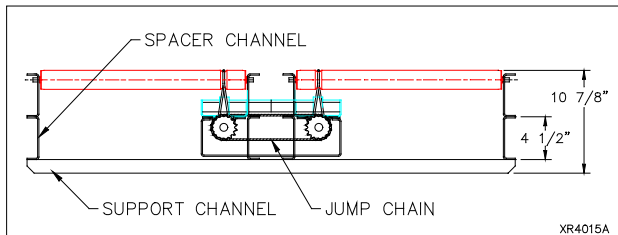


### WARNING

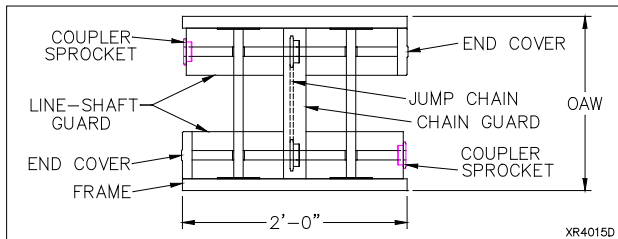
**U-joints used in curves can be dangerous. The curve line-shaft guards and U-joint covers are installed at the factory and must always be in place when operating conveyor.**

## JUMP CHAINS/BELTS

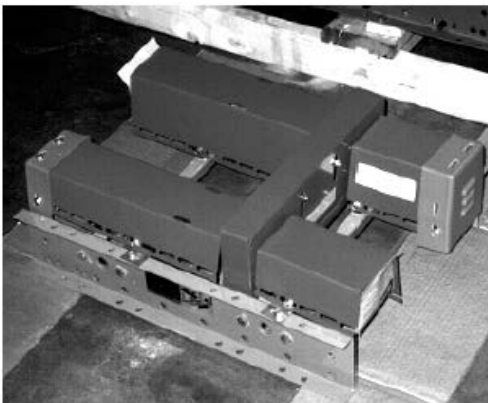
Jump chains are preassembled at the factory complete with sprockets aligned and chain tensioned. Jump chains come in two types, internal and external. The internal type is the most common and joins two line-shafts on opposite sides of the conveyor frame. The external jump chain connects two separate parallel frames. It is called external since the chain leaves one frame and enters the other. Internal jump chains are used to transfer the line-shaft drive to the opposite side of the conveyor frame to match the requirements of various assemblies which require a specific shaft location. Example: a curve is always driven from a line-shaft on the inside, while a merge assembly has the main line-shaft drive on a side opposite the spur. Another reason for the jump chain is to change conveyor speeds by varying the sprocket sizes within the jump chain to obtain a specific speedup or slowdown ratio.



*External Jump Chain Assembly*

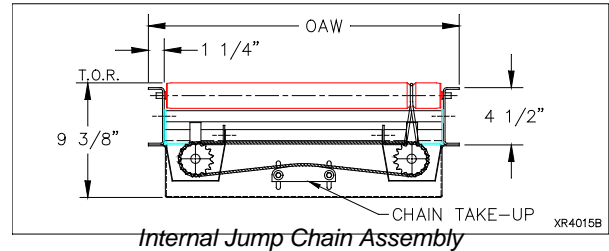


*Internal jump chain in 2'-0" bed.*



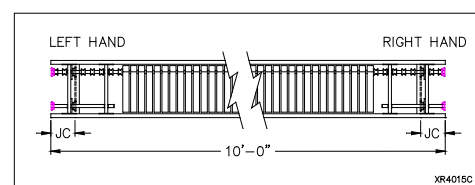
*Internal jump chain. Ships with all guards attached (shown upside down).*

The external jump chain connects two parallel conveyors from one drive motor. Depending on the twist of the drive belt connecting the line-shaft to the roller, the travel direction of the conveyors can be the same or opposite. With the standard factory drive belt twist, the two conveyors will normally run the same direction. If one conveyor must run the opposite direction as in a loop, the belt twist on one conveyor will have to be reversed with a counterclockwise twist.



The internal jump chain is offered in 10' and 2' long beds. The 10' long beds are designated as right hand or left hand depending on which end the jump chain is located. If several jump chains are used in the system, check the layout relative to line-shaft location to determine the proper assembly. On 2' long jump chain assemblies, both line-shafts run the full length. Both ends of each shaft are set up to receive either an end cover or coupler sprocket. Therefore, they are totally interchangeable. If the proper connections were not specified when the equipment was ordered, the coupler sprockets can be quickly relocated to the opposite shaft. The same thing is true on external jumps since these only come in 2' beds with coupler sprockets on all four shaft ends.

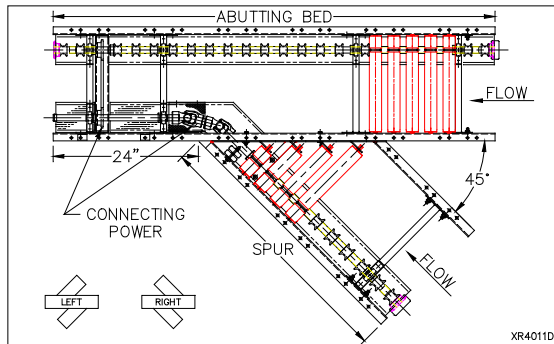
With 2' bed internal jump chain including a speed change ratio, the bed must be installed in a specific orientation to locate the speeds properly. The important thing to look for is the drive pulley. The layout should indicate where the speedup or slowdown begins. If the new speed occurs at the beginning of the jump bed, you will connect the incoming line-shaft to the bare shaft (without pulleys). If the change occurs following the jump bed, you will connect the incoming line-shaft to the shaft containing the pulleys. If there is any question about which shaft is the higher speed, you will need to remove the top cover and look at the sprockets. The small sprocket (fewer teeth) is always on the faster line-shaft.



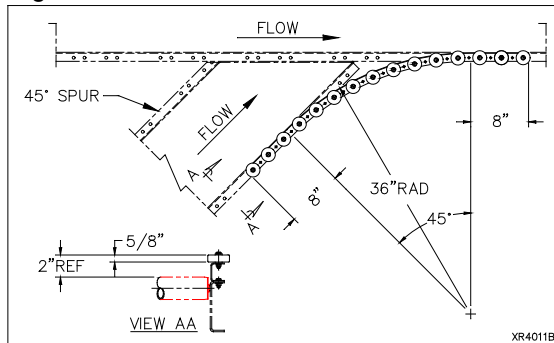


## MERGE ASSEMBLY

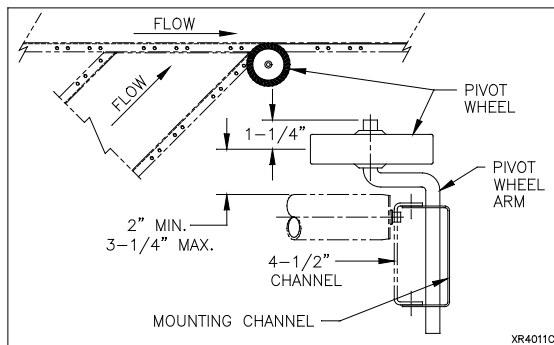
Merge assemblies are used at the juncture of two conveyors where one is required to merge into and join the other line. The merge assembly consists of an abutting bed, spur and power connection. Both conveyors are joined together using a common drive through the power connection. The power connection consists of a jump chain in the abutting bed joining a second shaft on the spur side which contains two universal joints to connect with the spur at 45 degrees.



Normally the merge assembly requires either a pivot wheel mounted at the juncture of the spur in the abutting bed or a curved wheel rail. Either of these accessories will guide the product onto the abutting bed, giving the product something to pivot against during the transition.

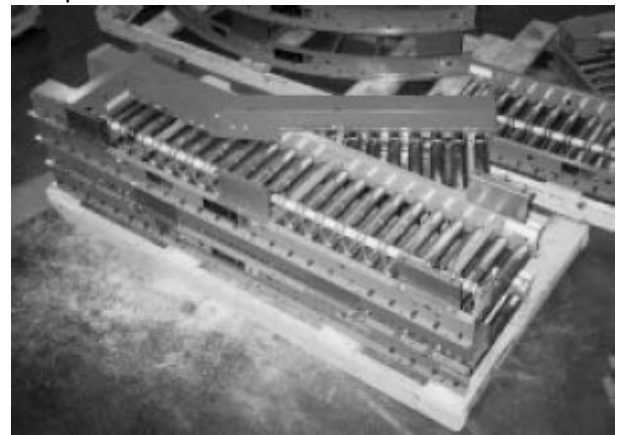


Curved Wheel Rail



Pivot Wheel

While the product is merging, it is being pushed by the spur and pulled by the abutting bed. The bottom of the product is forced to slide on the rollers as it pivots on the curved wheel rail or pivot wheel. The resistance of this sliding causes the capacity of the merge to be less than the equivalent straight conveyor. This difference is compensated for by utilizing 1/4" diameter belts in both the abutting bed and spur. In addition to the added drive capacity due to the larger diameter belt, it is recommended that the spur be mounted 1/4" higher than the rollers in the abutting bed to delay the pull of the abutting bed until the product is driven further onto it. The bolts holding the spur to the abutting bed will have to be loosened in order to reset this height since the merge assembly is shipped with the abutting bed and spur at the same elevation.



Merge assemblies ready for shipment. Preassembled with connecting power and spur guards (shown upside down).

## SPURS

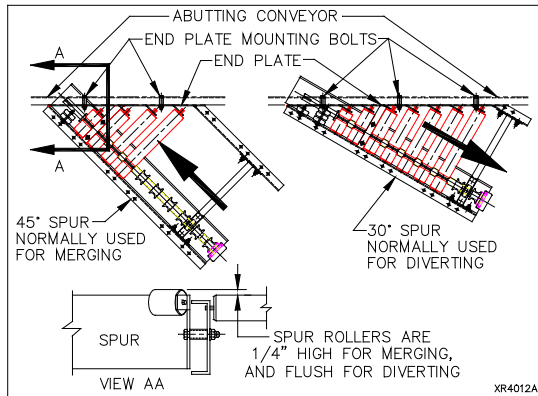
In some applications the power connection of the merge assembly is not needed. The spur is then driven from a different motor. In this case the abutting bed is ordered as an intermediate bed and the spur is ordered separately. The specific intermediate bed serving as the abutting bed must be specified with additional drive capabilities. This also means there will be no pre-existing mounting holes between the spur and the intermediate bed. These holes must be drilled at installation to make the spur connection.

Without a power connection to the main line, spurs may be placed anywhere along the abutting conveyor length.

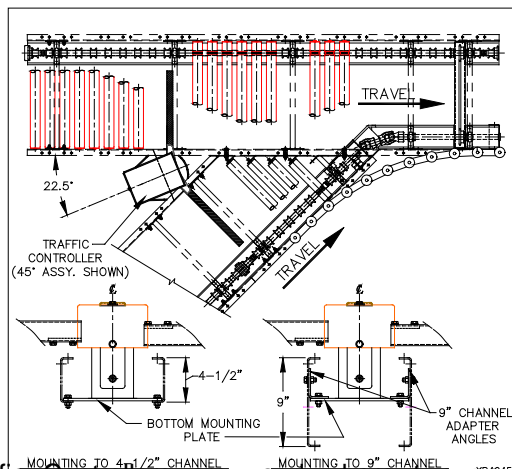
To install the spur:

1. When product is diverting to the spur, mount the spur so that the rollers of the spur and abutting bed are flush. When product is merging from the spur, set the spur height so the rollers of the spur are approximately 1/4" higher than the rollers in abutting conveyor.

2. Place the end plate of the spur against the side channel of the abutting bed and mark the location of the mounting bolts on the frame of the abutting bed.
3. Drill 13/32" diameter holes in the side channel of the channel where marked. (The number of holes is determined by the width of the spur.)
4. Remove the mounting bolts, in the end plate of the spur, and attach the spur to the bed. Leave the spacers on the mounting bolts. These spacers go between the channel and the spur end plate.
5. Check the spur elevation and tighten the bolts.



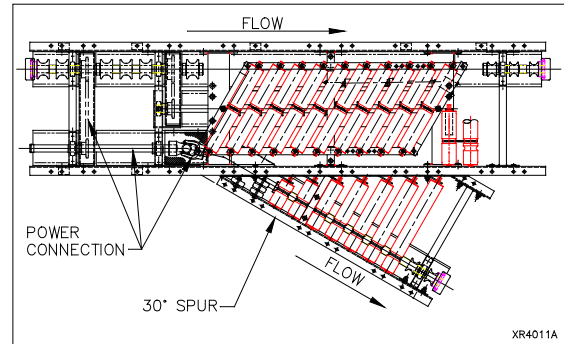
## TRAFFIC CONTROLLER



Traffic Controllers are used where two powered conveyors converge to prevent interference of products at the merge point on a first come first serve basis. The arms are bolted to the upper pivoting plate to be parallel with the rollers in the merging conveyors. The body of the traffic controller is mounted to the conveyor frames in a position which splits the angular difference between the frames. Ref. illustration. It is mounted by bolting the bottom plate to the bottom flanges of 4-1/2" deep channel frames or to the adaptor angles used with 9" deep frames. Reference the illustration.

Guard rails (angle or adjustable channel) are recommended on both sides of each conveyor. Conveyor rollers may be skewed upstream on each conveyor, as required, to align products along one side. This is important when conveying varying size products to prevent them from getting side by side if a backup occurs against one arm. Tip: Light products will push through the arms easier if skewed away from the traffic controller (toward the arm tip) to gain leverage.

## XENOSWITCH ASSEMBLY



The XenoSWITCH transfers product off a main line to a spur at 30°. The switching must be done in a gap of at least 30" between products. The switch works best when the product is aligned to the spur side as it approaches the switch. Minimum product size is 9" x 12".

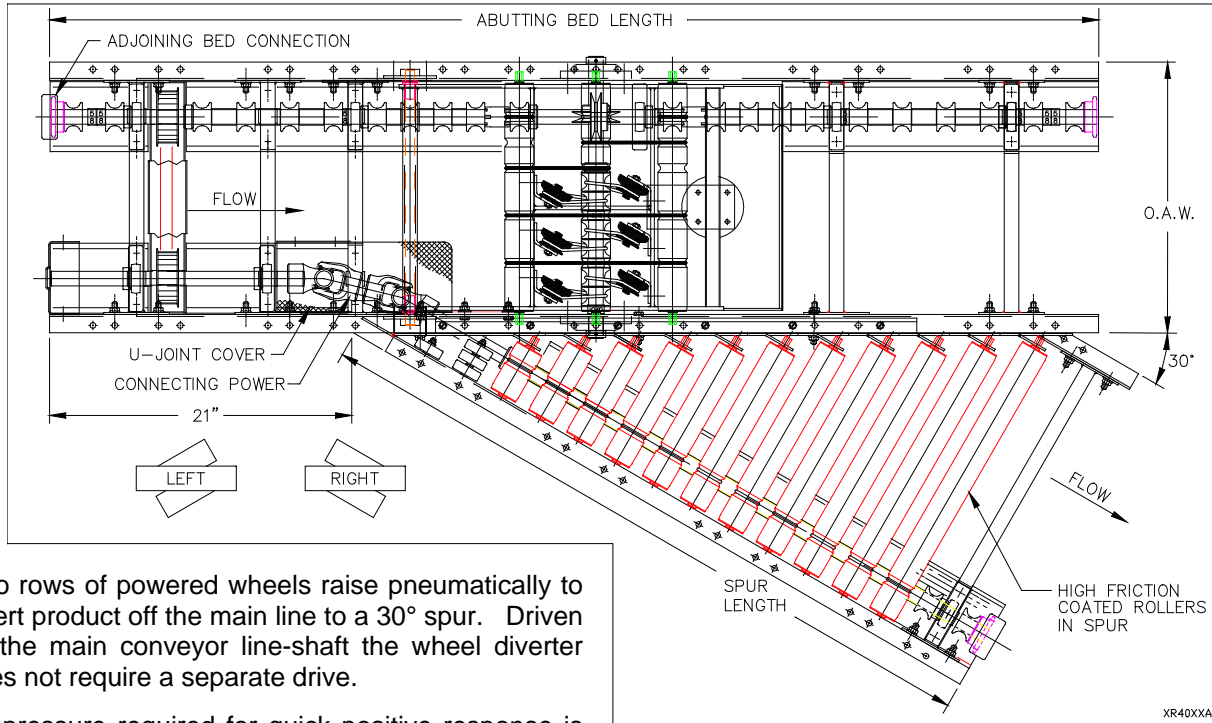
The XenoSWITCH is assembled at the factory and consists of a switch bed with pivoting switch frame, air cylinder and attached spur with power connection which continues the drive between the spur and switch bed.

The switch frame must rotate between products (not under any product). The XenoSWITCH is best used to divert several cases between switching. The XenoSWITCH is not a sortation device except for under ten products per minute.

The XenoSWITCH assembly is installed in the conveyor system using any of the standard supporting arrangements. When the switch frame rollers rotate, a gap is created between the switch and spur rollers. This may cause some product, with weak or flexible bottoms, to catch on the ends of the spur rollers. This situation may be alleviated by loosening the bolts that secure the spur to the switch bed and lowering the spur so the switch bed rollers are slightly higher than the spur rollers. Tighten the bolts after this adjustment is made.

For proper operation, use a minimum of 70-90 PSI air pressure to the XenoSWITCH cylinder.

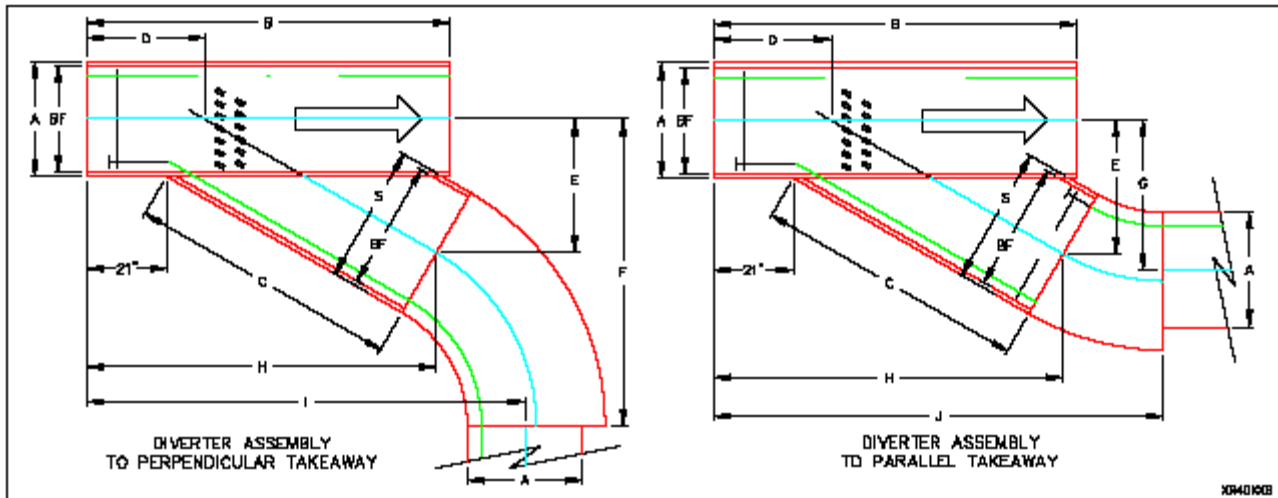
## WHEEL DIVERTER ASSEMBLY



Two rows of powered wheels raise pneumatically to divert product off the main line to a 30° spur. Driven by the main conveyor line-shaft the wheel diverter does not require a separate drive.

Air pressure required for quick positive response is 60-80 PSI. Air consumption (CFM) is .04 x cycles per minute. A four way solenoid valve, operated from an electrical signal, is required for actuation. The spur elevation must be 1/4" higher than main line and have plastisol coated rollers.

A 15" gap is required between products before arrival at the diverter. All products must divert to the same side and must be aligned along the spur side ahead of the diverter. Conveying surface must be flat and firm with very little distortion under maximum load. The layout dimensions shown below take into account the 6" width difference between the abutting

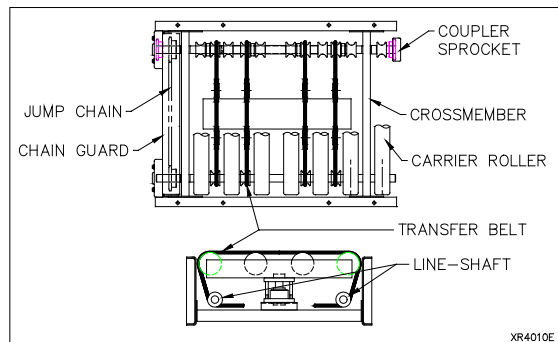


Diverter Bed			Spur & Curve			Diverter Assembly Dimensions (Includes HP)						
A	BF	B	S	BF	C	D	E	F	G	H	I	J
18-1/2"	16"	6'-0"	24-1/2"	22"	4'-0"	29-1/2"	22-5/8"	63-3/8"	25-5/16"	68-11/16"	89-3/16"	92-3/16"
24-1/2"	22"	8'-0"	30-1/2"	28"	5'-0"	30-5/16"	29-1/16"	72-3/8"	32-3/4"	80-9/16"	102-9/16"	105-9/16"
30-1/2"	28"	8'-0"	36-1/2"	34"	6'-0"	31-1/16"	35-7/16"	81-3/8"	39-9/16"	92-1/2"	116"	119"
36-1/2"	34"	10'-0"	42-1/2"	40"	7'-0"	31-7/8"	41-7/8"	90-3/8"	46-3/8"	104-3/8"	129-3/8"	132-3/8"

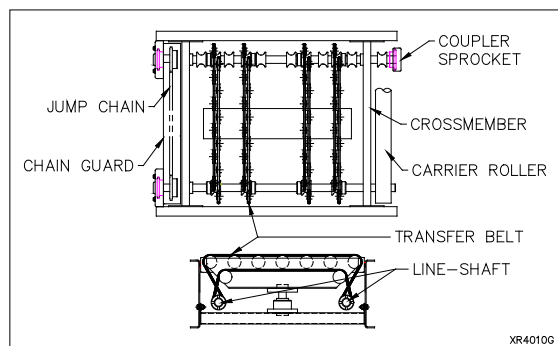
## URETHANE BELT TRANSFER (UBT)

**Important:** The twist of the drive belt determines the direction of the roller rotation. When devices such as urethane belt transfers (UBTs) are driven from the line-shaft, the motor must run in the direction to suit the UBT. Test the drive belt twist for correctness before installing rollers in that conveyor.

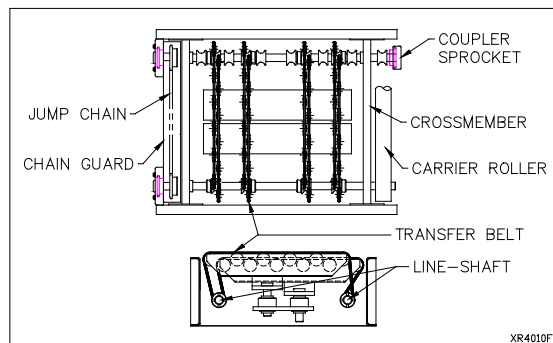
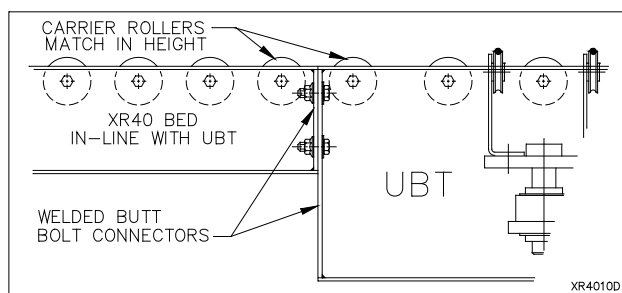
Since rollers are preinstalled at the factory in conveyors 24" wide or less, there is a 50% chance the drive belt twist will need to be changed during installation from clockwise to counterclockwise.



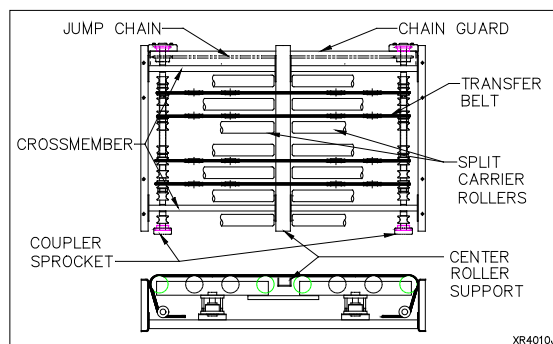
All Standard UBTs driven by the same motor must run in the same direction. Capacity is 35 lbs. per 3/8" dia. transfer belt.



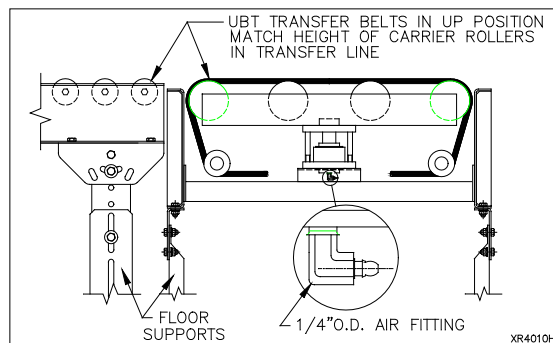
The Opposite Direction UBT allows the 1/4" dia. transfer belts to run in the opposite direction from the rotation of the line-shaft and standard UBTs. Capacity is 20 lbs. per transfer belt.



Bi-Directional UBTs allow product to be transferred or received from either side of the conveyor with 1/4" dia. belts. Line-shaft rotation can be either direction. Two transfer belt lifting tables control the dual direction transferring. Capacity is 20 lbs. per transfer belt.

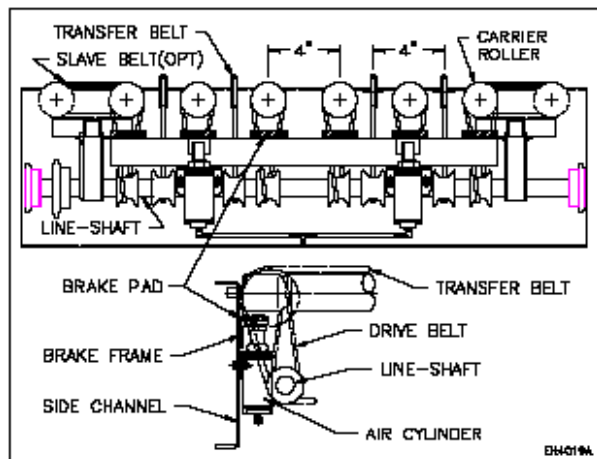


UBTs over 30" in width are available with double laned rollers. This allows the lanes (sides) to run in opposite directions. Uses include the end of two parallel lines or as a crossover between two conveyors.



The perpendicular adjoining conveyor bed is not attached to the UBT bed. Support the end of the adjoining conveyor separately with a standard support. Leave a 1/4" gap between the end of the adjoining conveyor and the side channel of the UBT. Support so the rollers are 5/16" higher than the UBT rollers. The UBT belts will be flush with the adjoining rollers when the transfer is raised. Attach the air supply to the air fitting under the air bag(s). For proper operation, maintain the air pressure between 60 and 100 pounds of air pressure at the UBT.

## UBT XenoBRAKE



A XenoBRAKE designed for use with UBTs provides clearance for the transfer belts. It is a low cost alternative for stopping product on a UBT. The XenoBRAKE mounts to the inside of the side channel between the channel and line-shaft assembly. The roller on each end of the UBT is slave driven from the adjacent roller so all rollers stop.

The UBT XenoBRAKE applies to all types of UBTs: standard, bi-directional and opposite direction. The double wide standard UBT with split rollers will require two XenoBRAKES.

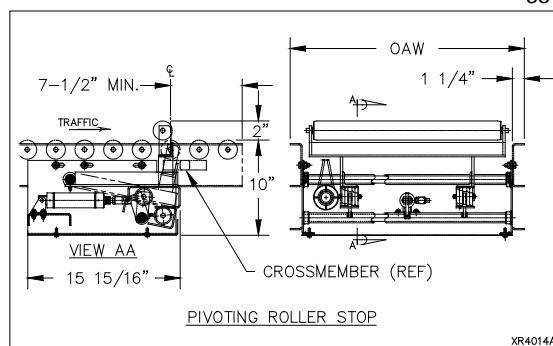
Placing a XenoBRAKE in a UBT may also provide another accumulation zone in addition to those between transfers. This requires fewer indexing controls and no loss of queue position at each transfer.

When transferring off, a pneumatic time delay can be added on the up cycle between the lift table and the XenoBRAKE cylinder. The XenoBRAKE will stop the product before the transfer belts rise and both the XenoBRAKE and the transfer belts lower together.

### PIVOTING ROLLER STOP

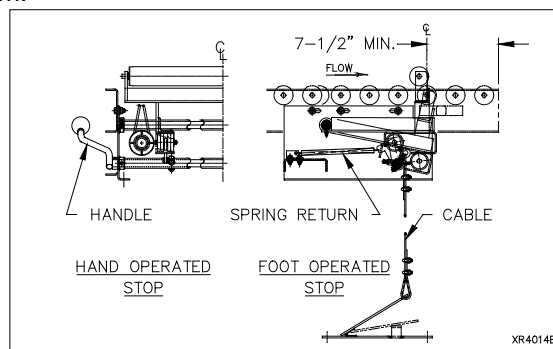
The stop has a gravity roller which raises above the powered rollers when activated. The arms which support this stop roller pivot causing the roller to fall away from the product when retracted. A minimum length bed of 2'-0" is required for attaching. A crossmember cannot fall within the stop frame. The stop roller may replace the roller adjacent to a crossmember on the upstream side.

Recommended air pressure is 60-80 PSI. Maximum product weight should not exceed 80 lbs. at 60 FPM. Accumulation held by the stop should not exceed 30'.



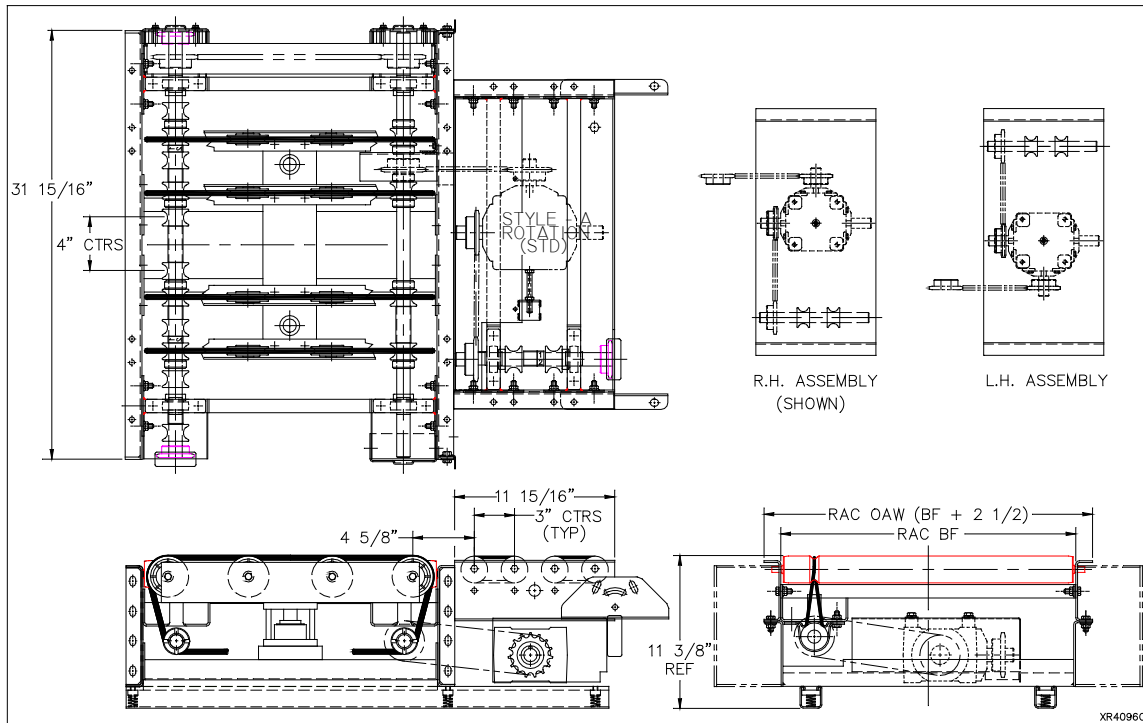
Pivoting roller stops are normally received preassembled, separate from the bed they are to be installed into. The powered roller which will be replaced by the pivoting stop roller must be removed from the conveyor bed. At least two rollers will need to be temporarily removed over the pivot point of the arms. Before the stop assembly is bolted into place, remove the top half of the split collar on both sides of the pivot arm assembly and remove the assembly. Bolt the remaining portion of the stop into place between the frame of the conveyor and insert the bracket back into place above the line-shaft assembly. Now replace the top half of the split collar and reinstall the rollers above the pivot. Adjust the lift arm when in the down position so that the gravity stop roller is flush with the other bed rollers. This is accomplished by loosening the jam nut on the air cylinder and turning the rod until the proper height is achieved. After this adjustment is made, retighten the jam nut. Complete the assembly by connecting air lines to the double acting cylinder and the actuating controls.

In addition to the air operated pivoting roller stop, foot and hand operated stops are also available. The foot operated product stop uses a cable to connect the foot pedal to an eye bolt on the pivot arm. This foot pedal must be bolted to the floor directly under the product stop. Hand operated models use an offset handle to the outside of the conveyor frame which directly attaches to the lift arm.





## RIGHT ANGLE CONNECTION/URETHANE BELT TRANSFER MODULE (RAC/UBT MODULE)



A right angle connection (RAC) module in a 12" bed is used at 90° intersections to transmit power from one line-shaft to the adjoining line-shaft. By combining a right angle connection (RAC) with a urethane belt transfer (UBT), a RAC/UBT module is offered. This rigid module is preassembled, reducing installation time.

There are two gearbox rotation styles depending on product travel direction, type of UBT and overall layout configuration. The proper gearbox is determined at the factory based on the specific application data received.

A splice is provided between the 12" bed which contains the right angle gearbox and its adjoining bed. This adjoining conveyor should be supported within 2'-0" of this connection. The UBT frame is supported at each end. Since this frame is 9" deep, follow the connector examples given on page 15 if joining a 4-1/2" deep channel with the 9" deep. If joining with another 9" deep, support on the joint.

The gearbox style designation (A or B) refers to the output shaft rotation. For opposite rotation (from A to B) the gearbox is simply turned over on its mounting plate. The vent is moved to the top and the plug to the bottom.

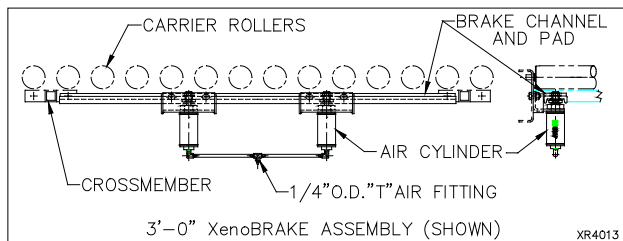
A style "B" may be required when two RAC/UBT modules are used within the same conveyor (drive unit) and have different directional requirements.

Gearbox style and overall configuration will determine if the drive belt twist, as received, will need to be reversed for proper conveyor travel direction.

## XenoBRAKES

XenoBRAKES are used to stop XenoROL® rollers by clamping them from below. XenoBRAKES are mounted to the inside of the side channel between crossmembers and slightly below the bottom of the rollers. They are raised by single acting spring return air cylinders which raise the brake against the bottom of the rollers when air is applied to the cylinders.

The pneumatic control may be manually actuated through a selector or toggle switch. Automatic operation uses a photoeye and solenoid valve combination or a mechanical pneumatic sensor may be used.



The rollers may be stopped to hold product in position, to stage product for a workstation operation, to index product for traffic control, or to allow for accumulation. When a brake is used for holding line pressure (minimum pressure accumulation), the rollers should be plastisol coated to increase the product's resistance to being pushed over the brake zone area. When activated, the brake brings product to a gentle sliding stop. The brake can be actuated at any time. However, the lighter the product, the less effective the brake is in resisting line pressure. Brakes used with roller coating have a rubber pad as the roller contact surface. Brakes used against steel rollers have two strips of urethane tubing (hose) to better grip and stop the rollers.

To ensure total stoppage of the rollers over the brake, air pressure should be set at approximately 60 PSI. If required, this may be increased to a maximum of 80 PSI.

Normally, XenoBRAKES are factory mounted in the conveyor bed; however, they may be purchased separately and mounted during installation. A brake is preassembled with the air cylinders and connecting air line to a "T" fitting. The brake mounting bracket holes match up with the holes between crossmembers on the side channel. This makes it easy to install a XenoBRAKE or move it if required. The brake length is designated by the center to center distance of the crossmembers it mounts between, not the actual length of the upper channel (i.e. a 36" brake measures approximately 34" long).

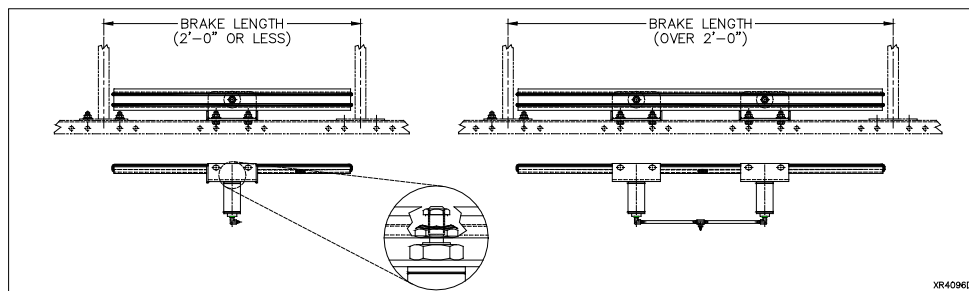
### ALIGNMENT ADJUSTMENT

XenoBRAKES may require alignment and squaring to the bottom surface of the rollers. To accomplish this the XenoBRAKE mounting bolts (2 per bracket) must be loosened. The brake is then air activated so it contacts the underside of the rollers. While being held against the rollers, the mounting bolts are tightened. After this adjustment, the brake will operate smoothly with roller contact along its entire length.

A flow control valve may be used to reduce actuation noise due to the space between the XenoBRAKE pad and the rollers.

### WARNING

**XenoBRAKES are pneumatically actuated. Personal injury can result if fingers are placed between rollers and brake pad while system is in operation. Be sure electrical and pneumatic power is removed before attempting any maintenance on this system.**



*The XenoBRAKES shown have urethane tubing over the channel to brake steel rollers. XenoBRAKES 2'-0" in length and under have one air cylinder. All brakes are located between crossmembers*

## POWERED GATE ASSEMBLY

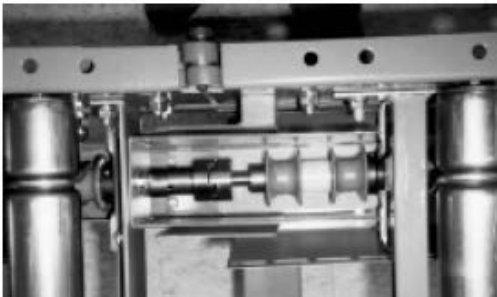
The gate provides a break in the conveyor line for pedestrian traffic. The gate is line-shaft driven from the adjoining conveyor.

Powered gate assemblies use the standard 4-1/2" deep frame. They consist of two beds, a 4' gate bed and 2' adjoining bed. The adjoining bed couples to the conveyor which provides drive through the gate. Note: Even though the entire gate is driven, a new drive must be provided following the gate on the discharge side.



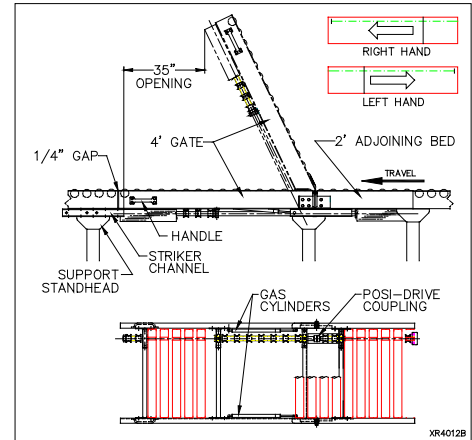
*Posi-coupling guard is mounted at factory.*

Gas spring cylinders are provided to assist in the lifting and closing of the gate section. A posi-drive jawed coupling engages and disengages the 4' gate as it is opened and closed. This spring-loaded assembly positively couples the gate section to the adjoining bed any time the gate is in its lowered position.



*Removed rollers allow a view of the posi-drive coupling at the pivot.*

Where the gate is installed, a gap of 72-1/2" is required for the gate section. Powered gates are installed so they open against the flow of product. Installed in this manner the gate section may serve as a stop to any product which arrives while the gate is open. In order to be installed with the gate section being lifted against the flow of product, it must have been pre-ordered in the correct right hand or left hand. Left hand means the line-shaft is on the left looking downstream. Right hand is the opposite, with the shaft on the right hand.



### SUPPORTING

1. Mount a floor support under these channels. Install the two striker channels under the conveyor bed following the gate so that 1-1/2" of the striker channel extends past the end of the bed.
2. Mount a floor support centered on the end of the bed preceding the gate and the adjoining bed.
3. Mount a floor support to the gas cylinder mounting channels located at the hinge point of the gate assembly. Make sure there is 1/4" gap between the hinged bed and the following conveyor.

**Note:** The striker channels are found bolted to the gate frame for shipping purposes.

The maximum conveyor elevation is 36" to allow the lifting and lowering handle to be reached when the gate is open.

When used in conjunction with MHS Conveyor XenoPRESSURE® non-contact accumulating conveyor, a standard index kit may be used to index product from the last zone prior to the gate to the first zone following the gate after the following zone is cleared. By using this index kit, product does not accumulate on the gate allowing it to be raised between products. The additional 6' of product travel from zone to zone over the gate must be considered when calculating product rates through this area.

### WARNING

**The end of the conveyor following the gate is exposed when the gate is opened. The end of this conveyor must have the coupler sprocket removed and a line-shaft guard end cover kit installed including the 1" bore set collar. This kit is located in the loose parts and includes mounting instructions and hardware.**

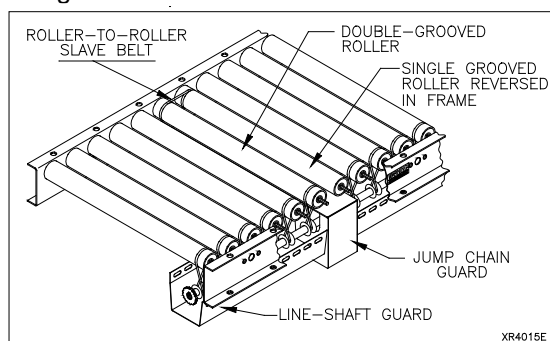


## ROLLERS

### STRAIGHT ROLLERS

There are two types of rollers used in straight sections: single grooved and double grooved. Single grooved rollers are used when connecting the line-shaft pulleys (spools) directly to the rollers. Double grooved rollers are used with a roller-to-roller "transfer belt" to power the next single grooved rollers. This is done in areas over drives and jump chains where it is not possible to have a drive spool on the line-shaft.

Place a single grooved roller over the obstruction with the groove opposite the line-shaft and place the double grooved roller next to it.

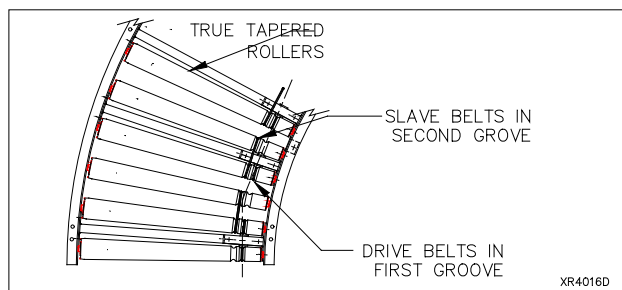


Rollers are installed at the factory for bed widths through 24" wide. Rollers are shipped loose for bed widths greater than 24".

### TAPERED ROLLERS

Tapered rollers are used in all curves and are grooved to provide roller-to-roller drive over universal joints. Curve rollers for XR40 have two grooves. Curve rollers for XR48 have three grooves to allow all rollers to be connected together for drive sharing.

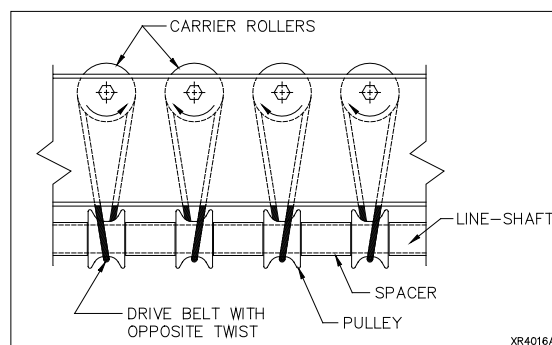
All rollers are installed in curves at the factory for all widths.



### ROLLER INSTALLATION

#### WARNING

**Use a blunt object to push on the roller axle. Pointed tools can slip and cause personal injury.**

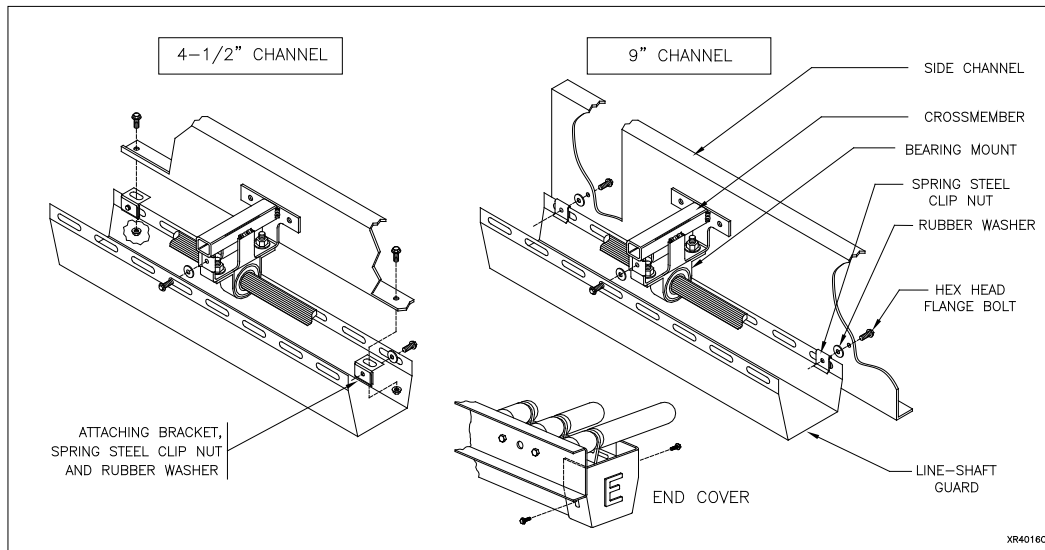


- Twist all belts in the same direction. The twist of the belt determines the direction of the roller rotation and conveyor travel.
- When devices such as urethane belt transfers (UBTs) are driven from the line-shaft, the motor must run in the direction to suit the device. Do not install rollers until after the motor is wired. Test the belt twist for correctness before installing all rollers in that drive unit.
- Since rollers are preinstalled at the factory in conveyors 24" wide or less, there is a 50% chance the belt twist will need to be changed at installation in units containing line-shaft driven devices like UBTs.

#### To install the rollers, proceed as follows:

1. Lay the rollers on the conveyor frames with the grooved end over the line-shaft.
2. After placing the belt over the roller, put the axle (on the line-shaft end) into the hex hole in the conveyor side channel.
3. Since rollers have spring loaded axles, depress the roller axle in the end opposite the line-shaft, align the shaft with the hole in the frame and release the axle. The spring in the roller will push the axle into the axle hole in the frame.

## LINE-SHAFT GUARDS



Line-shaft guarding is installed at the factory on curves, transfers, merges, gates, jump chains and other accessories. During installation, only straight section guards need to be mounted to the conveyor frames.

**WARNING**  
Failure to properly install line-shaft guards per the instructions in this manual will expose personnel to serious injury

Install the straight line-shaft guard sections as follows:

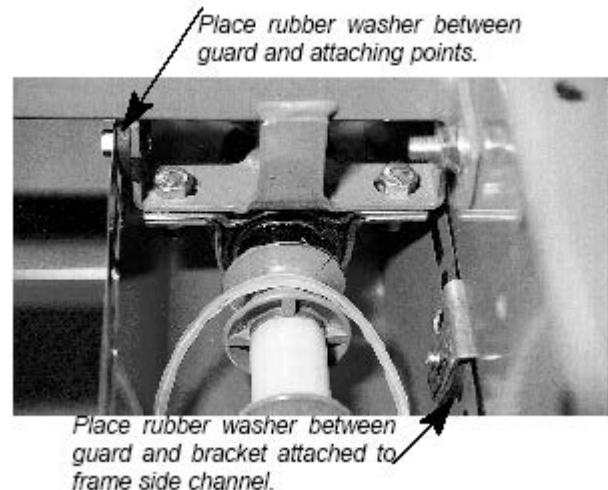
1. Loosely bolt the slotted side of the attaching bracket to the bottom flange of the side channel approximately 30" from each end (on a 10' bed).
2. Slide the spring steel retainer over the hole in the attaching bracket.
3. Slide spring steel retainers over the hole in the bearing mount four places per 10' bed.
4. Bolt the line-shaft guard to the bearing mount retainers, then to the attaching bracket retainers.

Important: Place the rubber washers between the line-shaft guard and attaching brackets to isolate the guard. This reduces noise levels due to vibration.

### GUARDS FOR INCLINED STRAIGHT SECTIONS

Line-shaft conveyors are often inclined or declined through the use of constant velocity universal joints at the upper and lower transition points. The line-shaft guards at these points must be cut, overlapped and joined at installation to eliminate gaps. A U-joint top cover is provided in the loose parts to fit the top side of the line-shaft guard over the universal joint. This cover is field installed.

**WARNING**  
Cutting a 10' line-shaft guard to match a specific length conveyor section can create razor sharp edges which could result in a severe laceration. A hand deburring tool or file should be used to remove any sharp edges before installing the guard.



**WARNING**  
Universal joints used in curves can be dangerous. The curve line-shaft guards and universal joint covers are installed at the factory and must always be in place when operating conveyor

## GUARD RAILS

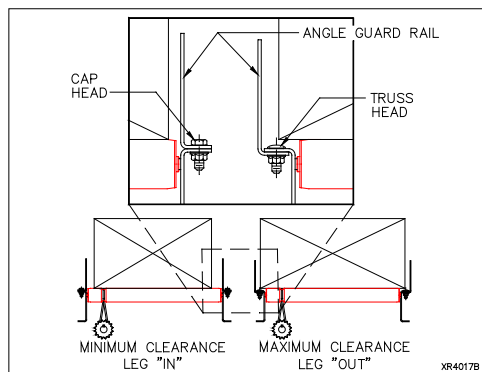
### ANGLE GUARD RAIL

Angle guard rails are bolted to the conveyor frames top flange. They are either bolted with the vertical leg "out" for maximum clearance or leg "in" for minimum clearance. Use a maximum of 4 bolts per 10'-0" long rail per side.

For minimum clearance, the horizontal leg is placed on top of the frame and attached with cap head or truss head bolts. For maximum clearance, the horizontal leg is placed under the top flange of the frame and must be attached with truss head bolts.

**Note:** Attaching the angle guard rail on top of the flange for maximum clearance may result in product interference with standard cap head bolts.

For a smoother more rigid joint, offset the angle rail joints and frame joints by a few feet. Most conveyors are not divisible by 10'-0" anyway, so start placing full length angle rails on the bed less than 10'-0" long and work both directions from there.



When installing angle guard rail on the curve section, special attention must be taken. The guard rail for curves is first cut from straight rails and then rolled to fit each particular curve. The mounting holes may not always align.

Install curved angle guard rail as follows:

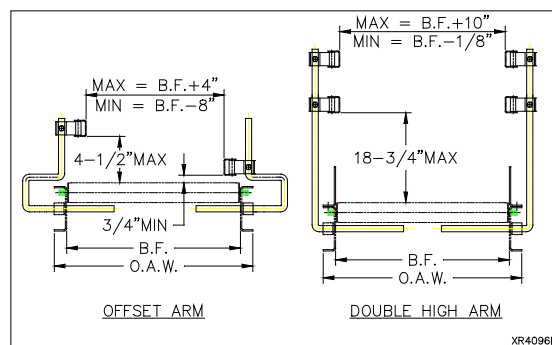
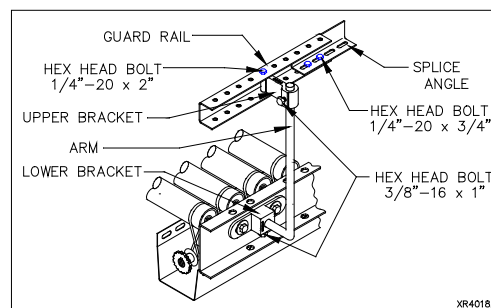
1. Bolt one end of the guard rail to the top flange of the curve bed.
2. Bolt the opposite end of the guard rail to the top flange. If the holes do not align, clamp the guard rail in place and drill new holes.
3. Bolt the guard rail to the curve with the appropriate number of truss head bolts.

### ADJUSTABLE CHANNEL GUARD RAIL

Adjustable channel guard rail is used to better match the width between guard rails to the conveyed product. It may also be adjusted vertically to better contain product and resist tipping.

Adjustable channel guard rail components are shipped from the factory as loose parts. The major parts include guard rail channel, upper and lower attaching brackets and splice angle.

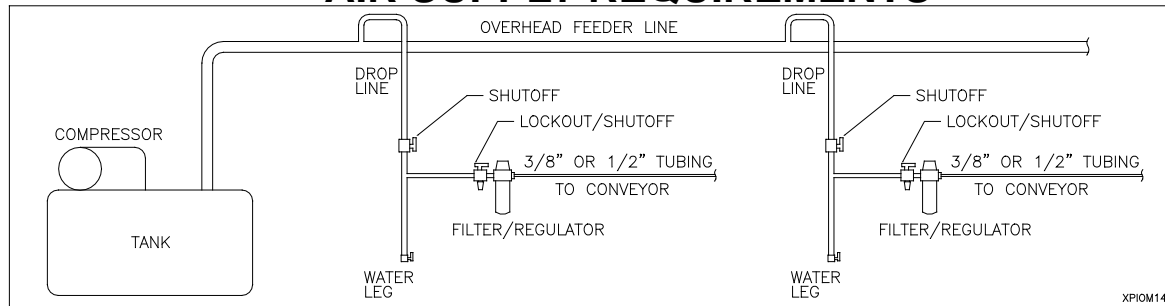
Each 10'-0" section of guard rail channel must be supported in two places. It is preferable to locate the arms 5'-0" to 6'-0" apart. The extra holes between crossmembers may be used to bolt the lower bracket to the frame. After bolting the lower bracket to the frame, insert the horizontal leg of the arm into the bracket. Attach the upper bracket to the arm at the proper height and attach the guard rail to the bracket. Set the width between the guard rails and tighten the 3/8-16 bolts in the brackets. Splice angles are used when joining rails end to end.



Adjustable channel guard rail may be used in conjunction with angle guard rail as illustrated on the optional double high channel. The angle rail guides the product while the channels prevent tipping or spillage.

Offset arms are used to allow the channel rail to overlap the rollers more. This may be desirable for small product or to assist in forcing product toward the center of the conveyor.

## AIR SUPPLY REQUIREMENTS



### GENERAL

Every conveyor system is unique with its own specific requirements. Therefore, the following is a general guide. Compressed air for conveyor systems is produced by air compressors. Air is pumped by the compressor into a storage tank and accumulated for future use. Pressure is usually about 100 PSI in the tank and main feeder line.

**MAIN FEEDER:** Air velocity through the main feeder piping can be kept smooth with lower losses using large diameter pipe with minimum bends and restrictions. The main feeder carries the compressed air overhead to all points of use. Standard weight black pipe or copper is suitable for plumbing the compressed air distribution system.

**AIR DROPS:** MHS Conveyor recommends using 3/4" pipe on air drops for high flow and low pressure loss. The drop is terminated with a drain at the bottom. A tee located prior to the drain branches off the drop to the conveyor. This branch line must contain a lockout/shutoff, filter and regulator. A shutoff must also be located in the drop before the branch tee. OSHA Rule 29, CFR1910.147 requires energy sources (air drops) be turned off and capable of being locked or labeled with a warning tag.

Following the regulator, the air line is reduced to 3/8" diameter for most applications, feeding the solenoid valves. If the quantity of devices or the air demand is high, 1/2" diameter may be used. Between the solenoid valves and devices, such as UBTs, 1/4" diameter is normally used. 3/8" diameter may be used for high air volume devices such as pushers.

**Note:** Most pneumatic devices do not require lubrication. Lubrication may affect the valving operation and cause sluggish or erratic operation. Some special devices with large air cylinders do require lubrication. These must be isolated with their own lubricator.

**Important:** If your air compressor uses a synthetic oil, a coalescing filter plus a regular filter of 5 micron is required before any air operated device. Synthetic oils will shrink the seals in pneumatic devices and valving.

### AIR CONSUMPTION

The highest air consumption is when several devices are operating simultaneously.

Formulas to determine cubic feet per minute (CFM) air consumption for various devices (at 60 PSI) are as follows:

UBTs	
Std. & Opp. 30" Wide or Less w/4 Belts	=.028 CF
Std. & Opp. 36" Wide or More w/4 Belts	=.045 CF
Std. & Opp. 30" Wide or Less w/3 or 5 Belts	=.045 CF
Std. & Opp. 36" Wide or More w/3 or 5 Belts	=.087 CF
Bi-Dir. 30" Wide or Less w/3, 4 or 5 Belts	=.045 CF
Bi-Dir. 36" Wide or More w/3, 4 or 5 Belts	

Other Devices		
XR40	36 "	=.0082 CF
XenoBRAKES	24 or less "	=.0056 CF
XR48	24 to 27" "	=.011 CF
XenoBRAKES	18 or less "	=.0082 CF
Locating Stop	XR40	=.0056 CF
Roller Stop	XR40 & XR48	=.026 CF
XenoSWITCH	XR40	=.038 CF

Compressor HP = Total CFM requirements ÷ 3.55

Air Tank Size = Approx. 1 gal. per required CFM

### PRESSURE SWITCH

An air pressure switch is recommended to be installed into the pneumatic circuit to detect a drop in air pressure below required levels. This signal is used to safeguard the operation of the system. The switch should be set at a PSI level which ensures operation of all devices. If pressure drops below approximately 60 PSI the conveyor system will shut off.

# ELECTRICAL

## GENERAL

### WARNING

**All electrical controls must be installed, wired and connected by a licensed electrician only.**

**All motor controls and wiring must conform to the National Electrical Code as published by the National Fire Protection Association and approved by the American National Standards Institute, Inc. In addition, since specific electrical codes vary from one area to another, be sure to check with the proper authorities before starting the electrical wiring.**

The electrical voltage of the motor will be stamped on the metal name plate. This voltage should be checked to see that it matches your available voltage. Many motors, both single phase and three phase, are dual voltage. Consult the wiring diagram on the motor for the proper connections. If a three phase motor on a single direction conveyor runs the wrong direction, the leads must be switched to reverse rotation.

### WARNING

**Do not connect the motor to any other voltage than stamped on its metal name plate.**

Consult the wiring diagram on the inside cover of the starter and pushbutton station for the proper electrical connections.

Three phase drives require transformers to reduce the pushbutton and control circuit to 115 volts. If primary voltage is changed, the transformer must be changed according to the wiring diagram found on the transformer.

**Note:** All control equipment is covered by the original manufacturer's equipment warranty.

*NEMA type enclosure ratings are as follows:*

NEMA 1 - Indoor use, provides protection against contact with internal components. Suitable for use in warehouse and distribution environments.

Gasketed NEMA 1 - Same use as NEMA 1, but with additional protection against dust and dirt.

NEMA 3 - Outdoor use, designed to keep out rain and dust.

NEMA 4 - Indoor and outdoor use, designed to keep out rain and dust.

NEMA 12 - Indoor use, provides protection against dust, dirt and oil seepage and dripping of noncorrosive liquids. Suitable for use in industrial environments.

NEMA 13 - Indoor use, provides protection against dust, dirt, sprayed oil and noncorrosive liquids.

## SAFETY GUIDELINES

The following are basic conveyor control safety guidelines for common controls equipment.

### WARNING

**All safety devices, including wiring of electrical safety devices, shall be arranged to operate in a "fail safe" manner. That is, if power failure or failure of the device itself would occur, a hazardous condition must not result.**

**START-UP WARNING HORN** - Ideally, all conveyors should be within sight of the conveyor start pushbutton. This allows the operator to verify that no one is on the conveyor or would be in danger if the conveyor were to start up.

If all conveyors being started cannot be seen from the start pushbutton location, then an audible warning device is required. It could be a horn, buzzer or bell unique to that conveyor for that location. It must be loud enough to be heard at any point on the conveyor being started. It should sound for a duration of five seconds after the start Any auxiliary equipment such as vertical lifts, turntables, etc. must be included in the warning circuitry.

All conveyor sections that stop and restart automatically should be marked with appropriate signs or labels. Order CEMA label CHR930002.

**START PUSHBUTTONS** - Start pushbutton must be the flush type or guarded such that inadvertently leaning against them will not actuate them. They should be provided with a legend plate clearly defining which conveyors will be started.

**STOP PUSHBUTTONS** - Stop pushbutton should be the extended type such that any contact with it is sufficient to stop the conveyor. They should have a legend plate defining which conveyors will be stopped.



**OPERATOR CONTROLS** - Additional operator controls should be designed into the system with the same guidelines that go into start and stop pushbutton, depending upon their function. Devices which are repeated on multiple control stations, such as emergency stops, should be located at the same relative location on each station. All operator controls shall be clearly marked or labeled to indicate the function controlled.

**EMERGENCY STOPS** - All locations where an operator must work directly at the conveyor or areas of high pedestrian traffic must be protected by an emergency stop. Operators should not have to leave their position to actuate the emergency stop.

For protection of equipment or product, emergency stops may be located throughout a system such that it is possible to shut down the system. The location will depend on likely observation points and areas with special devices and interfaces between equipment.

Emergency stops can be of the pushbutton or cable operated switch type. The pushbutton type should be a red, mushroom head, maintained pushbutton which requires resetting after it is actuated. Cable operated switches should trip by pulling the cable and require resetting at the switch.

An emergency stop normally stops all conveyors in the system. Very large systems may involve dividing a system into zones of control based on proximity of personnel, safety hazards, walls, obstacles, etc.

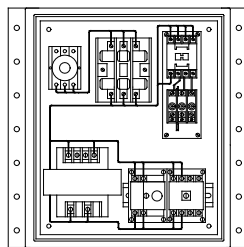
#### MHS Conveyor Control Modules (ECM)

Smaller systems requiring only basic controls located at or near each conveyor drive can utilize MHS Conveyor control modules. The MHS Conveyor Control Module and accessory components fulfill the need for basic control devices in a compact, standard package. This provides substantial savings over individual components.

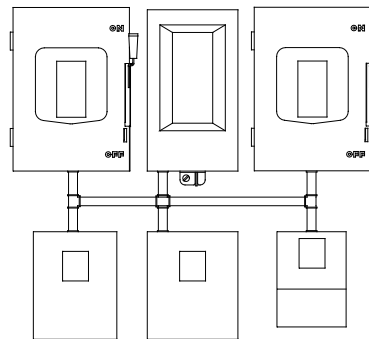
Example of ECM-2:

- Includes Prewired:
  - Lockable 30AMP disconnect
  - 3 Pole fuseblock

Provides additional Space to mount: Transformer, relay and timer, on a Provided din rail



**THIS**



**REPLACES THIS**

BC22A

Separately enclosed, mounted and field wired

- 3 Phase starter
- Fused disconnect switch
- Motor starter
- Transformer
- Relay
- Timer

**WARNING**

**Before restarting a conveyor which has been stopped because of an emergency, an inspection of the conveyor must be made and the cause of the stoppage determined. The starting device must be locked out before any attempt is made to correct the cause of stoppage**

**CONTROLS LOGIC** - Solid state controls logic devices, such as programmable controllers, are used extensively for conveyor control. They are very reliable, but a hardware failure or software bug could cause an output to function erratically. For this reason, start circuits, warning horn circuits and emergency stops should usually be configured using conventional relay logic.

**SAFETY SWITCHES** - All conveyor control cabinets and motors must be provided with safety (or disconnect) switches. These switches must have provisions for padlocking. As required for maintenance, equipment should be locked in the off position.

**SPECIAL DEVICES** - Special devices and equipment such as vertical lifts, turntables, high speed conveyors, etc. all have unique design and safety requirements. These must be examined in each case to determine what the requirements might be.

Controls engineering quotation is available upon request. Please contact our Customer Service Department.



# COMMISSIONING OF EQUIPMENT

## GENERAL

Commissioning of the equipment can best be defined as the final adjustments and test of the installed equipment required for its proper operation. The need for commissioning is inherent, since the individual components of equipment are brought together at the installation site to operate as a system.

Mechanical and electrical commissioning is most often carried out simultaneously. Commissioning must simulate the actual operation of the system as close as possible to demonstrate the ability to perform reliably at the specified rate in the prescribed operational sequence.

During the Commissioning Phase, it is necessary to load the equipment with product to be conveyed, which provides the means of detecting those areas requiring adjustment. Personnel will be required to support operational functions. This may serve as part of operator training and familiarity with the system. During the commissioning activity, special attention should be directed toward personnel safety. No unnecessary risks should be taken that would endanger the safety of any personnel. All personnel must familiarize themselves with all safety features of the system such as emergency stops and motor disconnects.

## COMMON ADJUSTMENTS

### Mechanical

- Check roller direction (belt twist)
- Check guard rail clearance to product
- Eliminate all catch points
- Check conveyor elevations
- All bolts and set screws tight
- Check product clearance to overhead structures
- Simulate all operational functions with actual product
- All necessary lubrication performed
- All chains properly tensioned
- All sprockets aligned
- All guards in place with proper clearance
- All OSHA required guards in place on walkways, catwalks, ladder-ways, floor openings, etc.
- All labels and warning signs in proper place unobstructed
- Any spare parts shipped with conveyors turned over to appropriate personnel
- Proper rllr to rllr height at bed joints and interfaces
- Check pneumatic connections for leaks
- All jump chains installed per print
- Any pneumatic speed controls adjusted

### Electrical

- Adjust timing functions
- Adjust limit switches

- Verify circuitry
- Verify proper line voltage
- Verify function of all safety shutoff devices
- Verify sequence of operation
- Verify each motor has lockable disconnect switch
- Check audible system start-up warning signals
- Verify all national, state and local codes are met
- Control stations marked/labeled to indicate the function or motor controlled
- Verify all devices are labeled and numbered to match documentation (Ex. PE 12, for photoeye No. 12 or SOL43 for solenoid valve No. 43)
  1. Determine what size product the photoeye must sense.
  2. Adjust for the worst case, usually smallest item, by loosening photoeye mounting nut and aligning while making sure photoeye has unobstructed view of reflector.
  3. Move the product in and out of the field of detection to ensure that the photoeye energizes and de-energizes.
  4. Readjust as required to achieve maximum performance and tighten mounting nut. If the photoeye cannot be adjusted, replace and adjust as required. When replacing the photoeye, be sure that the correct type is installed.
- Adjust proximity switches as follows:
  1. Loosen proximity switch mounting bolt and adjust sensing switch so that the product passes directly in front of the switch face at a distance of approximately 1/2".
  2. Check that the proximity switch energizes and de-energizes as the product passes in front of the switch face.
  3. Tighten the mounting bolt.

## DRIVE BELT BREAK-IN

The round drive belts are installed under tension with predetermined initial tension. After a time of static and running conditions, there is an initial tension drop in the belt which levels off to a working point where it will remain the rest of its flex life. Drive capacities and horsepower requirements are based on this working level, not the initial temporary level. After 3 hours run time, 64% of the tension drop has occurred. However, it takes 24 hours to reach 88% and 48 hours to reach 98%.

Run all minimum pressure accumulation conveyors 48 hours empty before applying air or running product. This will ensure motors are not overloaded during accumulation under the higher initial belt tension. This run time is best accomplished during installation as soon as the drive motors are wired and during the commissioning phase.

## PREVENTIVE MAINTENANCE

### GENERAL

The key to ensuring the expected return on investment is to protect against premature failure with a well-planned and follow-up program of preventive maintenance.

Preventive maintenance programs examine what may fail and then formulate action plans which will prevent failure or downtime. This kind of maintenance includes lubrication and replacement or repair of parts before failure but after expected life has been attained.

Preventive maintenance will save expensive downtime and wasted energy. It will increase the life of components. Along with preventive maintenance should be a record-keeping system. You must know what problems you have had in the past and when different components were serviced.

A visual and audible inspection should be taken every day. Visually you can see if a chain is loose, oil leaking, sprocket worn; or you can hear a faulty bearing, noisy chain or any other noise that might indicate a problem. When something major goes wrong with some component, a note should be made to see if a pattern to the problem occurs.

All personnel working in close proximity to the conveyor should inform maintenance or their supervisor of any unusual noise.

#### WARNING

Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.

Make sure personnel are clear of all conveyor equipment before restarting the system.

### MOTOR AND GEARCASE

The drive unit should be checked monthly. Check the motor gearcase for leaking seals. If reducer is other than Reliance Relialube, check the gearcase for proper oil level and add the approved oil for your

particular unit. Check for overheating, vibrations and dirt buildup.

With Reliance Relialube reducers, change oil only when performing maintenance that requires gearbox disassembly using Mobil SHC-634. When replacing the motor, relubricate using Fel-Pro C5A Anti-Seize or Mobiltemp 78 grease in the reducer bore and on the motor shaft.

### CHAINS AND SPROCKETS

Chains and sprockets should be checked monthly. Look for correct alignment. In time, set screws may loosen and allow the sprockets to become misaligned. Use a straight edge held parallel to both sprockets to check alignment. Shift one of the sprockets if the straight edge shows it is necessary.

Keep the chain clean and lubricated. Chains may

#### WARNING

REPLACE ANY CHAIN GUARD REMOVED in order to adjust, check or lubricate chain and sprockets. Guards are furnished and installed to prevent personal injury during operation; maintain them on the unit

be cleaned by wiping with a rag soaked in nonflammable cleaning solvent.

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints of the chain. Oil should be applied to outside plate and inside plate edges, since access to pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The Lubrication Guide on page 43 indicates the proper lubricant viscosity for various surrounding temperatures.

#### WARNING

Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.

During the monthly check, look for damaged or worn links in the chain and wear spots on sprockets. If either the chain or sprockets are worn, then both must be replaced and the cause of wear corrected.

If chains have stretched so that above adjustments cannot be made, remove a link and reconnect. If removal of one link makes the chain too short, add an offset half link and reconnect. Chains should be tightened until there is 1/2" total movement at center of span (1/4" each way of center).

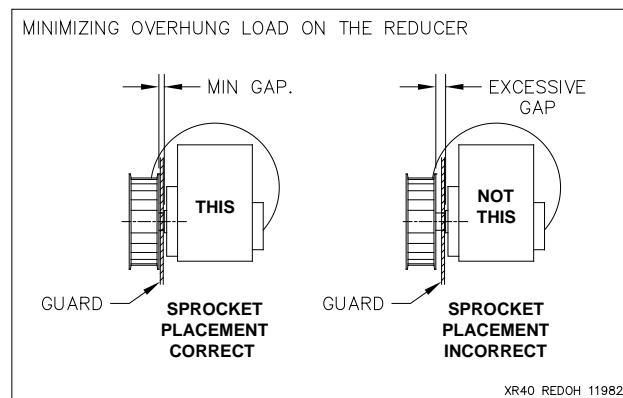
New chains should be installed under slight tension as they will elongate a small amount due to seating of pins and bushings during the first 250 hours of operation. Chains on drives having near vertical centers should be kept reasonably tight with idler sprockets.

## TIMMING BELT & PULLEYS

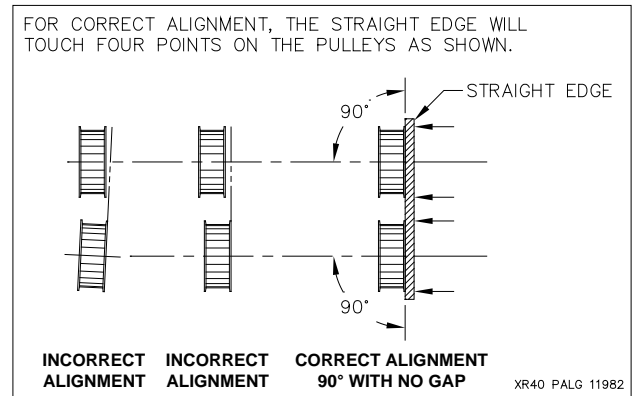
### PULLEY ALIGNMENT

Pulley alignment is critical to reducing wear and extending belt life.

First to minimize the overhung load on the reducer, place the pulley on the reducer shaft as close to the reducer as possible.



Then align the pulley on the line-shaft with the reducer pulley by placing a straightedge across face of pulleys as shown below. The straightedge should cross pulleys as near their center as possible.



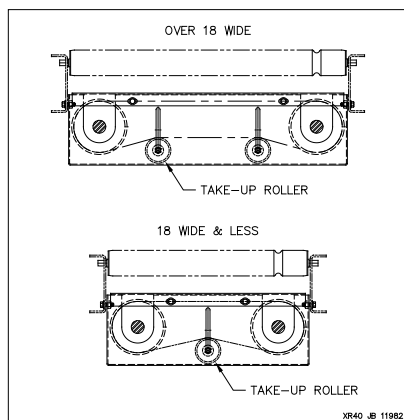
For jumps follow the above procedure starting out by placing the pulleys as close to the line-shaft bearings as possible and aligning the pulleys as shown above.

#### TIMING BELT TAKE-UP

In general, belt take-up is accomplished either by moving the pulley or by take-up rollers.

For dives the belt take-up is done by moving the reducer-motor assembly which moves the drive pulley. Remember to check the pulley alignment after moving the reducer.

For jumps, the belt take-up is done by the use of take-up roller(s). For 18 wide and narrower, there is only a single take-up roller. On wider widths, two take-up rollers are used. The take-up rollers must be placed under the return side of the belt as shown below. The belt is tensioned by moving the roller(s) up into the belt. When two take-up rollers are used, try to move them up evenly.



#### TIMING BELT TENSION

You must use one of the two following methods of tensioning the timing belt. Following these methods will properly tension the belt. If after tensioning you have problems with the timing belt jumping teeth, you need to look for problems that can cause excessive drive and correct them. **Higher tensions than those recommended can lead to component failure and void the warranty!**

#### CAUTION

Excessive belt tension may cause component failure!

#### Method 1

The preferred method of measuring belt strand tension is by using a Sonic Meter. Use either the Gates 505C or 507C Sonic Meter which will measure the belt strand tension directly in pounds.

For our standard HPR or HTD, 8 mm pitch, 30 mm wide Belt, use the following information to program the meter.

- HPR Belt weight = 5.8 g/m
- Belt width = 30.0 mm
- Belt span = Center Distance in millimeters

Note: To covert inches to millimeters, multiply by 25.4. For example, if your center distance measures 7 7/8" multiply 7.875 by 25.4 to get 200 millimeters.

The measured belt strand tension should be as follows:

- For dives the belt strand tension should be 50-80 lbs.
- For jumps the belt strand tension should be 30-50 lbs.

- For MOVIMOT drives the belt strand tension should be 20-30 lbs.

Note: You must use either the Gates 505C or the Gates 507C Sonic Meter for measuring the belt tension.

If you do not have a Sonic Meter, the belt tension can be measured by applying a set amount of force and measuring the resulting belt deflection. The following table gives you the information you need for this.

## Method 2

TIMMING BELT TENSIONING SPECIFICATIONS							
For Standard HPR or HTD, 8 mm Pitch, 30 mm Width Belts, Using the Tension Force as noted below.							
Round all fractional span distances to the nearest inch.							
Deflection tolerance: $\pm 1/64$ "							
Span	Deflection	Span	Deflection	Span	Deflection	Span	Deflection
6"	3/32"	20"	5/16"	34"	17/32"	48"	3/4"
7"	7/64"	21"	21/64"	35"	35/64"	49"	49/64"
8"	1/8"	22"	11/32"	36"	9/16"	50"	25/32"
9"	9/64"	23"	23/64"	37"	37/64"	51"	51/64"
10"	5/32"	24"	3/8"	38"	19/32"	52"	13/16"
11"	11/64"	25"	25/64"	39"	39/64"	53"	53/64"
12"	3/16"	26"	13/32"	40"	5/8"	54"	27/64"
13"	13/64"	27"	27/64"	41"	41/64"	55"	55/64"
14"	7/32"	28"	7/16"	42"	21/32"	56"	7/8"
15"	15/64"	29"	29/64"	43"	43/64"	57"	57/64"
16"	1/4"	30"	15/32"	44"	11/16"	58"	29/32"
17"	17/64"	31"	31/64"	45"	45/64"	59"	59/64"
18"	9/32"	32"	1/2"	46"	23/32"	60"	15/16"
19"	19/64"	33"	33/64"	47"	47/64"	61"	61/64"
For Drives use a Tension Force of 4 lb. $\pm 1/2$ lb.							
For Jumps use a Tension Force of 2 lb. $\pm 1/2$ lb.							
For MOVIMOT drives use a Tension Force of 1 lb. $\pm 1/2$ lb.							

## ROLLERS

For severe or dirty conditions, the rollers may require periodic (approx. 6 months) lubrication if they sound dry. If the rollers have unsealed bearings, lubricate them by removing them from the bed and place several drops of a good grade machine oil in the small opening around the inner race hub and spin the axle. Repeat for each end of the roller. Standard rollers are greased for life and normally do not require maintenance. However, if the conveyor operates over 120 FPM more than a single shift, it is under severe duty conditions. Periodically removing the rollers has an added benefit of distributing the wear on the bearing inner race by rotating the axle to a new position. If a defective roller bearing is found, replace the roller.

Do not allow tape, banding, shrinkwrap, etc. to build up on roller or pulleys. This can cause rollers to jam and the belt to mistrack. If this is a common occurrence due to the product packaging, clean up on a regular schedule.

### WARNING

Use a blunt object to remove rollers from frame. A screwdriver or similar pointed object could slip and cause injury.

## DRIVE BELTS

Drive belts should require no actual maintenance. Visually check for broken or worn belts. Normally, a few broken belts will not hamper the performance of XenoROL®. Periodically replace any broken belts. If belt shows signs of abrasion, check for belt rub against any object or foreign matter in roller groove.

## LINE-SHAFT BEARINGS

The line-shaft bearings have a set collar. After one week of constant operation, check each bearing to see if the collar is tight. If a collar is loose:

1. Set by using a set screw wrench.
2. Tighten the set screw.
3. Recheck every six months.

## MOTOR CONTROLS

### INSPECTION (SEMI-YEARLY)

#### WARNING

Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.

Excessive overheating is indicated by discoloration of components. Most often, these symptoms are a sign of loose connections. If left uncorrected this can eventually cause arcing between components, leading to destruction of the controls. It is normal to find the interior of the control cabinet very warm when it is first opened.

The condition of contacts must be checked on all contactors and starters that show signs of overheating. Make sure that they are free of dust and are not excessively pitted or burned. When badly burned or worn, the contacts must be replaced.

In the course of inspecting contact condition, spring pressure should be checked. As contact surface wears down, spring pressure can be lost because of the overheating. Contact spring resiliency can usually be detected by fingertip pressure.

Check for faulty door gaskets especially when there are excessive deposits of foreign materials. Particular attention should be given to conductive deposits because they can cause flashovers and premature component failure when allowed to collect to any great extent. Either reposition or replace defective gaskets and clean the control cabinet.

#### CAUTION

Avoid touching components until they have had time to cool. Some may still be hot

Check all overload settings on motor controls. Check for loose wiring and tighten as required.

## CLEANING

When cleaning a control cabinet, it is best to use a vacuum cleaner rather than compressed air. A vacuum cleaner removes rather than redistributes dust and dirt. Compressed air can damage and displace relay contacts and springs.

## SUPPORTS/Framework

Preventive maintenance for supports and framework should include the following periodic checks:

- a. Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents.
- b. Check and retighten any bolts that may have come loose.
- c. Touch up paint that has been chipped. Unpainted surfaces will rust.
- d. Check for stress cracks or fatigue.

## UNIVERSAL JOINTS

Universal joints (U-joints) are primarily used to "bend" the line-shaft in the XenoROL® system, such as in merges, curves, and small incline and decline angles.

To ensure proper lubrication of all four bearing assemblies on U-joints, add lubricant until it appears at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated.

Do not assume that bearing cavities have been filled with new lubricant unless flow is noticed around all four bearing seals. For universal joint application involving speeds below 500 RPM (approx. 200 FPM), a mineral oil in the SAE 140 to SAE 250 viscosity range should be used.

For universal joint applications involving speeds over 500 RPM, a high quality extreme pressure (EP) grease recommended by lubricant manufacturers for U-joints should be used. Lithium soap base greases meeting National Lubricating Grease Institute (NLG) Grade 1 and Grade 2 specifications are preferred.

The grease should be pumped in slowly until a slight bead forms around the seals. This bead, in addition to acting as an indicator of adequate relubrication,



provides additional protection against the entry of foreign matter.

Grease in the bearing prevents excessive wear of parts, protects ball races, balls, etc. from corrosion, and aids in heat dissipation within the bearing. Lubricate monthly.

#### **WARNING**

As with all rotating machinery, the line-shaft, couplers and U-joints present the possible danger of entangling hair, fingers, jewelry or clothing. Never operate the conveyor without the guards in place.

### **COUPLER SPROCKETS/CHAINS**

Coupler sprockets and chains located at the ends of line-shafts transmit rotational power from the conveyor drive to all connecting intermediate beds. To check or service couplers, shut off and lock out power supply.

To provide access, remove necessary rollers. Visually inspect coupler chain for cracks or broken side links. If a coupler chain needs replacing, the coupler sprockets (line-shaft) probably need realigning.

### **GUIDE POSTS**

Guide posts are used in location stops, urethane belt transfers and some special devices. Visually inspect for damage (ex. galling) and listen for squeaking. Lubricate with light oil if required.

### **AIR SYSTEMS**

The best preventive maintenance for any air operated device is clean air. Always be alert for air leaks anywhere in the system and correct promptly. Check all air line filter bowls for accumulated water and drain if necessary. Check for proper PSI settings on air regulators.

Monitor bowl drain every week. To manually drain the bowl, first remove the hose. Carefully turn knurled drain valve counterclockwise until you hear air escaping. Let all accumulated liquid drain and close by turning clockwise. Reconnect hose.

Remove and replace clogged filter elements as required by filter condition indicator. Indicator is mounted on top of the filter housing.

### **LUBRICATION**

Normally a lubricated air system is not required; however, if lubrication is used due to very dry air, it should be a non-detergent, lightweight oil without an ester or ketone base. It must also be anti-foaming, compatible with Buna N rubber and have high film strength.

**Note:** See Lubrication Guide for recommended oils which perform well.

#### **CAUTION**

If an internal (light oil) lubricator is to be used, **EXTREME CARE** must be taken to avoid over lubrication

## MAINTENANCE SCHEDULE

Periodic maintenance intervals shown may vary with load, speed, hours of daily operation, ambient temperature, humidity, etc. Intervals can be established by fairly frequent maintenance at first, then lengthen the intervals as justified by observation of need based on history. The following is based on 5 days per week, 8 hours per day under normal conditions.

### DAILY

- Listen to everything for unusual noises or vibration.
- Visually inspect to see that conveyor sections are clear and free of debris.
- Check to see that all safety guards are in place.
- Check any oil leakage.
- Check any unusual noises or vibration.
- Check for loose bolts or parts.
- Check air filter bowls for accumulated water.
- Listen for air leaks.

### WEEKLY

- Inspect bearings, gear reducers and motors for excessive noise or heat.
- Clean breather cap on gear motor (if used).
- Check operation of all electrical controls.
- Inspect motor mounting bolts.
- Check for proper PSI on air regulators.

#### WARNING

- Prohibit riding on conveyor by anyone.
- Think before making any adjustments. It may prevent an injury. Remember, all moving components are potentially dangerous.
- Protect yourself from unexpected starts when working on a stopped unit by locking and tagging the control panel or disconnect switch that supplies power to the unit.

### MONTHLY

- Check air filters for cleanliness.
- Check coupler chains for cracks.
- Clean chains and sprockets and lubricate with SAE 30 weight oil or equivalent. (Check chain tension and tightness of all adjusting screws.)
- Check drive unit for leaking seals and oil level in gearcase (if applicable), unusual noises, vibration and stress cracks.
- Check drive belts for wear, cracks or breaks.
- Lubricate U-joints.

### SEMI-YEARLY

- If dry sounding, lubricate unsealed bearings in rollers with light oil. Check free spin of rollers.
- Drain and flush gearcase after each 2,500 hours of normal operation or at least every 6 months (if applicable).
- Grease motor shaft bearings.
- Inspect and clean motor control centers.
- Grease regreasable bearings.
- Inspect timing belts for pulley alignment and belt wear.

### YEARLY

- Change oil in gearboxes.
- Inspect tightness of all nuts and bolts on units. Readjust and, if necessary, retighten.
- Check for plumb and level. Shims have been known to vibrate out from under supports in isolated incidents. Touch up paint that has been chipped. Unpainted surfaces will rust.
- Inspect for stress/fatigue cracks in frame and supports.

#### CAUTION

- Check to confirm tools and foreign objects have not been left on or inside the conveyor.
- Check to confirm all loosened parts have been retightened.
- Check to confirm all guards have been installed.

## LUBRICATION GUIDE

Item	Use	Procedure	Recommended Lube	
Chain Drives	Drives, External & Internal Jump Chains & Slave Drives	See Page 39 & 52	Mineral Oil, SAE 30	
C-Face Speed Reducers	Drive packages using Reliance Relialube reducers	See Page 39 & 54	Mobil SHC-634 for gearbox. For input bore and motor shaft use Fel-Pro C5A AntiSieve or MobilTemp 78 Grease	
	Drive packages not using Reliance Relialube reducers		AGMA Lubricant No.: #4 or 4EP; Viscosity Range (SSU at 100 degrees F) 626 to 765; ISO Viscosity Grade No. 150, Standard Specification 205.03	
Bevel Gearbox	Right Angle Connections	See Page 39 & 54	Mobil DTE Extra Heavy Oil (936133160)	
Guide Posts	Lift Table (Urethane Belt Transfer)	See Page 41	Light Oil	
Rollers	Product support and driving rollers	See Page 40	Light Machine Oil	
Air System	Actuate Pneumatic Devices	See Page 41	American Oil Co.	Rykon No. 11
			Gulf Oil Co.	American Oil No. 15
			Mobil Oil Co.	Harmony No. 43AW
			Non Fluid Oil Corp.	Harmony No. 44
			Shell Oil Co.	D.T.E. Light
			Sinclair Oil Co.	Air Lube 10w/NR
			Sun Oil Co.	Tellus No. 27
			Texas Oil Co.	Dura No. 150
			Sunvis No. 701	Sunvis No. 706
			Regal "A" R&O	
Universal Joints	Curves, merges, diverters, incline/decline	See Page 41	Below 200 FPM SAE 140-25D	
			Over 200 FPM Extreme Pressure (EP) Grease with Lithium Soap Base meeting NLG1Grade 1 and 2	
Note: See "Maintenance Schedule" for frequency of lubrication.				

## Troubleshooting Guide

Troubleshooting is the process of looking at trouble symptoms and then relating these to the most likely cause. By carefully analyzing the problem, the experienced troubleshooter can take appropriate corrective steps.

### **WARNING**

**Do not perform maintenance on the conveyor until the startup controls are locked off and cannot be turned on by any person other than the one performing the maintenance.**

### **WARNING**

**Before disassembling a valve or other pneumatic component or removing it from the installation, shut off and exhaust the entire pneumatic circuit and lock it off.**

**Note:** The disassembly or repair of equipment under Warranty may void such Warranty (motor and reducer, for example). Check to be sure the Warranty has expired or will not be voided before performing disassembly or repair.

The following troubleshooting guide lists certain conveyor problems, possible causes and corrections. These procedures will help in identifying and correcting these problems. Problems may have several possible causes each with their associated corrections. Read all causes and corrections before attempting repair procedures.

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
1	Insufficient drive	Not enough rollers being driven	Drive more rollers if available
		Poor bottom on product	Improve product conveyability or install drive belts with right tension
		Overloading of product	Remove overload
		Lubricant on belts, rollers or drive spools	Clean belts, rollers and spools (Ref. p. 54)
		Weak drive belts	Replace belts
		Drive belt interference with structure	Locate and correct interference
2	Excessive accumulation pressure	Too many rollers driven	Drive fewer rollers
		Drive belts with excessive tension	Replace with lower tension belts (Ref. Drive Belt Data Chart)
		Accumulating distance excessive	Break up pressure with XenoBRAKES
3	Rollers not turning/turning slowly	Weak belts	Replace belts (Ref. p. 55)
		Faulty bearing in rollers	Replace rollers affected
		Interference with roller or belt	Locate and correct interference
		Bent roller	Replace roller
4	Broken belt	Belt rubbing on interference	Make clearance, then replace belt
		Age (Flex life)	Replace belt
5	Weak belts	Reaction to chemical	Correct cause
		Excessive temperature	Replace with high temperature belt
		Ultraviolet rays (sun)	Replace belt with UV blocker type
6	Belt out of groove	Line-shaft location	Move shaft to reduce belt angle on groove input side
		Very dry condition	Lightly oil groove
		Groove mislocated in roller	Replace roller
7	Vibration in frame (slight side to side movement of frame is normal)	Misalignment in bearings	Loosen bearing and readjust shaft
		Structural frequency	Brace conveyor frame (Ref. p. 17) Add diagonal sway brace to support Change speed 20 FPM up or down
		Bent shaft	Replace shaft
		Misalignment in coupling	Realign coupling (Ref. p. 19 & 20)
		Universals out of phase	See Phasing-Universals (Ref. p. 21)
8	Roller pulsation after curve or merge	Angle or alignment of universals not equal	Readjust universals (Ref. p. 21)
9	Line-shaft bearing noisy	Misaligned line-shaft	Temporarily loosen noisy bearing plus bearing on each side, start motor, stop and retighten

## TROUBLESHOOTING GUIDE-MECHANICAL

## TROUBLESHOOTING GUIDE-MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
10	Product over XenoBRAKE will not hold	Pad or tubing not contacting all rollers	Shim padded channel Adjust per p. 30
		Padded channel bent	Replace padded channel
		Accumulating distance too great	Add additional XenoBRAKES
		Light product	Use plastisol coated rollers over XenoBRAKE or add additional XenoBRAKES
11	Drive belt riding above roller	Roller groove too shallow (see Item 6)	Use smaller diameter belts
			Replace roller
12	Bearing housing turning in roller shell	Insufficient swagging pressure	Tack weld outer bearing flange to shell
		Press fit not tight	Use industrial strength adhesive (like Loctite" 609) "
			Replace roller
13	Roller will not fit in frame	Crossmember too short	Shim crossmember at frame
		Frame bent	Straighten frame or replace
		Roller too long	Replace roller with shorter one
14	Excessive sprocket wear	Loose chain	Tighten chain (Ref. p. 52)
		Misalignment	Check alignment with straight edge along side of chain (Ref. p. 52)
		Dry chain	Lubricate on proper intervals (Ref. p. 42)
15	Nonsymmetrical wear on sprockets or rollers	Connected shafts not parallel	Realign shafts
16	Wear on inside of roller plates or side of sprocket teeth	Sprockets offset on shaft (misaligned) or out of parallel	Realign sprockets (Ref. p. 52)
17	Wear on tips of sprocket teeth	Chain elongated excessively	Replace chain (Ref. p. 52)
		Loose chain	Tighten chain (Ref. p. 52)
18	Broken chain parts, sprocket teeth	Drive overloaded	Avoid overloading
		Excessive slack causing chain to jump teeth	Periodically adjust tension (Ref. p. 52)
		Foreign object caught in chain	Remove object and prevent entry
		Inadequate lubrication	Maintain proper lubrication intervals (Ref. p.42)



## TROUBLESHOOTING GUIDE-MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
19	Excessive chain noise	Chain contacting stationary parts	Remove interference
		Worn sprockets or chain	Replace both (Ref. p. 53)
		Inadequate lubrication	Maintain proper lubrication intervals (Ref. p. 42)
		Broken or missing chain rollers	Repair or replace chain (Ref. p. 53)
		Sprockets misaligned	Align and tighten all fasteners
		Check shaft and sprocket alignments	Realign
		Insufficient chain tension	Adjust tension (Ref. p. 52)
		Chain jumping sprocket teeth	Adjust chain tension; check for wear (Ref. p. 52)
20	Excessive vibration	Broken or missing chain roller	Replace chain and sprockets (Ref. p. 53)
		Broken sprocket teeth	Replace chain and sprockets (Ref. p. 53)
21	Pulsing chain	Insufficient chain tension	Reposition drive sprocket shaft
		Misalignment of chain guard	Align sprockets and chain guard
		Overload	Adjust guard as appropriate Inspect for obstruction to or drag on conveyor
22	Broken chain	Drive overload	Avoid overloading Reduce unit length
		Frozen bearing on sprocket shaft	Inspect for damaged bearings and replace as necessary
		Worn or damaged chain	Replace chain as required
		Obstruction or jam	Remove obstruction to clear jam
		Very dry chain	Use lubrication schedule (Ref. p. 52)
		Rusty chain	Remove source of corrosion or use non corrosive chain; increase lubrication schedule
23	Sprocket loose on shaft	Loose set screws	Realign sprockets & tighten set screws
		Worn or damaged keyway	Replace with new key
24	Excessive slack	Normal wear	Expect rapid chain growth in first two weeks of operation -- reposition sprocket shaft; align sprockets and tighten down drive. (Ref. p. 52)
25	Chain climbs on sprocket	Improper chain/sprocket alignment	Realign sprockets
		Material build-up in sprocket teeth	Clean sprocket and readjust chain (Ref. p. 52)



## TROUBLESHOOTING GUIDE-MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
26	Broken coupler chain	Improper chain installation	Replace chain (Ref. p. 19 & 20)
		Misalignment of line-shaft and sprockets	Realign shafts and sprocket gap. (Ref. p.19 and 20)
27	XenoBRAKE hitting with excessive force against rollers	Excessive clearance	Brakes should be no more than 1/4" below bottom of rollers
		Excessive air pressure	Reduce pressure to 60 PSI and observe operation
28	XenoBRAKE not dropping completely away from roller	Brake located too high in frame	Loosen mounting bolts to finger tight. Actuate brake, retighten mounting bolts while actuated. This will align the brake assembly with the bottom surface of the rollers and bottom mounting bolts in the frame holes. See Note 1
29	XenoBRAKE not stopping rollers	Alignment to the rollers	See #28 above
		Inadequate air pressure or supply	See Note 1
		Tubing or pad worn and not contacting rollers	Shift tubing approximatley 1/2 on brake channel or replace tubing "
30	XenoBRAKE acts sluggish	Inadequate air supply or pressure	See Note 1
<p><b>Note 1</b> If the pressure falls more than 10% during actuation of the valve, the air supply may be inadequate. Inspect the system for undersized supply lines, sharp bends in the piping, restrictive fittings, a clogged filter element, or a defective pressure regulator.</p> <p>Air pressure for proper XenoBRAKE operation should be a minimum of 60 PSI. The air line size supplying solenoid valves should be 3/8" outside diameter. Between the solenoid valve and the zone it should be 1/4" outside diameter.</p>			

## TROUBLESHOOTING GUIDE-MOTOR/REDUCER

MOTOR/REDUCER PROBLEM		POSSIBLE CAUSE	REMEDY
31	Reducer running excessively hot	Low reducer oil level	Check oil level in gearcase and be sure breather plug is open (non Relialube reducers)
		Drag on conveyor	Check and inspect all bearings on conveyor
			Check for excessive product load
			Check all rollers for free rotation
32	Reducer or motor noisy	Insufficient reducer lubricant on motor shaft bearing	Add recommended oil to gearcase (Ref. p. 54)
		Damaged gears	Replace unit
		Output shaft or chain rubbing chain guard	Adjust guard
		Bent fan housing	Repair or replace part
		Worn brushes	Repair or replace part
		Worn bearing	Repair or replace part
33	Repeated motor stalling	Electrical	Check circuits and panel
		Motor wiring	Check heater size and amp draw
			Check motor wiring
		Drag on conveyor	Check all bearings
34	Drive slow to start	Electrical	Check circuits and panel
			Take ampere reading
35	Motor will not start	No line voltage	Check fuses and wiring for open circuit; check overload protection device and reset; check limit switches, starter and relays for faulty contacts or mechanical fault; check for voltage at source
		Low line voltage	Check control circuit voltage
			Check for low resistance short on line
		Conveyor jammed	Check for foreign material in chain and sprockets
		Burned out or shorted stator windings	Replace motor with spare and send defective motor to authorized repair station
		Failure of photo electric control	Check photo electric control
36	Motor will run but reducer output shaft does not turn	Worn worm gear in reducer	Replace reducer with spare and send defective reducer to authorized repair station

		Input shaft key missing or defective	Replace key
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## TROUBLESHOOTING GUIDE-MOTOR/REDUCER

MOTOR/REDUCER PROBLEM		POSSIBLE CAUSE	REMEDY
37	Reducer oil leakage (non Reliance Relialube)	Overfilling	Drain lubricant to proper level
		Vent in wrong location	Place vent in uppermost position
			Extend vent with pipe nipple
		Defective oil seals on output shaft	Tighten all bolts and fittings Install new oil seals
38	Motor overload protectors kicking out	Incorrect size	Check overload size and replace if necessary
		Short in motor	Replace motor
39	Motor runs, line-shaft does not turn	Drive chain broken or disconnected	Replace chain (Ref. p. 52)
		Sprocket loose	Install key, tighten set screws and check line-shaft for wear
40	Starter overloads kicking out	Wrong size overloads	Check proper size and replace
		Excessive amps being pulled	Reset starter and check amp draw
		Motor too small	Replace motor within size limits for conveyor speed
		Defective motor	Repair or replace motor
		Overloaded conveyor	Check for excessive product



## TROUBLESHOOTING GUIDE-ELECTRICAL

ELECTRICAL/SOLENOID VALVE PROBLEM		POSSIBLE CAUSE	REMEDY
41	Electrical shorts	Loose connection	Check all wire connections
		Improper voltage	Consider adding additional transformer
			Check fuses
42	Photoeye or proximity switches do not energize solenoid	Retroreflective photoeye not properly aligned with target	Realign photoeye with retroreflective target so indicator light comes on
		Defective switch	Replace
43	Solenoid valve blows to exhaust	Inlet poppet not sealed	See Solenoid Valves" (Ref. p. 56) "
		Faulty valve-to-base gasket	
		Faulty seals	
		Damaged spool	
		Cylinder leaks	
		Inadequate air supply	
		Water or oil contamination	
44	Solenoid fails to actuate valve	Loose pilot cover or faulty solenoid	
		Inadequate voltage at solenoid	
45	Air flow is normal only in actuated position	Broken return spring	
46	Solenoid buzzes	Faulty solenoid	
		Inadequate voltage at solenoid	
		Varnish in direct operated spool valve	
47	Solenoid burned out	Varnish in direct operated spool valve	
		Incorrect voltage at solenoid	
48	Valve is sluggish	Faulty seals on spool valve	
		Varnish in spool valve	
		Inadequate air supply	
		Inadequate pilot or signal pressure	
		Faulty silencer	
		Water or oil contamination	

## REPAIR PROCEDURES

### WARNING

**Do not perform maintenance on the conveyor until the start-up controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work areas. Make sure personnel are clear of all conveyor equipment before restarting the system.**

**Do not use gasoline or kerosene for cleaning. Use nonflammable solvent only.**

### COUPLER CHAINS

If the coupler failed from torque fatigue, analyze the amount of conveyor driven from that coupler. Perhaps the drive load can be shared better with adjoining conveyors. If the coupler failed from line-shaft misalignment, this condition must be corrected before the new chain is installed. (Ref. installation procedures for coupler chains on page 19 & 20). If corrective steps are not taken to address the cause of breakage, the replacement coupler chain will probably also fail. The set screws in coupler sprockets must be torqued to 13 ft-lb.

### CHAIN & SPROCKETS

Lubrication of roller chains is essential to effectively minimize metal-to-metal bearing contact of pin-bushing joints in the chain. Oil should be applied to outside and inside plate edges, since access to the pin-bushing area is possible only through clearances between the outside plates and the inside plates. Oil applied on the center line of the rollers cannot reach pin-bushing joints.

Chain drives should be protected against dirt and moisture. Oil supply should be kept free of contamination. A good grade of non-detergent petroleum base oil is recommended. Heavy oils and greases are generally too stiff to enter and fill the chain joints. The following table indicates the proper lubricant viscosity for various surrounding temperatures.

Temperature Degrees F	Recommended Lubricant
20 TO 40	SAE 20
40 TO 100	SAE 30
100 TO 120	SAE 40
120 TO 140	SAE 50

Inspection includes:

1. Lubrication check for dirt, grit, or chips and clean if necessary by soaking chain in nonflammable cleaning solvent
2. Sprocket alignment (see following text)

3. Wear on the inner surfaces of the roller chain link plates
4. Sprocket tooth wear
5. Chain tension (see following text)
6. Set screw tightness (5/16-18 at 13 ft.lbs. and 1/4- 20 at 6 ft.lbs.)

### SPROCKET ALIGNMENT

1. Loosen sprocket.
2. Align loose sprocket to the other by laying a straight edge across their faces or along the chain.
3. Retighten the loose sprocket.

### CHAIN TENSION

Chain should be checked for excessive slack, if the chain is running close to the tips of the sprocket teeth.

This can be checked by lifting the chain away from the large sprocket, making sure the chain is in mesh with the sprocket teeth. Excess clearance is conclusive evidence that the chain has elongated in pitch and no amount of tension adjustment will keep it properly meshed with the sprocket teeth.

Continued operation will quickly destroy the sprocket teeth which otherwise may be good. If the sprocket is still serviceable, replace the chain.

### TENSION ADJUSTMENT

1. Loosen mounting bolts of tension.
2. Increase tension up to 1/2" of total slack (1/4" each way of center).
3. Turn adjusting bolts on gearbox plate or move gearbox in mounting slots until there is 1/2" total chain slack.
4. Retighten all bolts after checking alignment.

If chains have stretched so that above adjustments cannot be made, remove a link and reconnect. (If removal of one link makes the chain too short, add offset link and reconnect.)

If a chain should break or fail due to overload, neglect or accident, those portions of the chain which appear to remain intact are, in all probability, damaged and subject to early failure if continued in service. Replace the entire chain and sprockets.

## CHAIN/SPROCKET REPLACEMENT ON LINE-SHAFT

1. Shut off and lock out power supply to area of required maintenance.
2. To provide access, remove necessary rollers.
3. Remove line-shaft guard.
4. Disassemble any components involved with the operation of the line-shaft, slave drive, chains, couplers, etc.
5. Remove chain with roller chain pin extractor.
6. Unbolt the bearing housings from the crossmembers.

### CAUTION

**The line-shaft will fall unless supported or held**

7. With line-shaft removed, loosen the eccentric cam collars and coupler chain on the side closest to the sprocket to be removed.
8. Remove all components up to the sprocket being replaced.
9. Loosen set screws on sprocket and remove.
10. Place new sprocket on shaft with keyway aligned and key installed.
11. Remount line-shaft to conveyor bed and properly align sprockets with straight edge against the face of both sprockets.
12. Tighten set screws to specification.
13. Reassemble all components in reverse of disassembly.
14. Reassemble coupler chain around coupler sprockets.
15. Double check tightness of all fasteners.
16. Properly tension chain.
17. Recheck alignment of sprockets.
18. Reinstall chain guard.
19. Reinstall line-shaft guard.

## UNIVERSAL JOINTS

U-joints are primarily used to "bend" the line-shaft in the XenoROL System both horizontally and vertically. They are used in curves, diverter spurs, merges and small incline or decline angles.

To ensure proper lubrication of all four bearings, pump lubricant slowly until it appears as a slight bead at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates that the bearings are fully lubricated. In addition this provides additional protection against the entry of foreign matter.

For universal joint application involving speeds below 500 RPM (approximately 200 FPM), a mineral oil in the SAE 140 to SAE 250 viscosity range should be used.

Grease in the bearing prevents excessive wear of parts, protects ball races, balls, etc. from corrosion, and aids in heat dissipation within the bearing.

Disassembly/assembly procedure as follows:

1. To provide access to maintenance area, remove necessary rollers.
2. Remove line-shaft guarding in area requiring maintenance.
3. Loosen set screws on the universal joint and remove from shaft.
4. Replace universal.
5. Reverse above procedures for assembly.
6. Torque 3/8-16 set screws to 23 ft.lbs.

Ref. universal joint "phasing" page 21.

## LINE-SHAFT BEARINGS (STANDARD)

Line-shaft bearings have an eccentric camlock set collar to secure the inner bore to the line-shaft. After one week of constant operation, check each bearing to see if the lock collar is tight.

If a collar is loose:

1. Push and rotate the collar onto the eccentric hub.
2. Twist the collar in the direction of shaft rotation.
3. Set the collar by using a punch or set screw wrench with a light tap in the nonthreaded hole.
4. Tighten set screw (1/4-20 to 6 ft.lbs.)
5. Recheck every six months.

To replace any worn or damaged bearings, the drive shaft must be removed from the conveyor. Follow the same procedures as sprocket replacement. Any burrs caused by locking set screws should be removed before sliding bearings or spools off the drive shaft.

Before reassembly the line-shaft must be cleaned. Be sure the shaft is dry before reinstalling bearings and spools.

### WARNING

#### REINSTALL ALL GUARDS.

**As with all rotating machinery, the line-shaft, couplers and U-joints present the possible danger of entangling hair, fingers, jewelry or clothing.**

## LINE-SHAFT

During manufacturing processes line-shafts are left with a light coating of lubricant. Excess is wiped off before the assembly of components onto the line-shaft. A certain amount of lubricant is needed to prevent formation of rust before the conveyor is put in use. Under normal conditions this has no detrimental effects. However, on rare occasions some rollers may have reduced drive capacity due to excessive lubricant remaining after assembly or due to a localized spill.

To get access to the line-shaft, a spacer must be cutoff. A solvent containing no lubricant, which does not harm plastic or urethane, and dries without leaving film, must be used. Success has been found with some brake cleaners, isopropyl alcohol and certain CRC electrical contact cleaner products.

Use the cleaner liberally while shifting the pulleys back and forth on the line-shaft with the drive belts removed. The solution must run out to properly flush. The removed spacer can be placed back on the shaft. Make sure the belt twist is correct when placing the drive belts back on the rollers.

## REDUCERS/GEARMOTORS

Units are properly filled at the factory with sufficient lubrication for desired mounting position. With "Relialube", the break-in period and subsequent oil change ordinarily experienced with conventional reducers has been eliminated.

With Reliance Relialube reducers, change oil only when performing maintenance that requires gearbox disassembly. In this case, use only Mobil SHC-634. If possible return to Reliance service center for repairs.

Disassembly/assembly procedure as follows:

1. To provide access to maintenance area, remove necessary rollers.
2. Disconnect drive chain from line-shaft drive sprockets using roller chain extractor tool.
3. Disconnect any electrical connection.
4. Remove reducer or gearmotor.
5. Perform required maintenance.
6. Reverse procedures for assembly.
7. After all fasteners are tight, double check chain tension and sprocket alignment.
8. Replace all guards.

Regularly inspect all gearbox reducers (ref. lubrication chart) to guarantee maximum performance.

1. Tightness of bolts and screws
2. Correct alignment of shaft and couplings

## 3. No major oil leaks

### WARNING

Do not perform maintenance on the conveyor until the startup controls are locked out and cannot be turned on by any person other than the one performing the maintenance. If more than one member of a crew is working on the conveyor, EACH CREW MEMBER MUST HAVE A LOCK ON THE POWER LOCK OUT. The air pressure must be turned off to the work area. All pneumatic devices must be de-energized to prevent accidental cycling of the device.

Make sure personnel are clear of all conveyor equipment before restarting the system.

4. No excessive heating
5. No unusual vibration or noise

Enclosed gear drives (except those tagged as prelubricated) require filling to the proper oil level before operating as indicated. Equivalent lubricants should con-form to AGMA Standard Specification No. 250.03 applying to the AGMA Lubricant Number indicated for the required ambient range. Service life and efficiency of gears and bearings will be affected by oxidation or contamination of oil used. Improved performance will be obtained by periodic lubrication at regular intervals of approximately 2,500 hours of operation or six months, whichever comes first. See lubrication guide page 43

### **RIGHT ANGLE CONNECTION**

Service life and efficiency of gears and bearings will be affected by oxidation or contamination of the lubricating oil. Improved performance will be obtained by periodic relubrication in accordance with the following recommendations.

Check for proper oil level by removing the oil level plug on the side of the unit. If the oil level is low, add the proper lubricant through the vent-filler plug on the top of the unit (with the lively plug still removed) until the lubricant comes out of the oil level hole. Replace the plugs securely.

After an initial operating period of approximately 80 hours, the housing should be completely drained, preferably while warm. Refill housing to proper level with fresh oil. Re-peat this procedure every 2,500 hours of operation or every six months thereafter, whichever occurs first.

## DRIVE BELTS

When it becomes necessary to replace a XenoROL® drive belt, there are choices depending on the situation. New original manufactured belts are the best and will last the longest. Replacement belts with hook connections require only the removal of a roller to install. Making belts by heat welding a length of cord stock requires special tools and techniques.

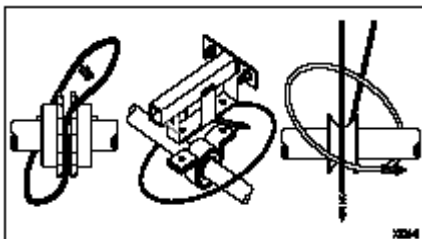
When replacing all belts, only use original type belts with the following procedure.

Disassembly/assembly procedures (original belts):

- Remove all rollers.
- Remove the line-shaft guarding.
- Remove coupler chains at both ends.
- Unbolt the line-shaft bearings from the conveyor crossmembers, then lower line-shaft carefully.
- Place new belts over the line-shaft assembly. If spares are included, they must be secured with tie straps to the spacers. Do not tighten tie to cause belt compression or distortion or it will not be usable in the future.
- Reassemble the line-shaft by bolting the line-shaft bearings to the crossmembers.
- Realign adjoining coupler sprockets.
- Attach coupler chains. (Ref. installation of coupler chains pages 19 and 20.)
- Be aware of the drive belt's twist direction for proper conveying direction. Twist belt onto roller's groove and reassemble roller into conveyor bed.

When replacing a few belts in a specific location, use original type belts with the following procedures:

- Remove rollers receiving new belts.
- Remove the line-shaft guard.
- Remove the coupler chain closest to the replacement wear.
- Remove the bolts holding line-shaft bearings between the coupler and replacement area.
- Pass the belt between the coupler sprockets.
- Pass belts over the line-shaft bearings.
- Pass the belts through all connected belts by turning the roller while pulling the belt through.
- With the new belts in their respective pulleys, reassemble bearing and couplings.



In an emergency the belts may be replaced by cutting and splice welding a new length belt from cord stock using the following procedure:

- Preheat the iron with the adjustment knob at approximately the three-fourths setting for a couple of minutes.
- Feed new length of belt around line-shaft.
- Holding one end of the belt in each hand, place the ends against each side of the heating surface and thoroughly soften both ends making sure melted material appears around the entire perimeter of the splice.
- Remove from iron and match cord, end to end. Hold firmly together until the joint solidifies.
- When belt is cool, trim the flashing from around the welded joint. Twenty minutes cooling time is recommended before reconnecting to the roller.
- Be aware of the orientation of roller drive belts for conveying direction. Twist belt onto roller groove and reassemble roller into conveyor bed.
- To reassemble the roller into conveyor frame, lay the roller on the frame with the grooved end over the line-shaft. After placing the belt over the roller with the correct twist, put the axle on the line-shaft side into its hex hole. Align the axle with the hex hole on the opposite side/frame and depress axle with a blunt object. Push the roller downward into frame until axle snaps into hex hole in side channel.

### WARNING

Use a blunt object to depress roller axles. If a screwdriver or similar pointed tool is used and slips, it could cause injury to the installer.

## XENOBRAKES

XenoBRAKES are used as an indirect stop to hold product. The brake is a steel channel with a solid rubberlikepad or urethane tubing on the top. It is mounted under the rollers to the side channel. When activated, pneumatic air cylinders push the brake channel against the under side of the rollers. The rollers are unable to turn against the brake.

XenoBRAKES use solid pads when used with coated rollers. The rollers are coated (usually with plastisol) to increase the friction between the rollers and product to hold accumulating pressure of additional products. Urethane tubing is used over the brake channel with single products stopped on noncoated rollers.

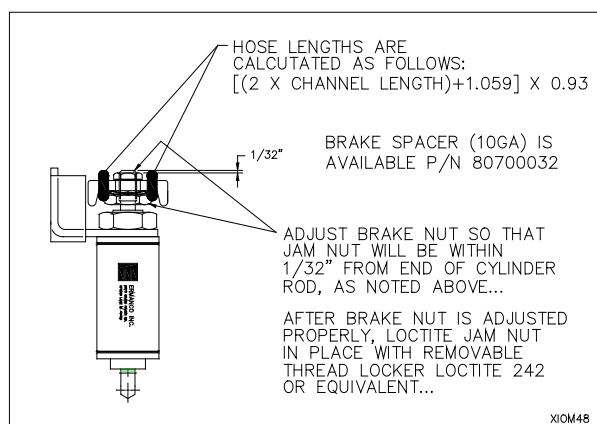
Note: Never use brakes with tubing with coated rollers since the tubing will quickly cut through the coating.



XenoBRAKES may be used to hold product back until line pressure is great enough to overcome the coefficient of friction between the product and the roller surface. They are also used to create zero pressure zones with individual sensor controls.

The brake is adjusted during installation so that the brake comes up against the rollers evenly. This adjustment is made by adjusting the jam nuts on the air cylinder and/or the mounting brackets to frame connection. The air cylinders operate at 60 PSI.

- Shut off air supply.
- To provide access, remove necessary rollers.
- Remove air cylinder air lines.
- Remove the bolts holding brake to side channel of conveyor.
- Remove the brake channel.
- Remove the air cylinder jam nut.
- Remove air cylinder.
- Replace air cylinder.
- Reverse procedures for assembly.



## SOLENOID VALVES

In order to minimize downtime, it is normally not feasible to repair malfunctioning electrical or valve components while leaving the conveyor unusable. Spare components should be kept in stock for emergency replacement. If feasible, the part may be repaired later to replace maintenance stock. Items, which cannot be readily repaired or are questionable, should be re-placed. Components under warranty should not be re-paired except in an emergency

### WARNING

Before removing a valve or other pneumatic component, shut off and exhaust the entire pneumatic circuit and shut off and lockout electrical supply.

### Valve Removal and Replacement

- Open the wire cover for the manifold on which defective valve is mounted.
- Remove solenoid wires from their terminals.
- Loosen and remove two Allen head screws on top of valve body.
- Remove valve and gasket from subbase.
- Install replacement valve and existing gasket in reverse order.

### Coil Replacement

- Loosen straight-slot screws on capsule assembly.
- Remove defective solenoid coil, pulling wires through the valve. Be careful not to damage paper gasket positioned between coil and valve body.
- Route wires of new coil assembly through valve body and paper gasket, and trim to proper length.
- Attach new coil using straight-slot screws

### Valve Body Overhaul

- Remove coils as described above.
- Carefully remove detent body, spool and spring, noting their orientation. (For double solenoid, remove detent assembly and spool.)
- Use a blunt plastic probe (pen) to push spring retainer through valve body. This will remove both spring retainer and sleeve assembly. (For dual solenoid, push bumper to remove sleeve.)
- Note: Sleeves are not interchangeable.
- Clean and lubricate spool and sleeve per accompanying repair kit instructions, and replace all seals.
- Install spring retainer in valve body.
- Assemble detent body to cleaned spool/sleeve assembly and install spring in end of spool (single solenoid only).
- Push cleaned spool/sleeve assembly into valve body until detent body is sealed.
- Replace coil(s) as described in paragraph above

## MOTOR CONTROLS

### WARNING

Before servicing or performing any work in the motor control panel, disconnect and lockout the main incoming service. If only the panel disconnect is off, the incoming side will still be

### INSPECTION

Excessive overheating is indicated by discoloration of components. Most often, these symptoms are a sign of loose connections. If left uncorrected this can eventually cause arcing between components, leading to destruction of controls. It is, however, not unusual to find the interior to the MCC quite warm when it is first opened.

The condition of contacts must be checked on all contactors and starters that show signs of overheating to ensure that they are free of dust and dirt and are not excessively pitted or burned. When badly burned or worn, the contacts must be replaced.

In the course of inspecting contact condition, spring pressure should be checked. As contact surface wears down, spring pressure can be lost because of the overheating. Contact spring resiliency can usually be detected by fingertip pressure.

Check for faulty gaskets especially when there are excessive deposits of foreign materials. Particular attention should be given to conductive deposits because they can cause flashovers and premature component failure when allowed to collect to any great extent. Either reposition or replace defective gaskets and clean the control cabinet.

### WARNING

Avoid touching components until they have had time to cool. Some still may be hot.

Check overload settings on motor controls. Check for loose wiring and tighten as required.

### CLEANING

When cleaning a control cabinet, it is best to use a vacuum cleaner rather than compressed air. A vacuum cleaner removes rather than redistributing dust and dirt. Compressed air can damage and displace relay contacts and springs.

### SENSING SWITCHES

The sensing switches are of two types: retro-reflective photoeye and proximity switch.

Adjust the retro-reflective type as follows

1. Determine what sizes of target the photoeye must sense.
2. Adjust for the worst case, usually smallest item, by loosening photoeye mounting nut and aligning while making sure photoeye has unobstructed view of reflector.
3. Move the target in and out of the field of detection to ensure that the photoeye energizes and de-energizes.

Adjust the proximity type as follows:

1. Loosen proximity switch mounting bolt and adjust sensing switch so that the product passes directly in front of the switch face, as close to the switch face as possible without making contact.
2. Check that the proximity switch energizes and de-energizes as the product passes in front of the switch face.
3. Tighten the mounting bolt.

## Parts Identification

This section is used to identify parts that may require replacement during the life of the conveyor.

Parts which specifically pertain to XenoROL® XR40 or XR48 are included with illustrations. Additional parts and assemblies are listed together in chart form as "Additional Replacement Parts" on page 69. Drive components are identified for standard speed and horsepower combinations.

A "**Recommended Spare Parts List**" is published for all conveyor orders of \$10,000 or more. This spare parts list is sent to the purchaser approximately (2) weeks after the order is received. It includes part numbers, description, pricing and recommended quantities to be kept for maintenance.

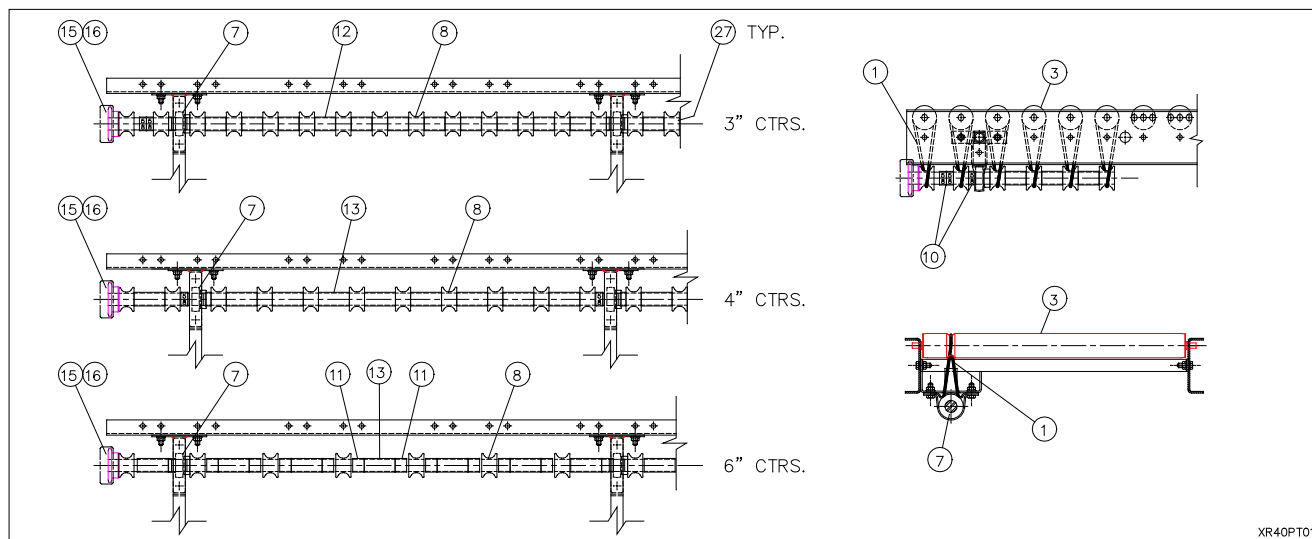
If you are unable to locate this document (orders under \$5,000) another may be obtained by contacting the MHS Conveyor Customer Service at 231-798-4547 or Fax 231-798-4146.

To identify a part and its part number, refer to the assemblies and devices on the following pages. Determine the balloon number for the required part and reference the composite parts list on pages 67 and 68. The parts listed may then refer to one of the data charts for more detail.

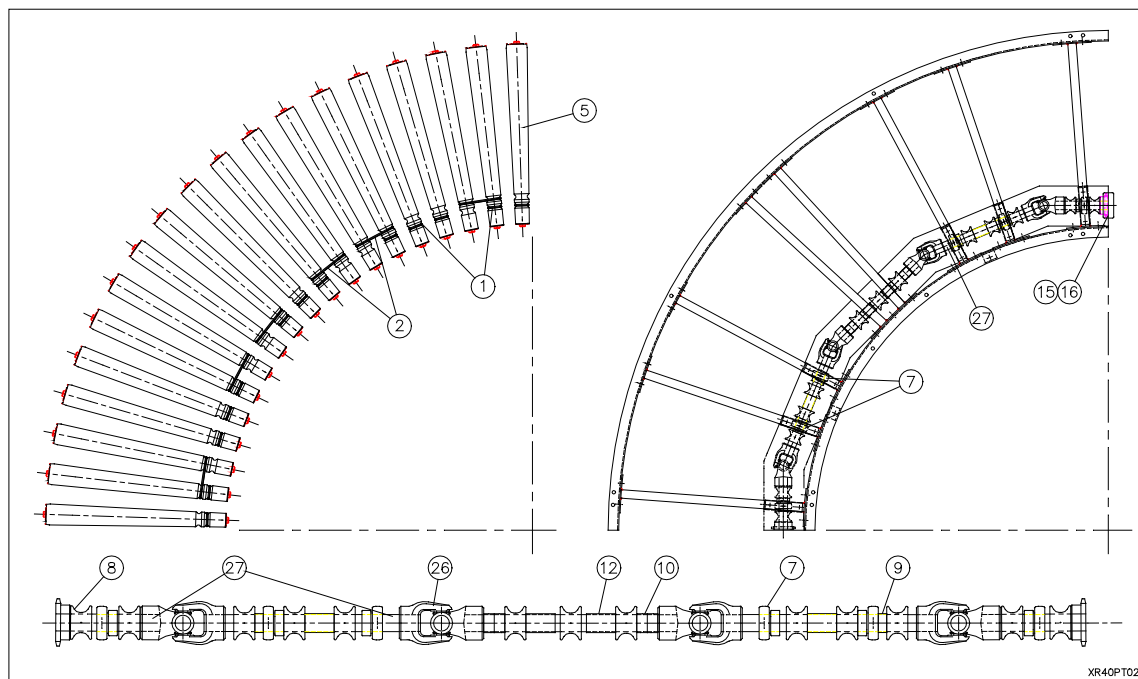
XR40 is used for illustration purposes in this section. XR48 differs in using 9" deep frame channels, 7/32" diameter drive belts, location of crossmembers. These differences are accounted for in the part numbers.

## PARTS IDENTIFICATION

### INTERMEDIATE BEDS

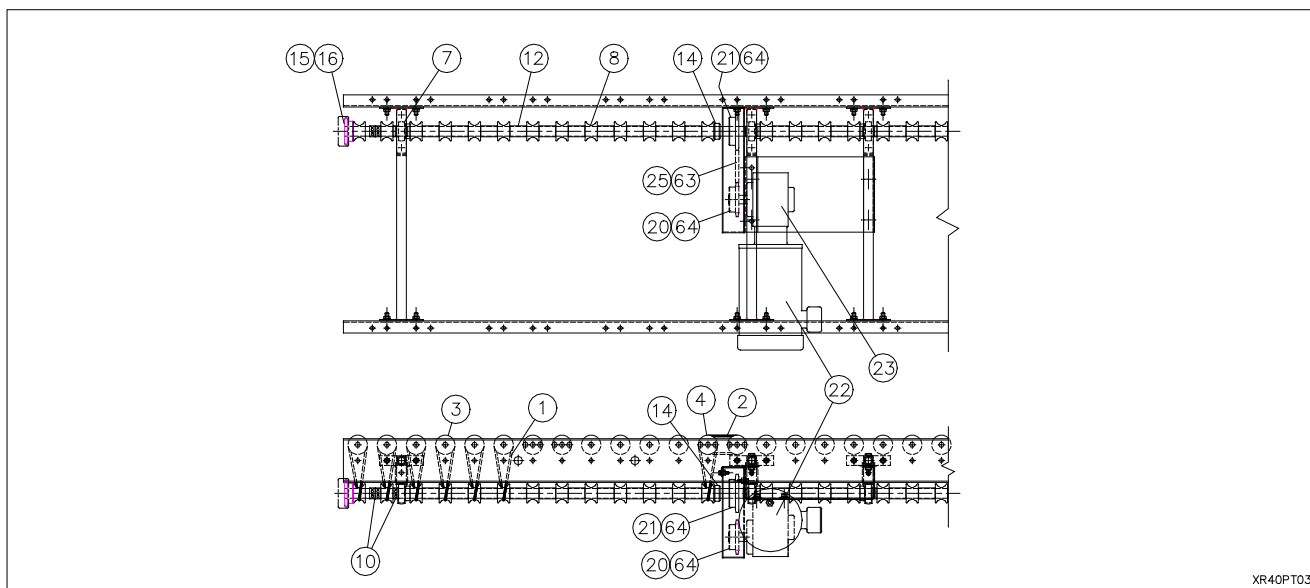


### CURVES

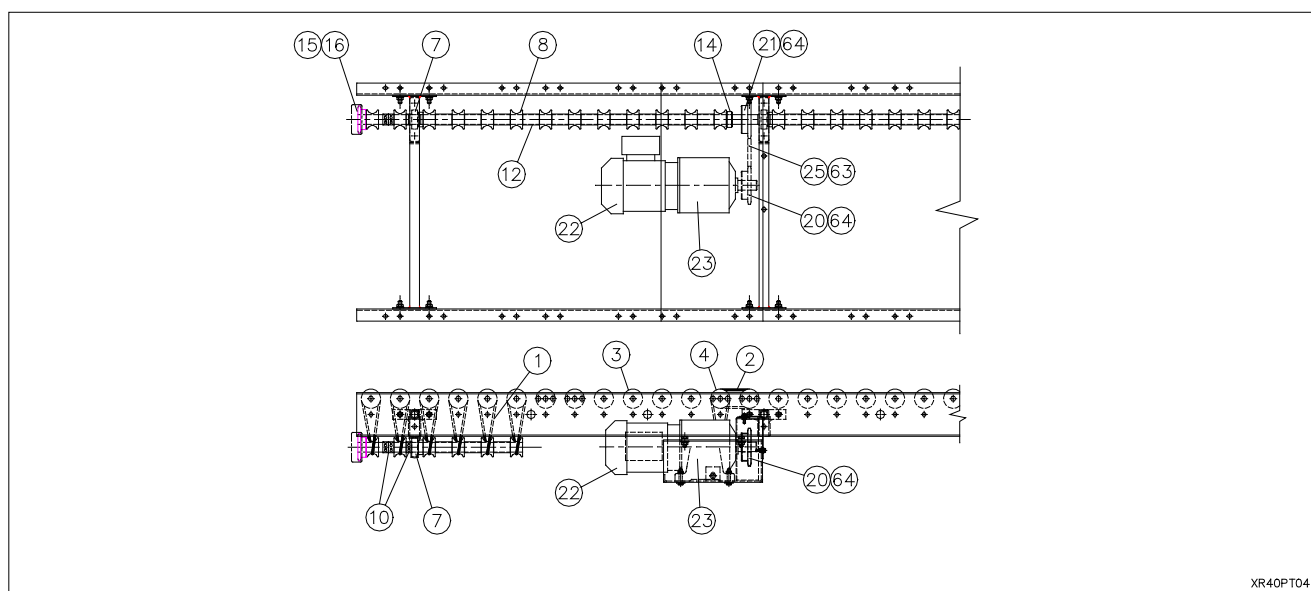


## PARTS IDENTIFICATION

### DRIVE PACKAGE AND BED

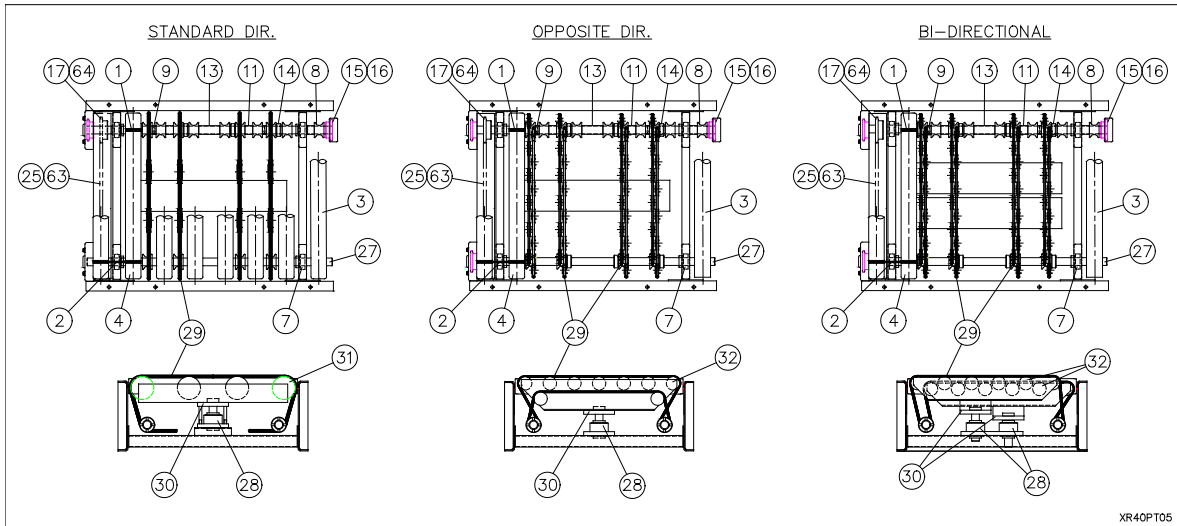


### LOW PROFILE DRIVE PACKAGE AND BED

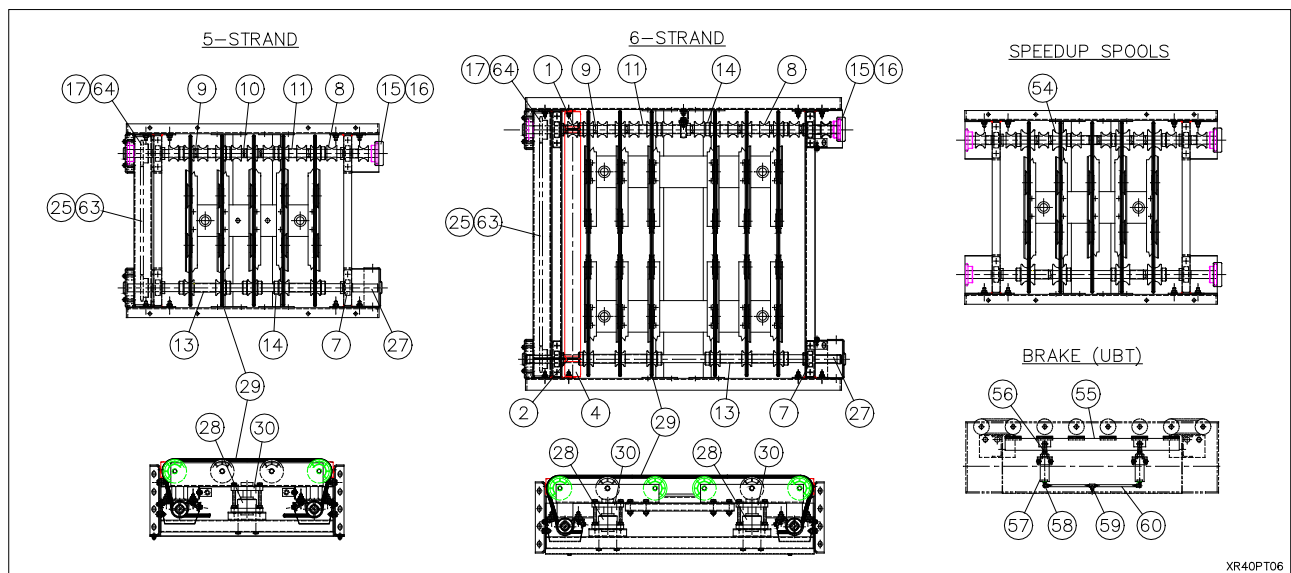


## PARTS IDENTIFICATION

### URETHANE BELT TRANSFERS



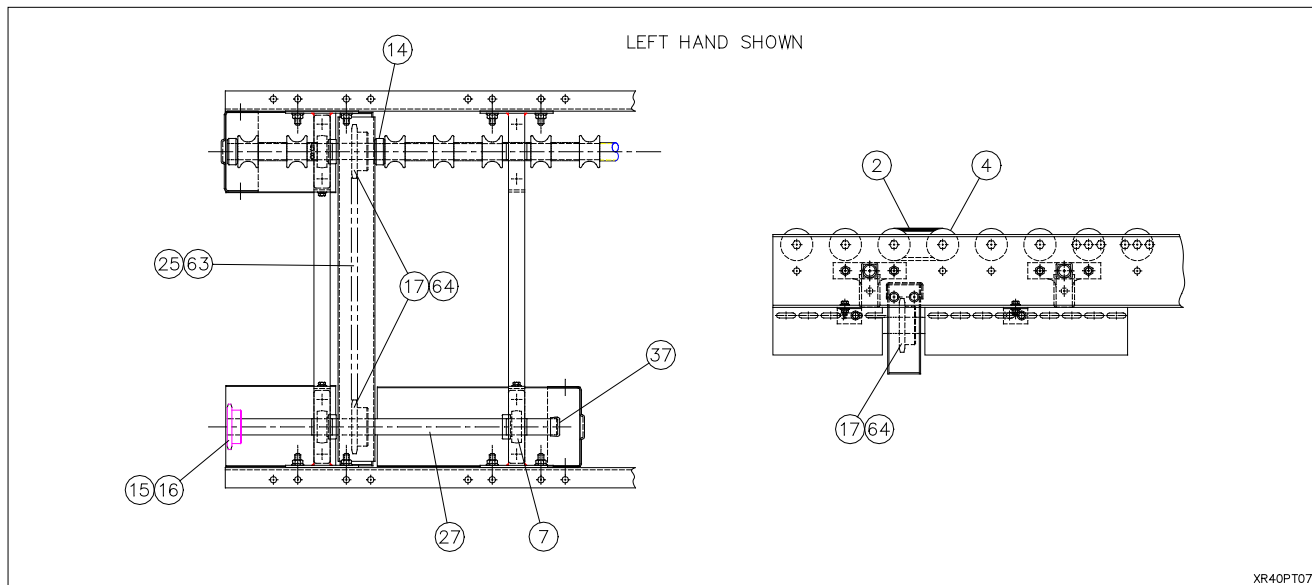
### URETHANE BELT TRANSFERS OPTIONS



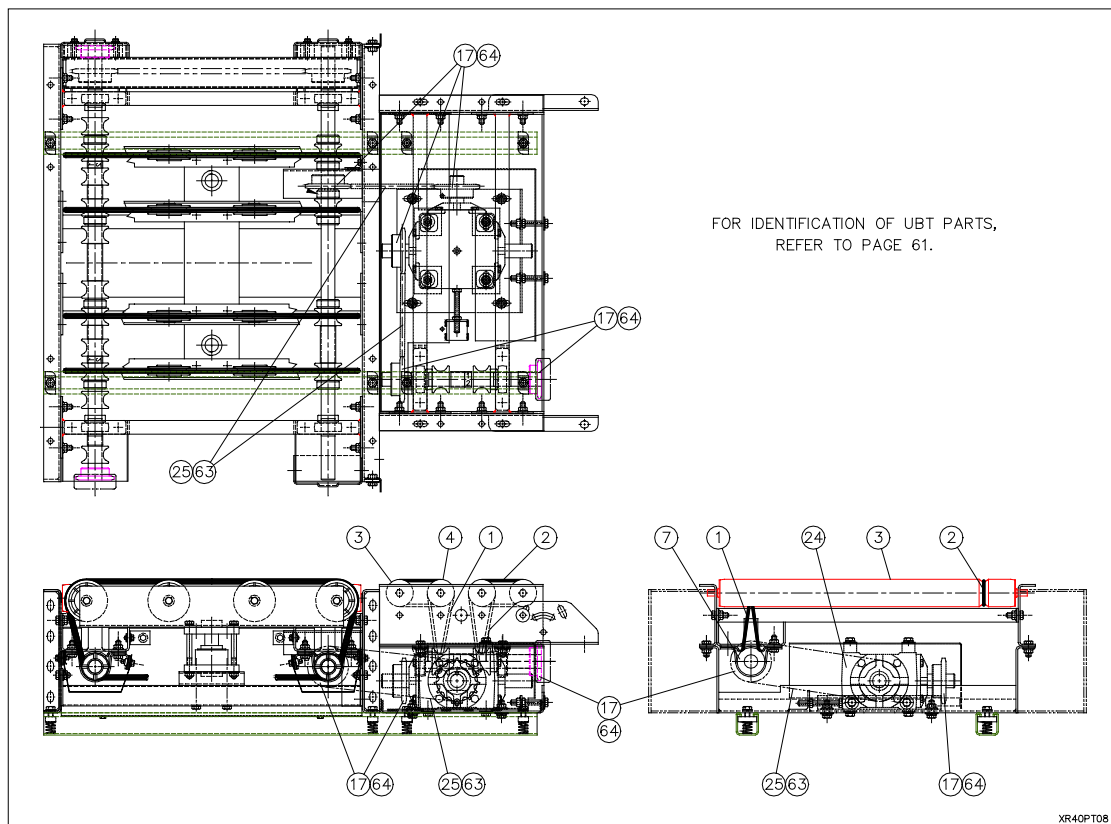


## PARTS IDENTIFICATION

### JUMP CHAIN ASSEMBLY

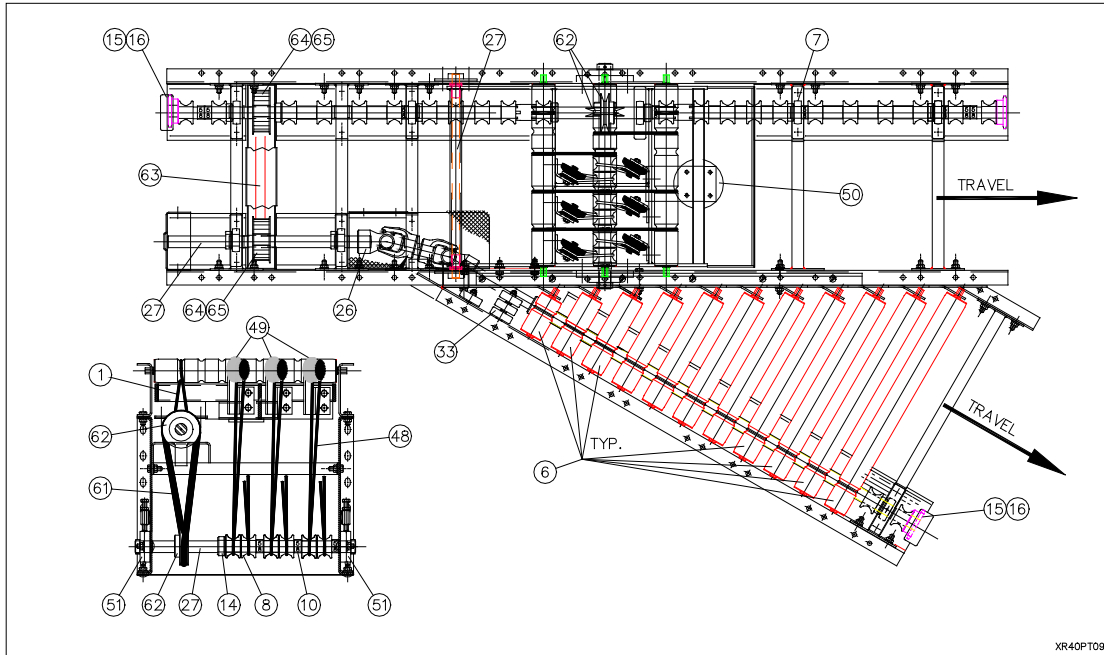


### RIGHT ANGLE CONNECTION / URETHANE BELT TRANSFER MODULE

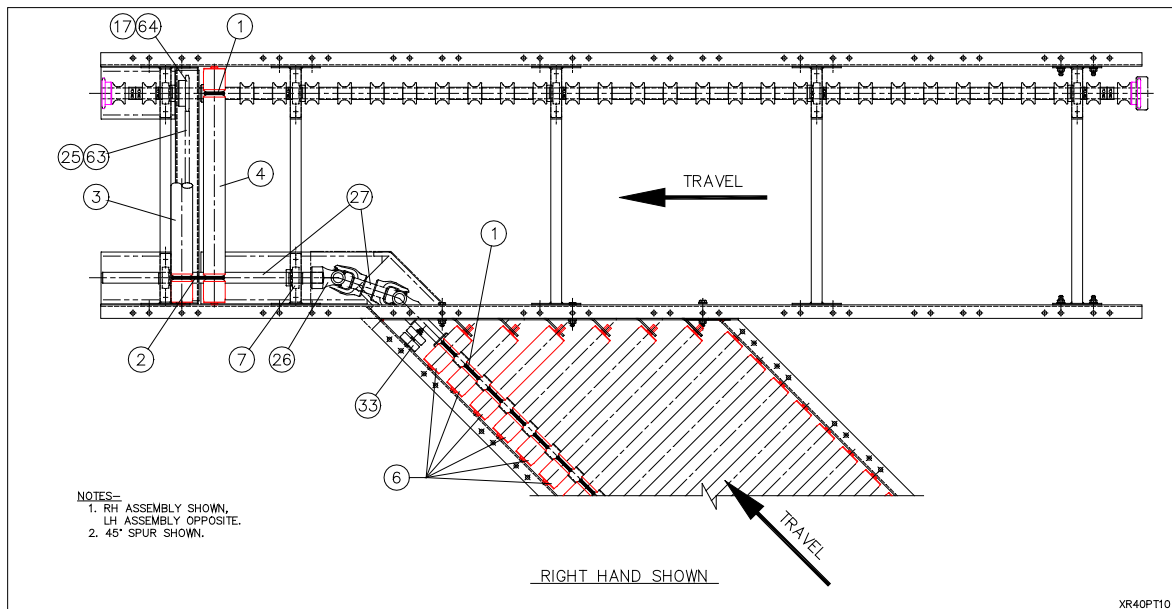


## PARTS IDENTIFICATION

### WHEEL DIVERTER ASSEMBLY

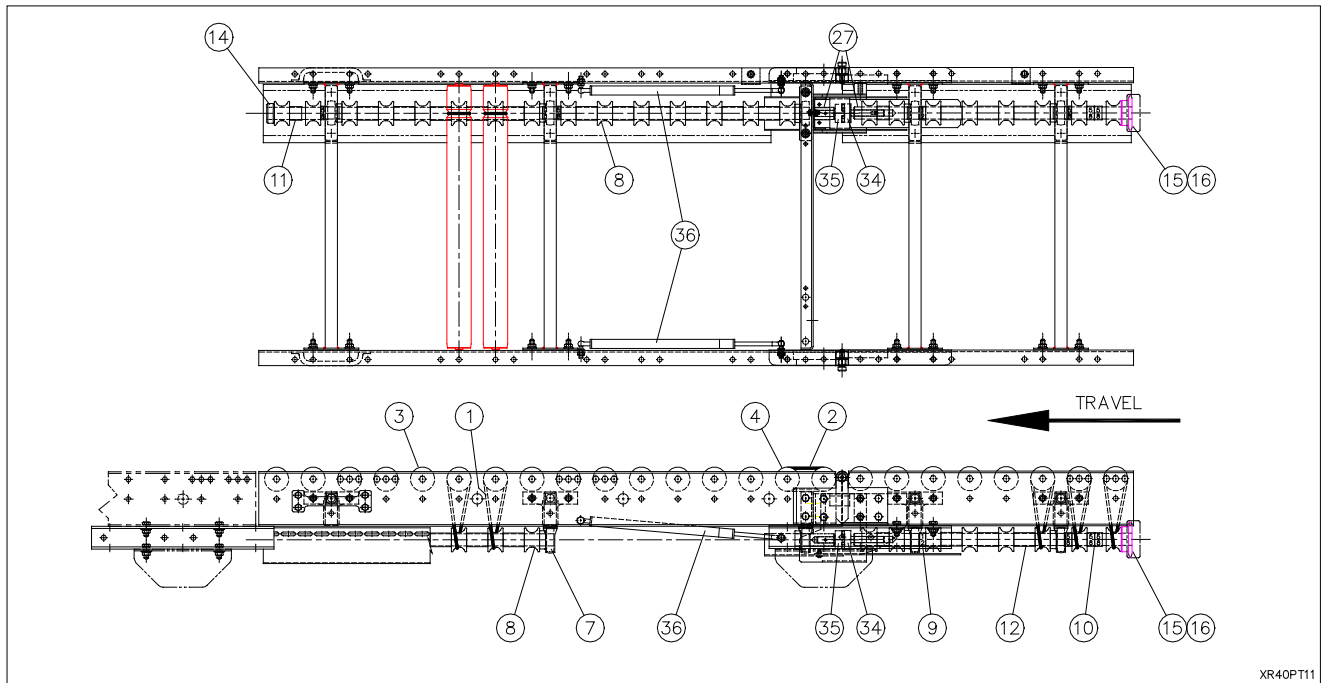


### MERGE ASSEMBLY

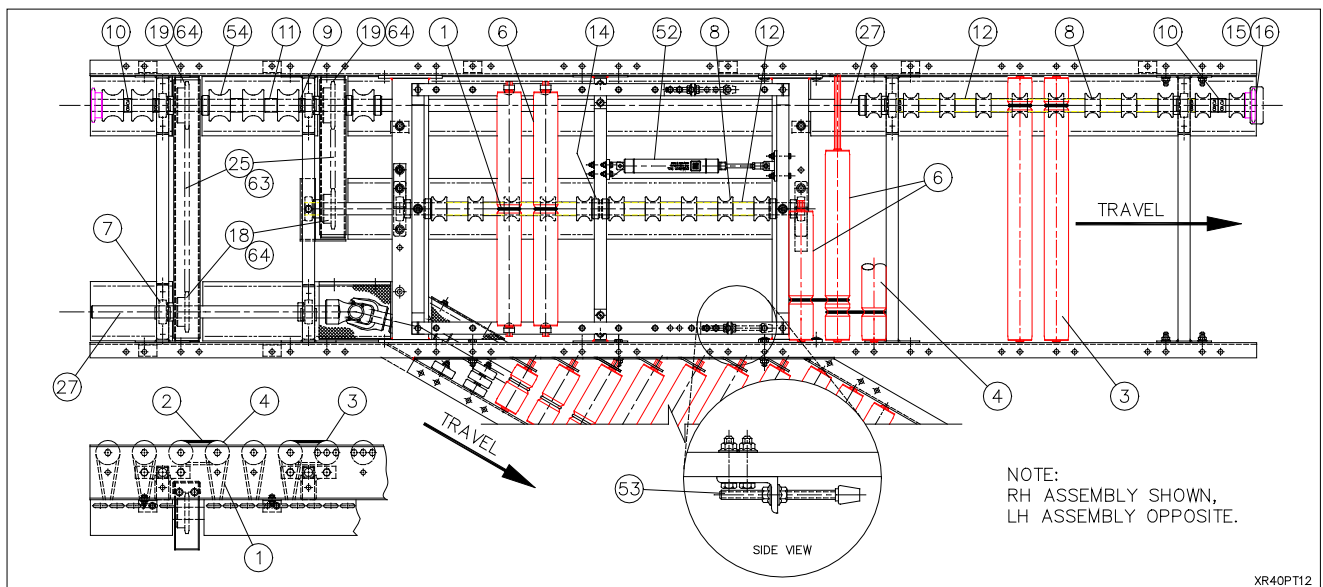


## PARTS IDENTIFICATION

### GATE

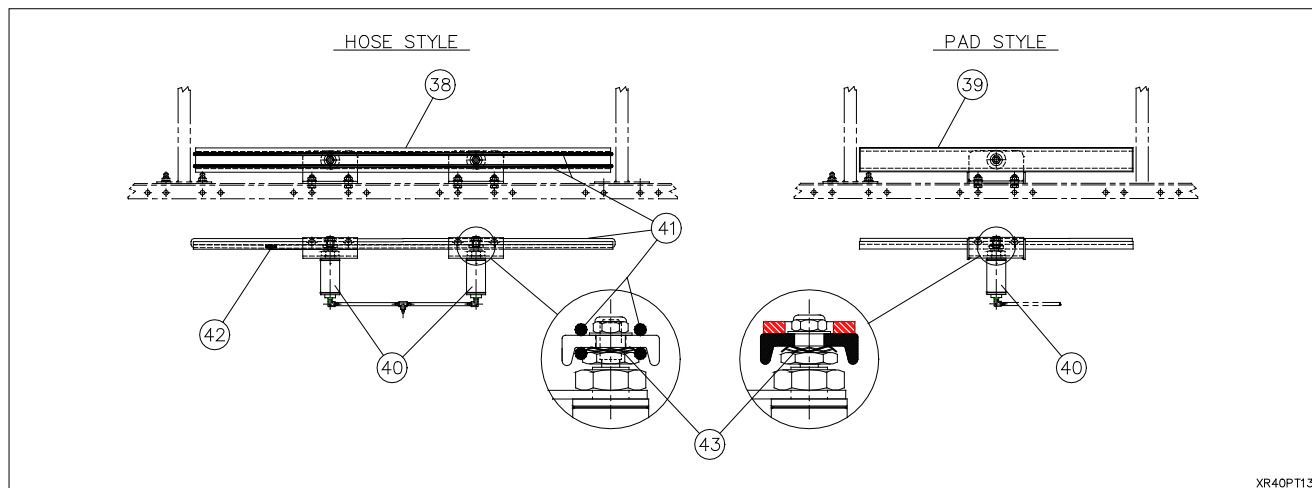


### XENOSWITCH ASSEMBLY

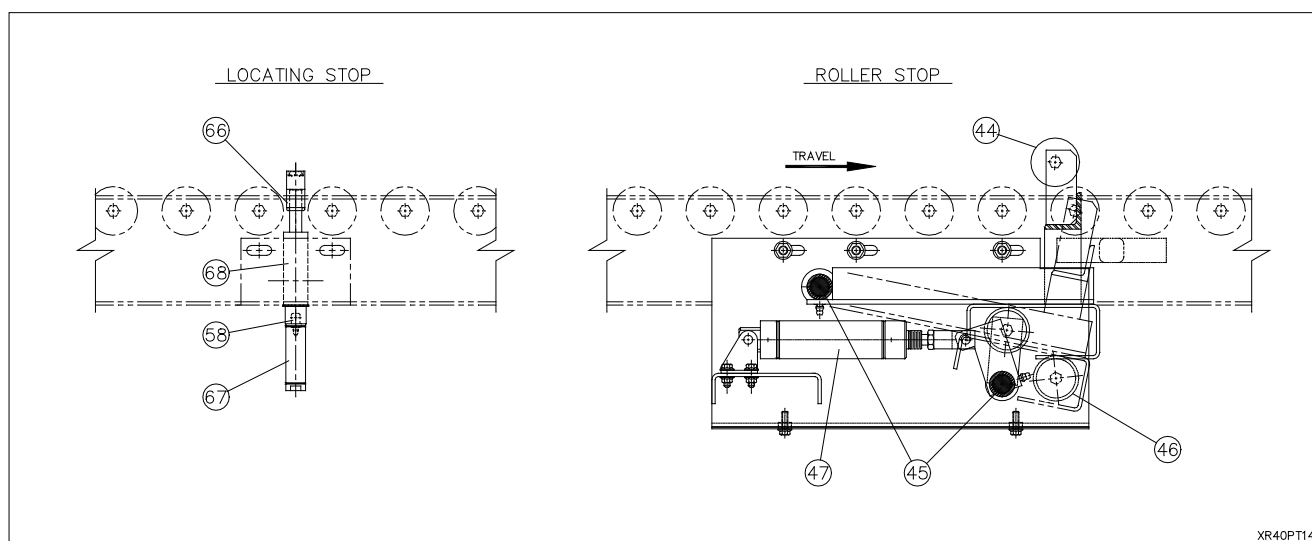


## PARTS IDENTIFICATION

### XENOBRAKE

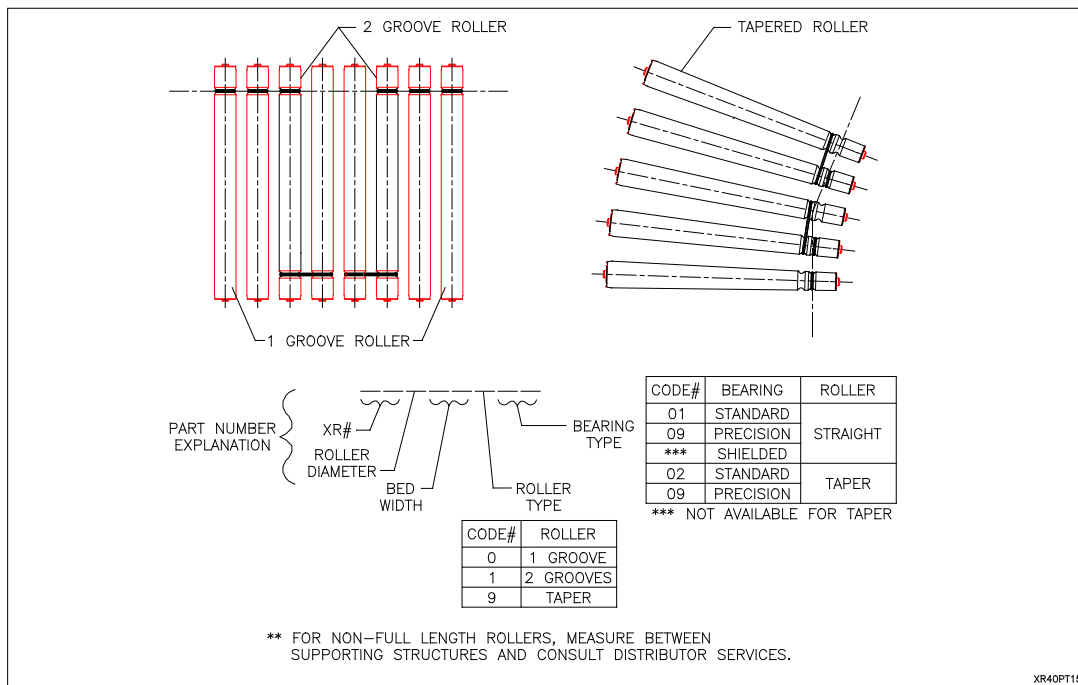


### LOCATING STOP AND PIVOTING ROLLER STOP



## PARTS IDENTIFICATION

### ROLLER DATA



XR40 Roller Assembly	True Tapered	Straight
15" OAW 13" BF	E0009796	40215001
18" OAW 16" BF	E0009797	40218001
24" OAW 22" BF	E0009798	40224001
30" OAW 28" BF	E0009799	40230001
36" OAW 34" BF	E0009800	40236001
42" OAW 40" BF	E0009801	40242001
XR48 Roller Assembly	True Tapered	Straight
18-1/2" OAW 16" BF	E0009797	48218001
24-1/2" OAW 22" BF	E0009798	48224001
30-1/2" OAW 28" BF	E0009799	48230001
36-1/2" OAW 34" BF	E0009800	48236001
42-1/2" OAW 40" BF	E0009801	48242001
48-1/2" OAW 46" BF	E0009802	48248001

## PARTS IDENTIFICATION LIST

Balloon No.	Description	Part Number
1	Drive Belt	Refer to Drive Belt Data Chart
2	Slave Belt	page 70
3	Roller	Refer to Roller Data page 66
4	Roller, Slave	
5	Roller, True Taper	
6	Non-full length rollers	
7	Bearing, 1 Bore "	90050103
8	Spool, 1 Bore "	90801200
9	Spacer, 1/2 "	90800173
10	Spacer, 5/8 "	90800174
11	Spacer, 1 "	90800175
12	Spacer, 1-3/4 (3" Centers) "	90800176
13	Spacer, 2-3/4 (4" Centers) "	90800177
14	Set Collar, 1 "	90140011
15	Sprocket, Coupler	90800505
16	Chain, Couler (Delrin)	90140025
17	Sprocket, Jump Chain	Specify by number of teeth and sprocket number
18	Sprocket (XenoSWITCH Assembly)	90800524
19	Sprocket (XenoSWITCH Assembly)	90800548
20	Sprocket, Drive	Refer to Drive Data page 71
21	Sprocket, Driven	
22	Motor	
23	Reducer	
24	Reducer, Hub City	90655000
25	Chain, RC50	Specify Length 90140029
26	U-joint	90895001
27	Shaft	Specify length of shaft, location and length of keyway(s) other than at end, plus use and location
28	Air Bag	90000025
29	Transfer Belt (UBTs)	Specify by UBT type, width, and belt diameter
30	Lift Table Assembly	90120020
31	Wheel Transfer (Std. Direction)	90930105
32	Wheel, Transfer (Opposite & Bi-directional)	90930120
33	Skate Wheel, 2 diameter (Merge) "	90930101
34	Coupling, Female (Posi-Drive)	90141100
35	Coupling, Male (Posi-Drive)	90141101



## PARTS IDENTIFICATION LIST

Balloon No.	Description	Part Number
36	Spring, Gas (XenoGATE)	
	15-1/2 Wide	90700270
	18-1/2 Wide	90700275
	24-1/2 Wide	90700280
	30-1/2 Wide	90700285
	36-1/2 Wide	90700290
	42-1/2 Wide	90700295
37	Cap, Safety	90140001
38	Brake, Hose Style	Specify by length
39	Brake, Pad Style	
40	Air Cylinder (XenoBRAKE)	89000020
41	Hose, Urethane	89000580* * Length calculated as follows: [(2 x Channel Length) = 1.059] x 0.93
42	Union Connector	89000505
43	Washer, 5/8 Wave	95300019
44	Roller, Gravity	Specify by "BF" dimension
45	Cam Weldment, Std.	
46	Skate Wheel (Roller Stop)	90930100
47	Air Cylinder (Roller Stop)	89000056
48	Drive Belt (Wheel Diverter)	90530094
49	Wheel, Sorter	90930103
50	Air Cylinder (Wheel Diverter)	89000122
51	Bearing, 1 bore (Wheel Diverter)	90050223
52	Air Cylinder (XenoSWITCH)	89000050
53	Stop, Adjustable	90800152
54	Pulley, Speedup	90801202
55	Brake, Pad (UBT)	Specify by UBT description
56	Clevis, Rod	89000051
57	Air Cylinder, Brake (UBT)	89000042
58	Elbow, Male Barbed	89000510
59	Tee, Union Barbed	89000520
60	Tubing, Black Urethane	89000582* * Specify by length
61	Belt, Power Twist	90530120
62	Sheave, V-Belt	90700102
63	Belt, Timing	Specify by center to center of shafts and number off each pulley
64	Pulley	Specify by number on pulley
65	Bushing	90800696
66	Pin/Block, Assembly	81400471
67	Air Cylinder (Locating Stop)	89000480
68	Bushing, Ball	90040104

## ADDITIONAL REPLACEMENT PARTS

<b>Line-shaft Assembly</b>	
Including: Line-shaft bearings, spacers, spools, coupler sprockets (for 3 rollers) "	Specify model, bed length, zone lengths, drive or intermediate bed and driven sprocket size if drive bed. Contact the Distributor Services Department for cost and delivery.
<b>Spools</b>	
Split Standard	90801201
Split Speedup	90801203
<b>Crossmember (Standing Width)</b>	
15" OAW 13" BF	40615113
18" OAW 16" BF	40618116
24" OAW 22" BF	40624122
30" OAW 28" BF	40630128
36" OAW 34" BF	40636134
42" OAW 40" BF	40642140
<b>Air Piping</b>	
Clear	89000580
Red	89000581
Black	89000582
<b>Drive Belt Repair Kit</b>	
Including: Carrying case, cut length chart, heating iron and 25' of drive belt cord (specify diameter)	99940002
<b>Quick Replacement Belts</b>	
Including: S" hook" (for straights) 3/16 dia x 13-1/2" "	90530035
<b>Side Channel (specify roller centers)</b>	
4-1/2" Deep 10' Long	40745310
9" Deep 10' Long w/welded butt bolt connectors	50690310
<b>Roller to Roller Traction Belt (includes tracking O-ring)</b>	
3" Roller Centers	90530028
4" Roller Centers	90530029
<b>7/16" Hex Eye Blt for Switch</b>	95300100
<b>U-Joint, constant velocity (incline/decline use only)</b>	90895000
<b>16 oz. Can of Spray Paint</b>	
Ermanco Blue	90802201
Ermanco Dark Blue	90802202
Ermanco Green	90802203
Ermanco Beige	90802204
Ermanco Charcoal Gray	90802205
Ermanco Orange	90802206

## XR40/48 DRIVE BELT DATA

	Belt Application	Centers	Dia.	"L" Length	Part Number
XR40	Drive Pulley to Roller	5 "	1/8"	13-1/2"	90530002
		5 "	5/32"	13-1/2"	90530048
		5 "	3/16"	13-1/2"	90530009
	Drive Pulley to Roller (High Tension)	5 "	7/32"	13-1/2"	90540009
	Roller to Roller	4"	3/16"	11-5/8"	90530007
		3"	3/16"	9-15/16"	90530005
		2-1/4"	3/16"	9"	90530003
	Drive Pulley to UBT Roller	5"	7/32"	12-7/8"	90560016
	Drive Pulley to Tapered Roller	5-3/16"	7/32 "	12-11/16"	90560018
	Tapered Roller to Tapered Roller	3"	3/16 "	9"	90530003
2-3/8"		3/16 "	7-7/8 "	90530012	
XR48	Drive Pulley to 2" Roller	5 "	7/32 "	13.04 "	90560040
	Drive Pulley to 1.9" Roller Speed-up Drive Pulley to Roller	5 "	7/32 "	12-11/16"	90560018
	Roller to Roller	3"	3/16 "	9-15/16"	90530005
	Drive Pulley to Tapered Roller	5-3/16"	7/32 "	12-15/16"	90560041
	Tapered Roller to Tapered Roller	3"	3/16 "	9 "	90530003

## DRIVE PARTS IDENTIFICATION

DRIVE DATA						
Motor HP See Chart Below	FPM	Reducer See Chart Below	Drive Sprocket Item 20	Bore	Driven Sprocket Item 21	Bore
1/2, 3/4	20	56/262-30	5016	1-1/8 "	5018	1"
1/2, 3/4	25	56/175-20	5015	7/8 "	5020	
1/2, 3/4, 1	30		5016	7/8"	5018	
1/2, 3/4, 1	35	56/175-15	5014			
1/2, 3/4, 1	40		5016	7/8 "		
1/2, 3/4, 1	45	56/262-15	5018			
1-1/2	45	56/175-15	5018	1-1/8 "		
1/2, 3/4, 1	50	56/175-10	5014	7/8 "		
1-1/2				1-1/8 "		
1/2, 3/4, 1	55	56/175-10	5015	7/8 "		
1-1/2				1-1/8 "		
1/2, 3/4, 1, 1-1/2	60	56/175-10	5016	7/8 "		
2		140/262-10		1-1/8 "		
1/2, 3/4, 1, 1-1/2	65	56/175-10	5017	7/8 "		
2		140/262-10		1-1/8 "		
1/2, 3/4, 1, 1-1/2	70	56/175-10	5019	7/8 "		
2		140/262-10		1-1/8 "		
1/2, 3/4, 1, 1-1/2	75	56/175-10	5020	7/8 "		
2		140/262-10		1-1/8 "		
1/2, 3/4, 1, 1-1/2	80	56/175-10	5018	7/8 "	5015	
2		140/262-10		1-1/8 "		
1/2, 3/4, 1, 1-1/2	85	56/175-10	5019	7/8 "		
2		140/262-10		1-1/8 "		
1/2 3/4 1 1-1/2 2	90	56/175-10	5012	7/8 "	5018	
	95		5014		5020	
	100		5015		5020	
	105		5014		5018	
	110		5016		5020	
	115				5019	
	120				5018	

Item 22	HP	Motor
	1/2	90480106
	3/4	90480111
	1	90480116
	1-1/2	90480120
	2	90480125

Note: For other speeds us the following formula:  

$$\text{FPM} = 0.387 \times \text{Reducer Output RPM} \times \frac{\text{Drive Sprocket}}{\text{Driven Sprocket}}$$

Item 23	Reducer	
	56/175-5	90655005
	56/175-10	90655009
	56/175-15	90655014
	56/175-20	90655016
	56/262-15	90655038
	56/262-20	90655018
	56/262-30	90655023
	140/262-10	90655011

## LOW PROFILE DRIVE DATA

DRIVE DATA WITH CHAIN & SPROCKETS					
FPM	Motor HP	NORD	Output RPM	Drive Sprocket (Reducer)	Driven Sprocket (Line-shaft)
30	1/2	SK272VL-71L/4	86	H5017 1"	5018 1 "
	3/4	SK272VL-80S/4	85	H5017 1"	
	1	SK272VL-80L/4	82	H5018 1"	
45	1/2	SK272VL-71L/4	128	H5017 1"	5018 1 "
	3/4	SK272VL-80S/4	128	H5017 1"	
	1	SK272VL-80L/4	123	H5017 1"	
60	1/2	SK272VL-71L/4	174	H5017 1"	5018 1 "
	3/4	SK272VL-80S/4	173	H5017 1"	
	1	SK272VL-80L/4	167	H5017 1"	
75	1/2	SK272VL-71L/4	226	H5016 1"	5018 1 "
	3/4	SK272VL-80S/4	224	H5016 1"	
	1	SK272VL-80L/4	216	H5017 1"	
90	1/2	SK272VL-71L/4	255	H5017 1"	5018 1 "
	3/4	SK272VL-80S/4	254	H5017 1"	
	1	SK272VL-80L/4	245	H5018 1"	
120	1/2	SK272VL-71L/4	305	H5019 1"	5018 1 "
	3/4	SK272VL-80S/4	304	H5019 1"	
	1	SK272VL-80L/4	243	H5019 1"	

Contact the Customer Service for all timing belt applications.

## MISSION

To meet or exceed all customer expectations by providing the highest quality products and services, on time, at exceptional value, in an environment which promotes safety and personal development.



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