

# INSTALLATION, OPERATION, MAINTENANCE MANUAL



XenoROL®

XR30

# XR30 IOM

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## **PURPOSE**

It is the intent of Ermanco Inc., through this manual, to provide the necessary information to qualified personnel for the installation, operation and maintenance of Ermanco XenoROL® XR30 conveyor.

This manual describes basic installation practices, assembly arrangements and general maintenance, including troubleshooting guide, service intervals and replacement parts identification.





## EQUIPMENT WARRANTY

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

MHS Conveyor-ERMANCO 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-ERMANCO immediate notice in writing and examination proves the claim that such materials or parts were defective when furnished. For drive components specific to XenoROL®, 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-ERMANCO 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-ERMANCO 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-ERMANCO 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-ERMANCO.

The warranties specified above do not cover, and MHS Conveyor-ERMANCO 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-ERMANCO carries only such warranty as given by the manufacturer thereof, which warranty MHS Conveyor-ERMANCO will assign or otherwise make available to Purchaser without recourse to MHS Conveyor-ERMANCO, 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-ERMANCO representative. **MHS Conveyor-ERMANCO** will not be responsible for units that have been tampered with or disassembled by anyone other than the authorized representative of the respective manufacturer.

Rev. January 31, 2003

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 AGREEMENT.

# INTRODUCTION TO XR30

## INTRODUCTION

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. If the torque requirement from 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 unequalled 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.

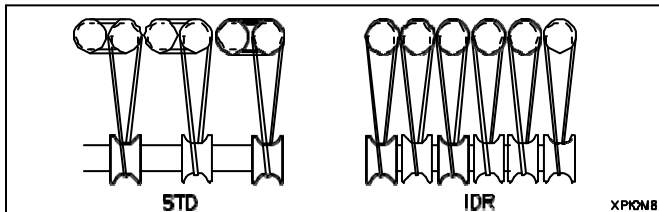
XenoROL XR30 line-shaft driven live roller conveyor uses the same line-shaft design as XR40 with all the benefits of economy, versatility, quietness, safety and cleanliness. Low horsepower requirements result in long conveyor lengths on a single drive. With rollers on 1-1/2" centers, XR40 is especially suited for small or flexible product handling.

XenoROL XR30 conveyor is unique since it has been engineered with two belt drive arrangements and capacities. These drive specifications are "Standard" and (Individually Driven Rollers) "IDR".

"Standard" uses one spool and drive belt to power two rollers through a slave belt. The standard type is well suited for small, light weight products. It gives lower pressure when accumulating which also allows the rollers to stop under the product easier, reducing product marking.

"IDR" uses one drive spool and belt to power each individual roller. The IDR design has much higher drive capacity for heavier products or when weight is concentrated on smaller footprints.

**NOTE:** Speedup pulleys cannot be used with IDR.



## MINIMUM PRESSURE ACCUMULATION

When conveyed product is stopped, the roller drive belt and pulley also stop while the line-shaft continues to turn. Long lengths of accumulated product must be zoned with stop devices to brake the total line pressure into smaller increments. The impact force of moving product increases with weight and speed.

Stopping devices can also be used to accumulate product prior to curves. Air or electrical sensor controls can be supplied.

Long lengths of accumulated product must be zoned with XenoBRAKES or case stops. A braking device on specified centers reduces the total line pressure into several increments. XenoBRAKES or case stops can be used to accumulate product prior to curves. Air or electrical sensor controls can be supplied to activate the stop device.

Always consult the Sales Engineering Department.

**REDUCTION OF LINE PRESSURE:** Line pressure of accumulated articles can be reduced by removing belts at specified intervals on the conveyor. With rollers on 3" centers, the accumulated pressure can be reduced 25% by removing every fourth belt.

Caution: Drive capacity, which is also reduced 25% must be sufficient to convey the heaviest product.

DRIVE CAPACITY PER ROLLER BY PRODUCT BOTTOM		
Drive Capacity Per Roller (lbs.) 1/8" Dia. Belt		Product Bottom
STD.	IDR	
3.5	7	Soft, weak bottom, load unbalanced, uneven bottom, with noticeable bumping. Ex.: plastic totes, wire or steel baskets, lightweight corrugated.
5	10	Slight indentation, less than even loading. Ex.: normal corrugated and most plastic totes (includes most applications).
6	12	Firm, very flat bottom and uniform loading. Ex.: heavy wall corrugated, double wall corrugated and stiff treated materials.
7.5	15	Hard and flat bottom, uniform load distribution. Ex.: plywood and fiber board.

**NOTE:** There are 8 rollers per foot on 1-1/2" centers.

## PRECAUTIONS

**TEMPERATURE RANGE (AMBIENT):** 35°F to 100°F. For temperature applications outside this range, consult Sales Engineering Department.

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

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

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

## WARNINGS & SAFETY INSTRUCTIONS

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

Your XenoROL® line-shaft driven live roller conveyor is motor powered and can be stopped only by turning off power to the motor. As with all powered machinery, the drive and driven sprockets, chains, line-shafts, universal joints and pneumatically actuated devices present a danger. We have installed or provided guards to prevent contact with these components. We have also installed warning labels to identify the hazards. Guards are only effective when in place. **After maintenance, REPLACE guards immediately. Keep ALL warning labels clean and clear of any obstructions.**

Warning labels need to stand out clearly to be effective. Never remove, deface or paint over WARNING or CAUTION signs. Any damaged label will be replaced by Ermanco Inc. at no cost. Contact the Order Service Department when required.

It is very important to instruct your personnel in the proper use of the conveyor including the location and function of all stop controls. Inform them of the potential hazards involved in its use. Establish work procedures and access areas which do not require any part of their person to be under the conveyor. Require that caps or hair nets be worn and prohibit the wearing of loose clothing or jewelry when working at or near the conveyor.

Before working on a conveyor, protect personnel from unexpected starts by shutting off power at the point of operation control and lockout the disconnect switch using the proper lockout procedures. After lockout of the control panel or disconnect switch that supplies power to the unit, try the equipment to ensure it's inoperable and attach a "DANGER" tag to the lock. Make sure personnel are clear of the system and all guards replaced before starting the conveyor.

Maintain enough clearance on each side of the unit for safe adjustment and maintenance of components.

Provide crossovers or gates at sufficient intervals to eliminate the temptation 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. REFERENCE PAGE 10.**

# 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.

However, 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 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 dry designated 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.

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

## SUBASSEMBLIES

Conveyors are shipped as subassemblies. Each subassembly is shipped complete except typical loose parts listed on page 8. Drives with motors are shipped mounted to a drive bed.

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

## PARTS INVENTORY & IDENTIFICATION

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 24XR30 3/4 HP 60 B  
JOB: C003325 11/10/95



*Identification labels on bed and drive package*

IT#: X9503463  
DSC: BED 12XR30-1.5D X 10'  
JOB: C003325 11/10/95  
TAG: O-RINGS 90530082 90530013  
90530004

Loose parts are boxed and shipped separately. You must have all bed 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 not practical to inventory and are easily obtained if necessary.

## TYPICAL XR30 LOOSE PARTS

Part Number	Item	Use	Illustration
41700910	<b>LINE-SHAFT GUARD END COVER with Set Collar, Kit</b>	Cover end of L-S guard at termination of conveyor	See <b>Warning</b> p. 10
90140001	<b>Safety Caps</b>	Cover end of line-shaft keyway at joint between drive units	See <b>Warning</b> p. 10
90314510	Line-shaft Guard, 10' straight	Guard, line-shaft	p. 25
41701000	Attaching Bracket	Fasten line-shaft guard	p. 25
95200001	Spring Steel Retainer	Fasten line-shaft guard	p. 25
95000021	Hex Flange Set Screw	Fasten line-shaft guard	p.25
95300036	Rubber Washer	Isolate guard	p. 25
90480028	U-joint Cover Guard	Horizontal to incline, straight beds	p. 19
90140025	Coupler Chain	Line-shaft coupling bed to bed	p. 16-17
Varies by Size	Floor Support	Support conveyor frames	p. 11
80400002	KBA Knee Brace	Brace frame to support leg	p. 11
80400003	KBB Knee Brace	Brace frame to support leg	p. 11
80400004	KBC Knee Brace	Brace frame to support leg	
80700001	Guard Rail Arm	Support adjustable channel G.R.	p. 26
80700002	Guard Rail Clamps	Fasten Adjustable Channel G.R.	p. 26
80700011	Guard Rail Splice Angle	Support rail to rail joint	p. 26
95000027	1/4-20 x 2 Hex HD Bolts	Adjustable Channel G.R.	
80700112	Spacer Channel	Ceiling Hanger	p. 12-13
80700013	V-Bracket	Ceiling Hanger	p. 12-13
Varies by Length	Cross Pipe	Ceiling Hanger	p. 12-13
80701011	Standhead Connector	Bed Joints	p. 12-13
40700051	Butt Bolt Connectors	Bed Joints	p. 12-13
	Special Connector Devices	Per application	
	Electrical Components	Per application	
	Special Device Parts		
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 Nut		

# 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. (Reference page 16.)

## 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 related to this first point. Normal practice is to dimension 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 dimensioned 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 dimensioned from the floor and becomes the reference elevation point until a change in elevation is shown on the layout. This new elevation is then dimensioned from the floor and becomes the new reference point. The process is repeated each time an elevation change occurs.

## CAUTION

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

## 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 in 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 Ermanco. 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.

## LINE-SHAFT TERMINATIONS

### WARNING

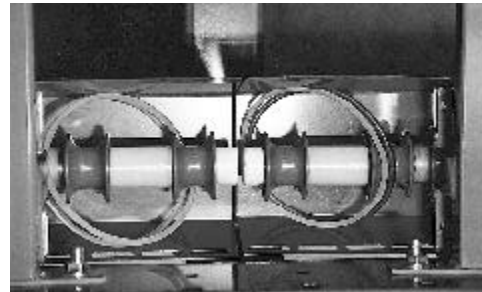
Remove any coupler sprocket which is not coupled to an adjacent sprocket. These sprockets must be removed before the bed is installed. The white line-shaft safety caps must be installed in place of the sprockets to cover the end of the keyway.



Never leave unused sprockets on line-shaft.

### WARNING

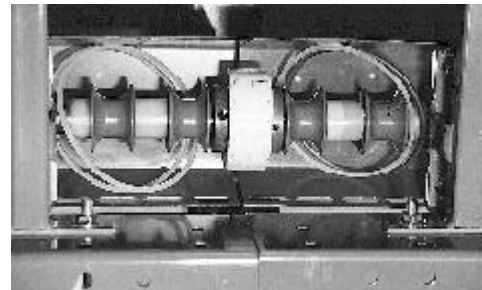
Safety caps are required on ends of all adjoining line-shaft conveyor beds not coupled together.



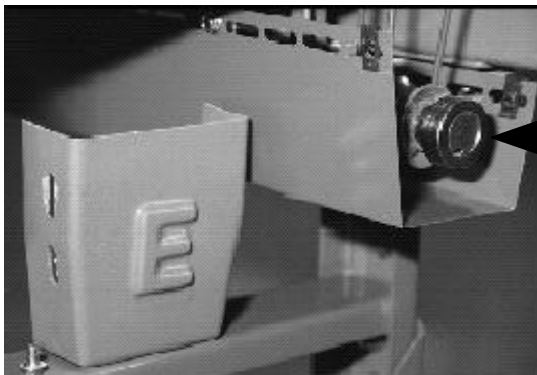
At joint between adjacent drive units, remove sprockets and add white plastic safety caps.

### 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.

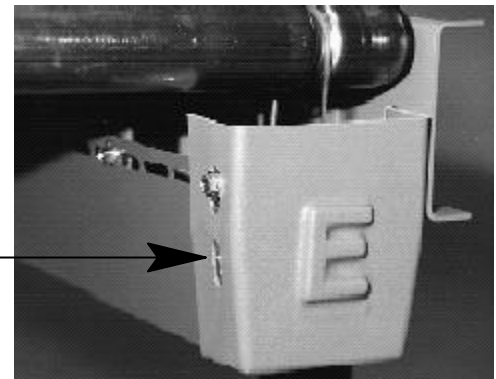


When continuing drive, install coupler chain per instruction on pages 16 and 17.



Set Collar

End  
Cover





# SUPPORTING ARRANGEMENTS

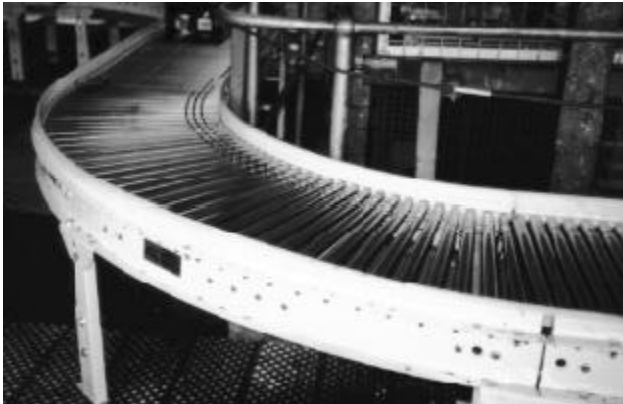
## FLOOR SUPPORTS

Install support attaching bolts 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® XR30 conveyor is 4-11/16" 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 be compensated for in the pivoting standhead of the support.



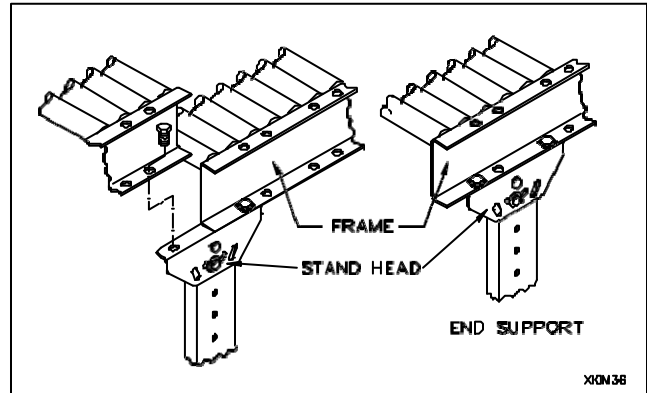
90° curve with true taper rollers. A single support leg is located on outside channel on outside at 45°. Over 18" width should have full support.

## 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 on opposite side. Anchor bolts for equipment subject to impact loads should be a minimum of 1/2" diameter.

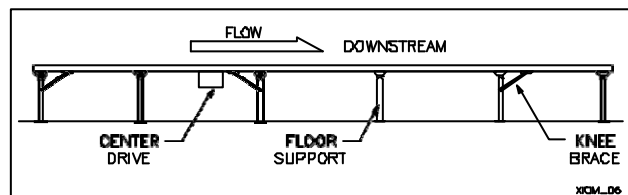


## WARNING

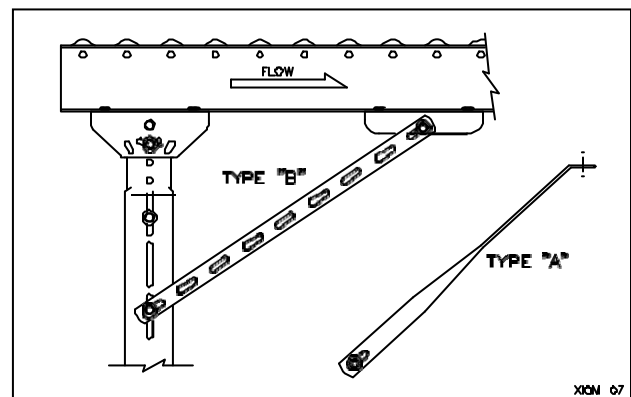
**Place a bolt through the frame and support immediately with finger tight nut. This will prevent the frame from falling off the support if bumped and causing injury.**

## KNEE BRACES

Stability along the conveyor length is achieved with knee braces. Braces resist stresses caused by flow direction, 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 on the supports "DOWNSTREAM" side 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 brace strap and frame should not exceed 45 degrees, or be less than 30 degrees. On short supports where a small angle results, the brace strap may need to be shortened.

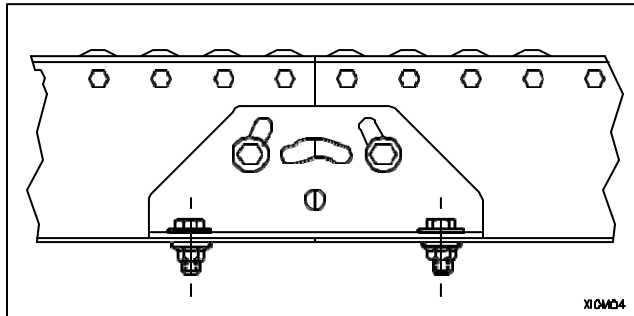




## CONNECTORS

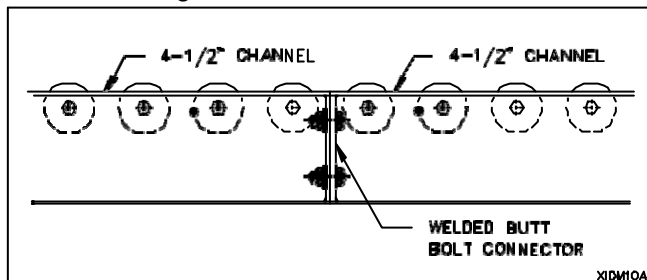
Adjoining beds may be connected using optional stand-head connector plates (one on each side). Connectors are normally used with ceiling hangers when the hanger is not centered on the frame joint. The hanger should be within 1' of the joint while maintaining 10' maximum centers. The beds should be temporarily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



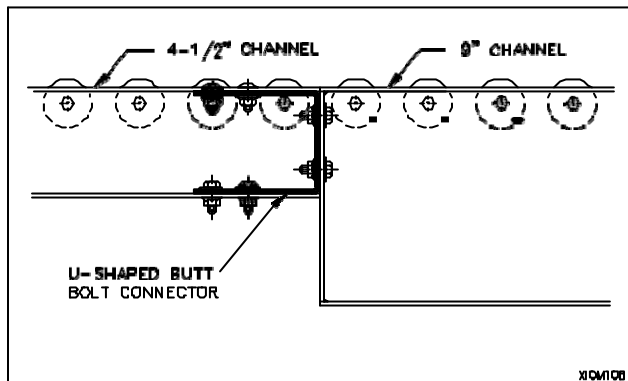
Beds should be checked for squareness before final tightening of bolts.

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.



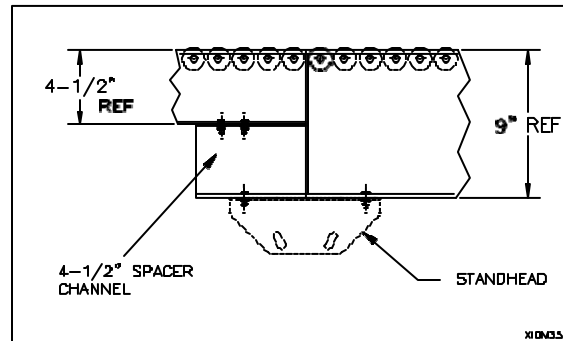
Welded butt bolt connector available for 4-1/2" deep frames; they are standard with 9" deep frames.

U-shaped butt bolt connectors are installed at installation and may be used to connect two 4-1/2" channel frames. However, they are most commonly used to connect a 4-1/2" channel frame to a urethane belt transfer which uses a 9" frame with pre-welded butt bolt plates in each end. This connector cannot be used to connect to a curve without field modification to brackets mounted to the curve.



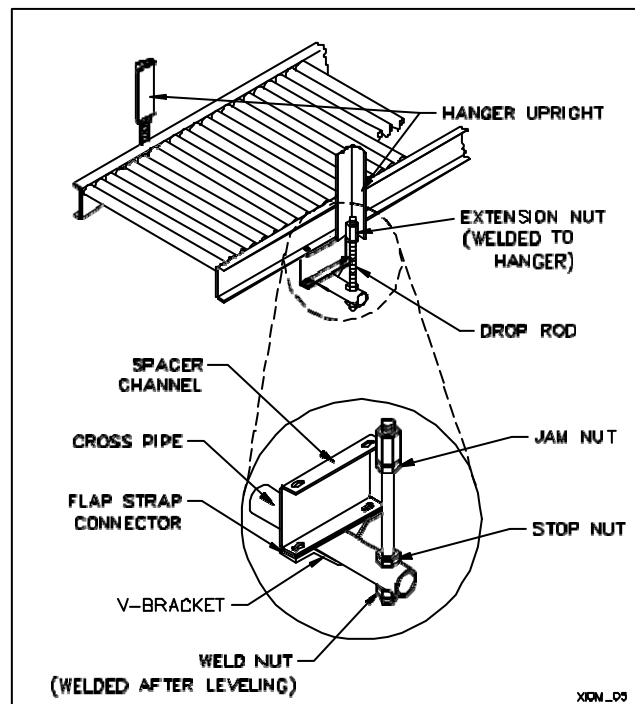
A butt bolt connector kit includes two U-shaped brackets which is suited for connecting to 9" deep channels (i.e., UBTs).

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 in the frame joint between 4-1/2" and 9" deep channel frames.



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

## CEILING HANGERS



Drop rods and nuts are optional. The extension nut is welded into angle 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**

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 a 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.

### METHODS FOR ANCHORING

#### *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.

## SWAY BRACING

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 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

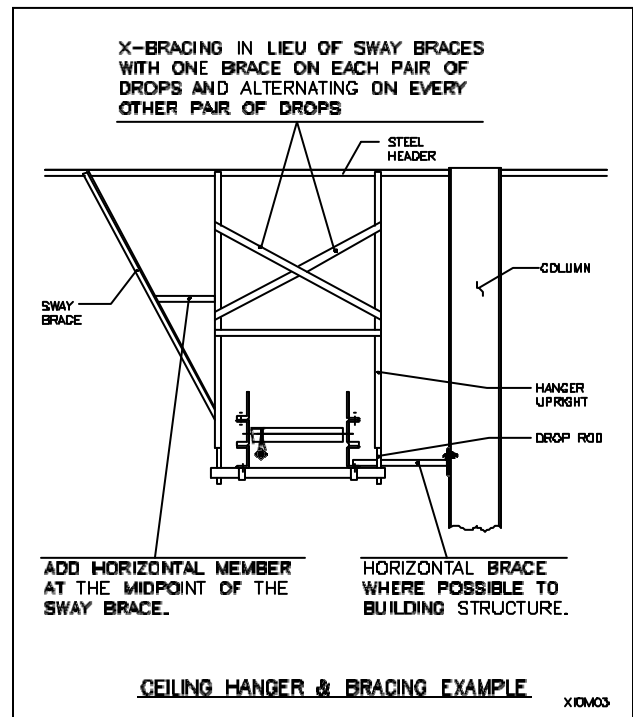
## DIAGONAL SWAY BRACE

Floor support 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. The holes in the support uprights need to be field drilled.

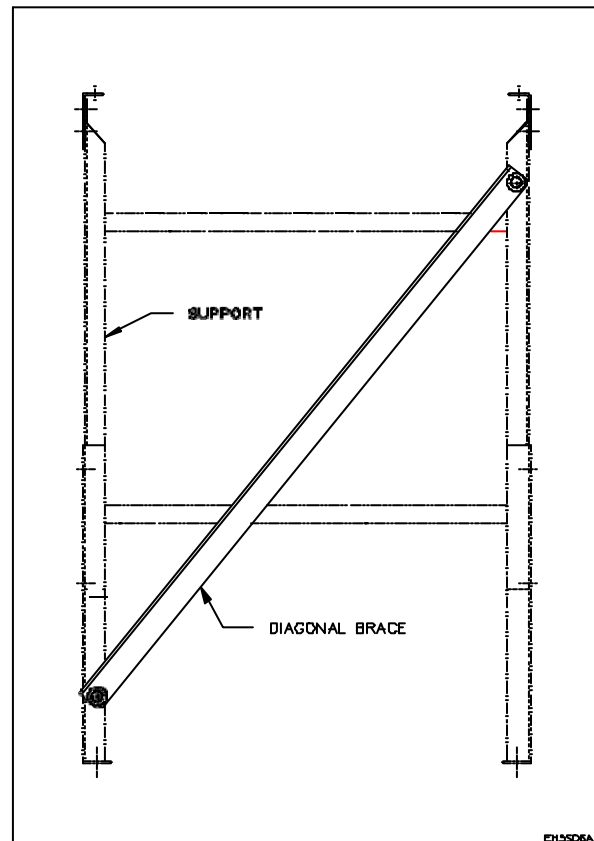
If excessive oscillation persists after bracing has been added, it may be the result of harmonics. This can occur when the conveyor operating speed generates vibrations with a frequency at or near the conveyor's natural frequency of its structure.

This condition is rare normally occurring between 85 FPM and 120 FPM. It may be minimized by more than normal bracing or by changing conveyor speed either increasing or decreasing.



## CAUTION

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

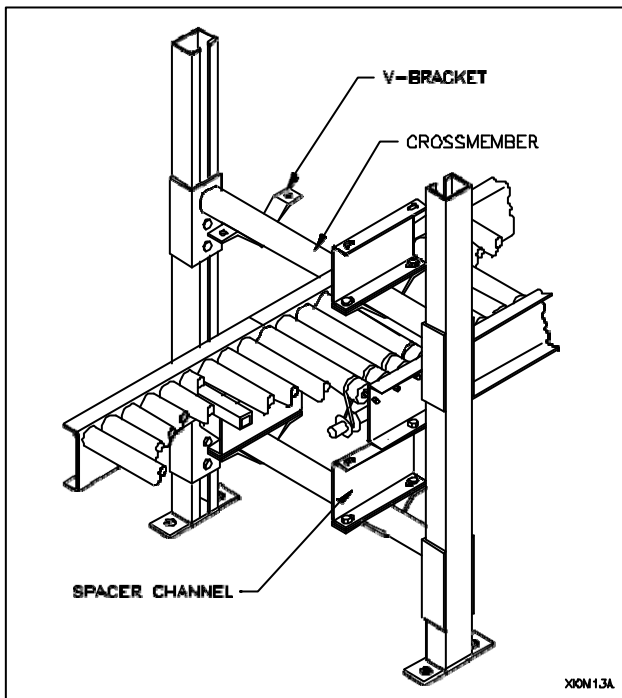


## MULTI-LEVEL XENOROL SUPPORT

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.



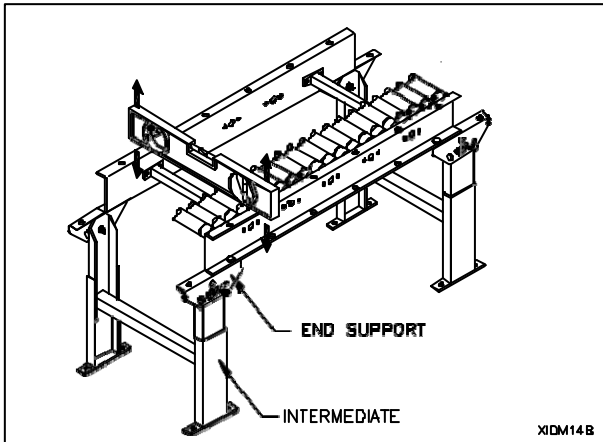
# COMPONENT INSTALLATION

## GENERAL



*XenoROL® XR30 being stacked on pallet for shipping (7) intermediate beds per side.*

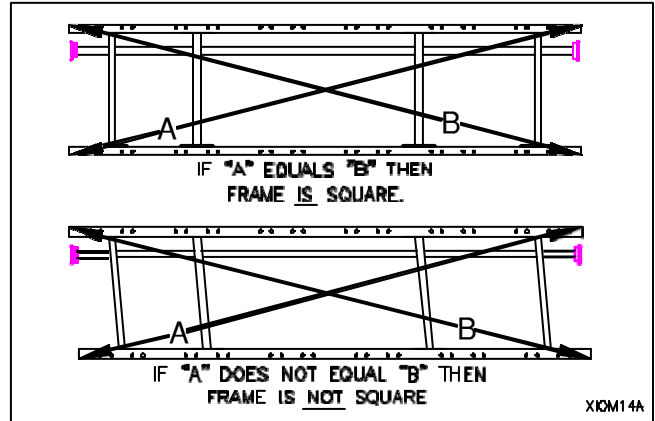
Straight bed sections may be installed using any of the support methods previously described (see SUPPORTING ARRANGEMENTS). As each bed is installed in the system, level it lengthwise and across the bed width on a roller. The supports should also be checked for vertical. A shorter level may be required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

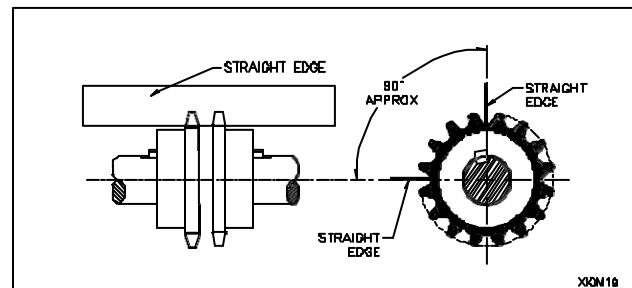


## FRAME ALIGNMENT

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.

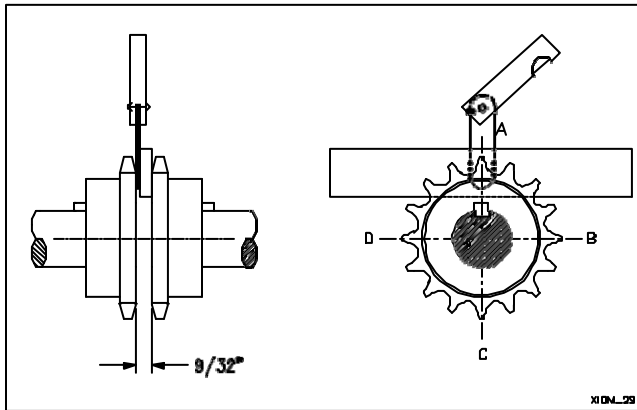


If the coupler sprockets do not align vertically, adjust either or both of the following:

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.

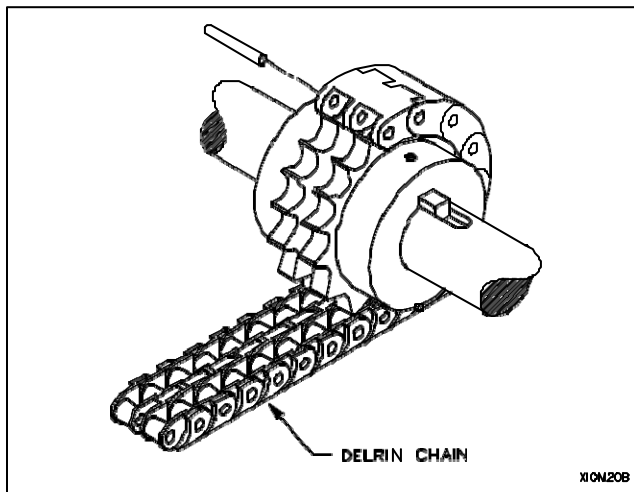
Angular alignment and gap may be checked with a feeler gauge and shim material every 90 degrees.



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 sets screws to 13 ft.lbs.

#### 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.



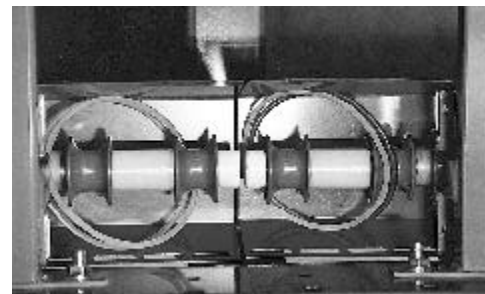
Connecting the coupler chain is accomplished by inserting the serrated pin through the side of the double wide Delrin coupler chain. Care must be exercised when installing the press fit pin to ensure the side link opposite the insertion side is not damaged. Support the chain link by using a C-clamp or 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.

#### WARNING

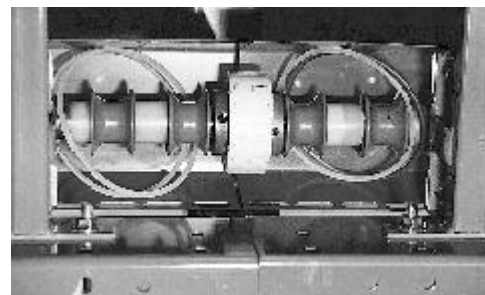
**Remove any coupler sprocket which is not coupled to an adjacent sprocket. The sprockets must be removed before the bed is installed. The white line-shaft safety caps must be installed in place of the sprockets to cover the end of the keyway on 1" diameter shafts. A steel set collar is used instead of the white safety cap on all 1-7/16" shafts.**



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



*Never leave unused sprockets on line-shaft.*

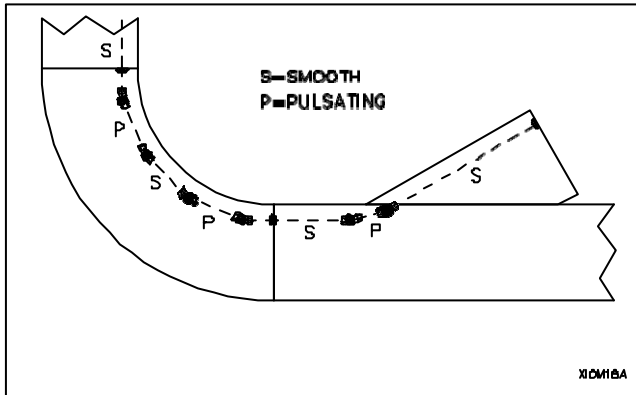


*When continuing the drive, install coupler chain per instructions.*



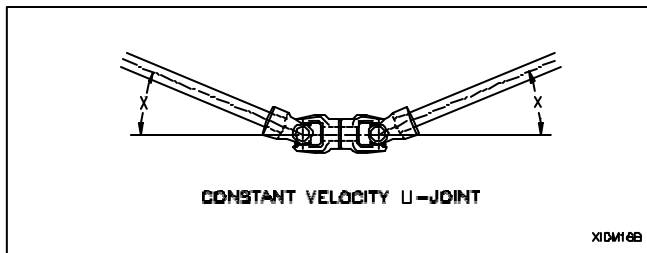
### PULSATING EFFECT OF POWERED CURVES

During the operation of the powered curves, a slight pulsating or jerking effect may be noticed in the rollers powered off that portion of the drive shaft connecting each pair of universal joints (U-joints). This is caused by the intermittent speedup and slowdown effect of universal joints. Pulsing is most noticeable as universal joints approach operation at 30 degrees (as in a 60 degree curve) and virtually unnoticeable as the universal 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.

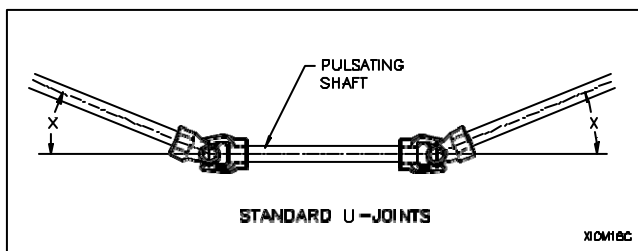


### PHASING - UNIVERSALS

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 be 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 universals 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 universals can also have detrimental affects on other components besides the universal itself.

When a pulsing shaft is broken by a coupler on an incline/decline, we have potential phasing problems. The universal MUST be in line before installing the last coupler chain. No drive may be located between a pair of universals. No jump chain other than 1:1 ratio may be located between a pair of standard universals.

### 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 universal joints to bend the line-shaft both horizontally (curves) and vertically. Vertically bending the line-shaft through universal 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.

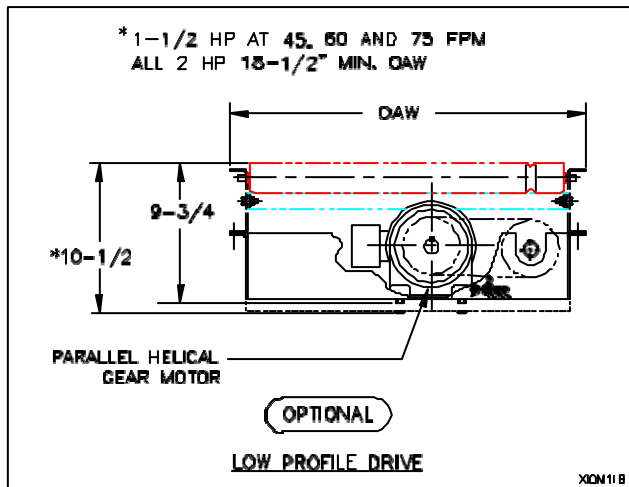
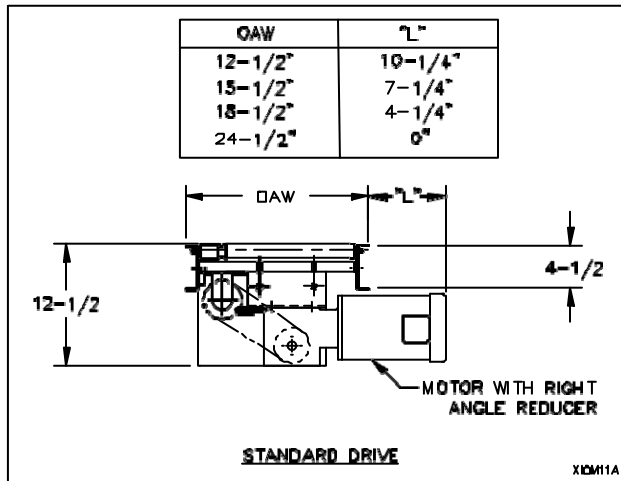
### CAUTION

**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, universal joints are required on the line-shaft at the upper and lower transition points. Constant velocity universals are recommended to avoid phasing and pulsation problems. Only the IDR drive type should be considered for inclining and declining.

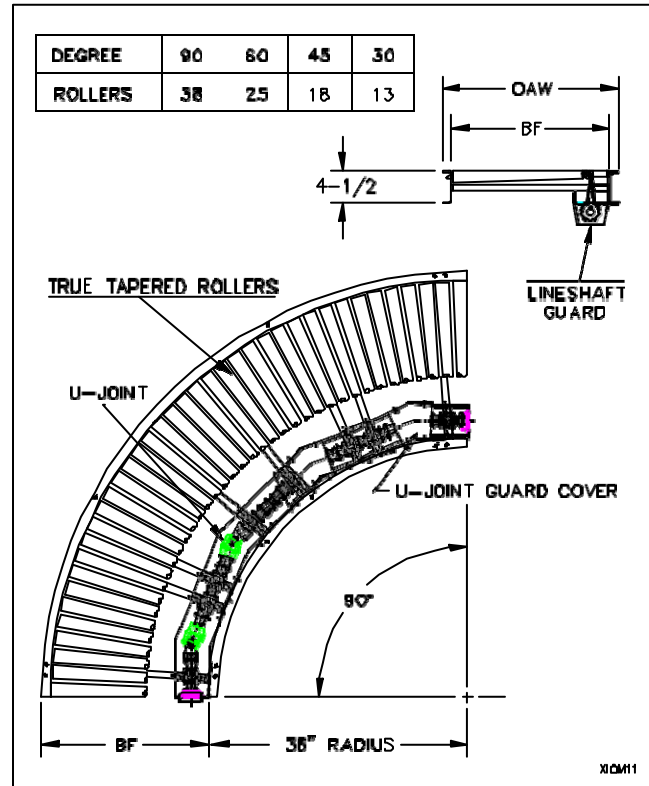
## DRIVES

Since XR30 is offered in widths to 24", most 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.



## CURVES

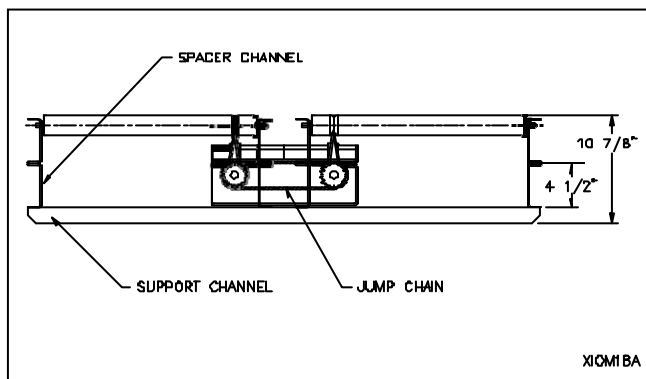
Curves are installed the same as straight sections. In addition to end supports, 90 degree curves should have a support in the center of the outside frame channel. Curve center leg supports are available. If a curve is joined by inclined XenoROL® requires a universal, a 1' minimum length straight bed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





## JUMP CHAINS

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 relocate the line-shaft 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 through line-shaft 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 speed up or slow down ratio.

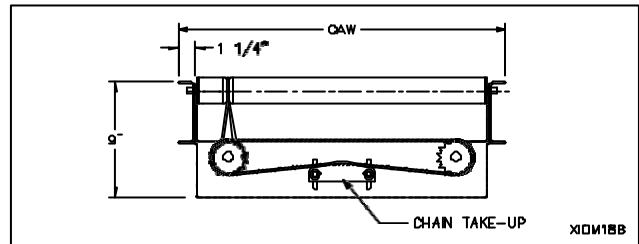


*External Jump Chain Assembly*



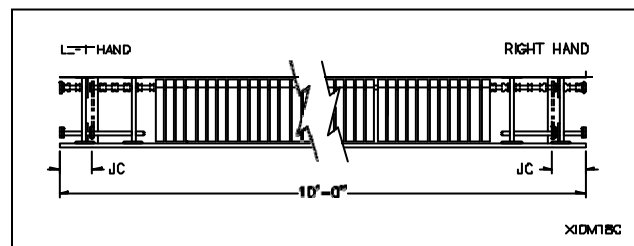
*Internal jump chain in 2'-0" bed. Ships with all guards attached (shown upside down).*

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 counter-clockwise twist.



*Internal Jump Chain Assembly*

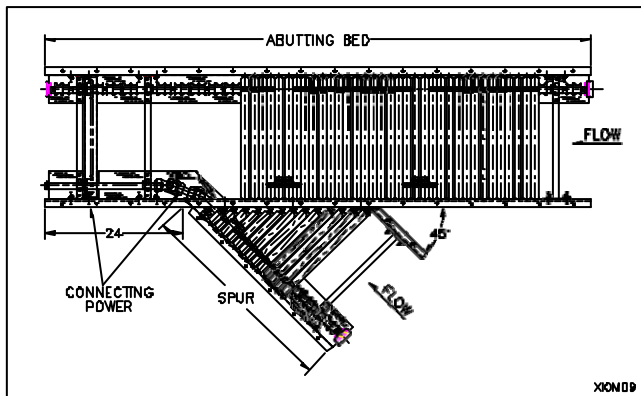
The internal jump chain is offered in 10' and 2' long beds. The 10' long beds are designated as right hand or left hand indicating which end the jump chain is located. If several jump chains are used in the system, check the layout relative to line-shaft location to determine the proper assembly. On 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 chains 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 speed up or slow down begins. If the new speed occurs at the beginning of the jump bed, you will connect the incoming line-shaft to the bare shaft. 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.



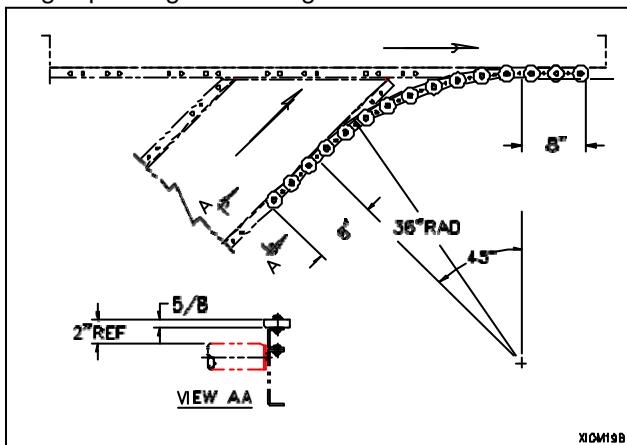
*Jump Chain Location*

## MERGE ASSEMBLY

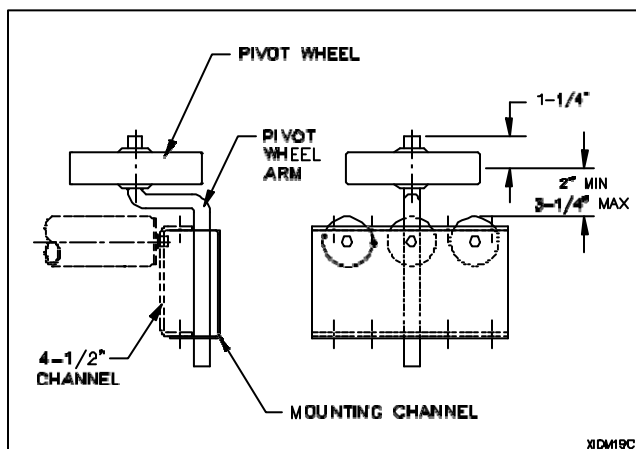
Merge assemblies are used at the juncture to two conveyors where one is required to merge into and join the other line. The merge assembly consists of an abutting bed, spur and power connection. Both conveyors are joined together using a common drive through the power connection. The power connection 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.



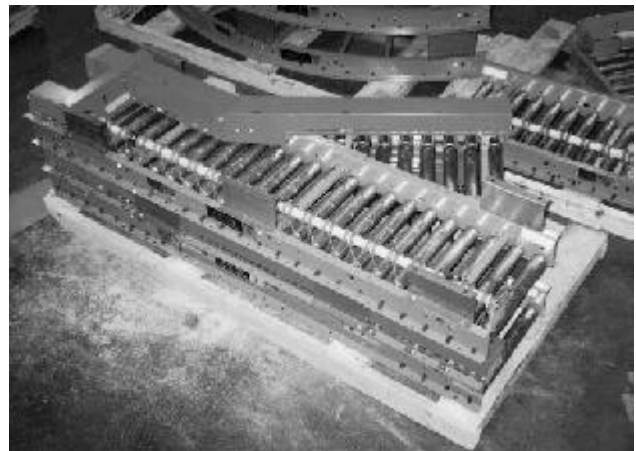
*Curved Wheel Rail*



*Pivot Wheel*

While the product is merging, it is being pushed by the spur and pulled by the abutting bed at 45 degrees opposing forces. 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 on XR30 by utilizing the individually driven roller (IDR) drive arrangement using 5/32" diameter belt in lieu of the standard 1/8" diameter belt. In addition to the added drive capacity due to the larger diameter belt and IDR drive system, 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 on to 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.

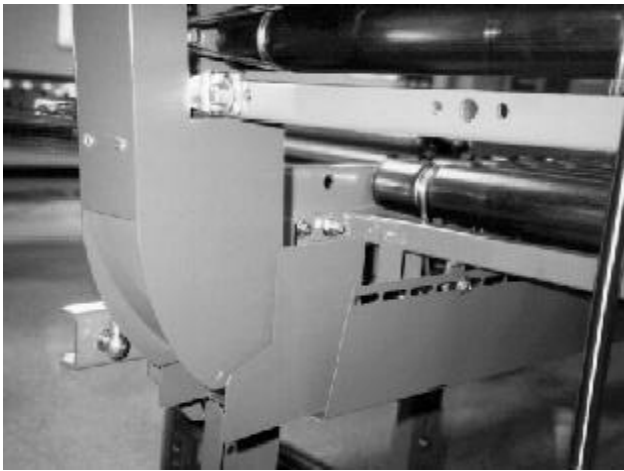
In some applications the power connection is not needed, and the spur line is driven from its own motor. In this case the abutting bed is ordered as an intermediate bed and the spur is ordered separately. It is then up to the person engineering this system to specify a specific intermediate bed to serve as the abutting bed with additional drive capabilities. This also means there may be no fixed relationship between the spur and the point it meets the intermediate bed and will probably require drilling at installation to make the connection. In this case the spur should be set at an elevation approximately 1/4" higher than the abutting bed before the holes are marked for drilling to obtain the optimal elevation relationship.



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

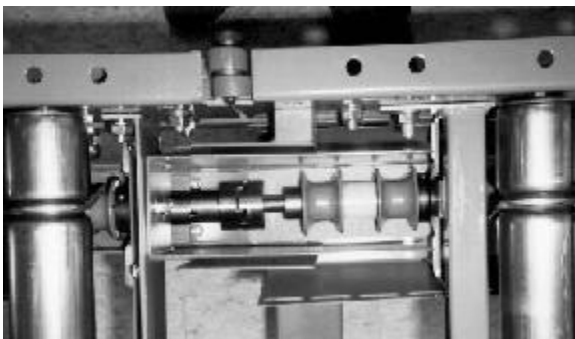
## POWERED GATE

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.



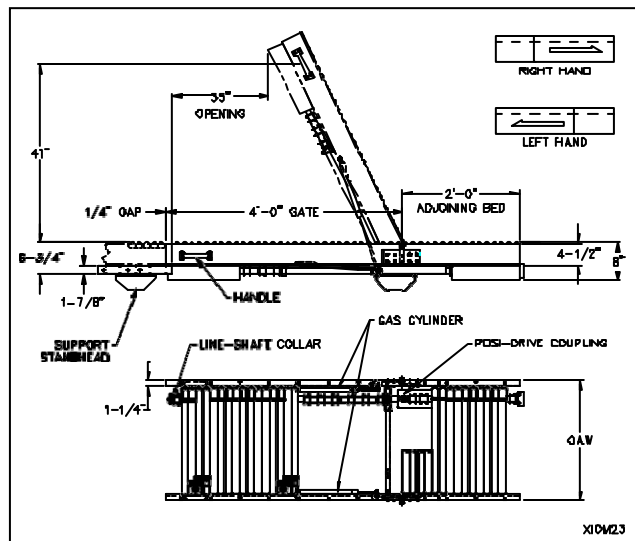
*Posi-coupling guard is mounted at factory.*

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 roller allows 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. When opened the gate provides 35" of clearance for personnel passage. 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 down flow. Right hand is the opposite with the shaft on the right hand looking with the flow of product.



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

To support the powered gate, install the two support striker channels (from the loose parts box) to the conveyor bed following the gate so that 1-1/2" of the striker extends past the end of the bed.

1. Mount a floor support under these channels.
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 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.

When used in conjunction with Ermanco 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 and utilized between products while they are accumulating or transporting. The additional 6' of product travel from zone to zone over the gate must be considered when calculating product discharge rates through this area.

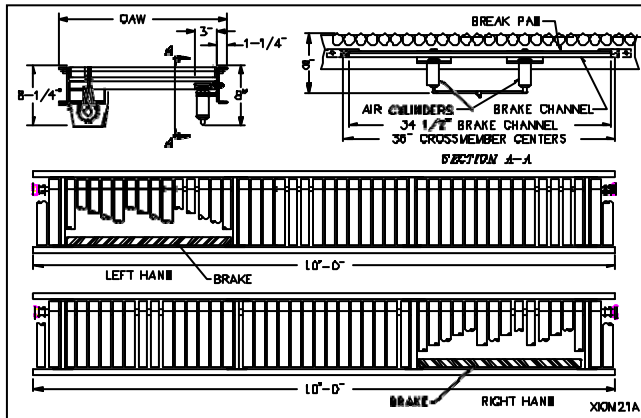
## WARNING

**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. See instructions on page 10.**

## XENOBRAKES

XenoBRAKES are used to stop XenoROL® rollers by clamping them from below. XenoBRAKES are mounted to the inside of the frame 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 by a photo solenoid combination or mechanical pneumatic sensor.



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 or minimum pressure accumulation, the rollers should be coated to increase the product's resistance to being pushed in the brake zone area. 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 to better grip and stop the rollers.

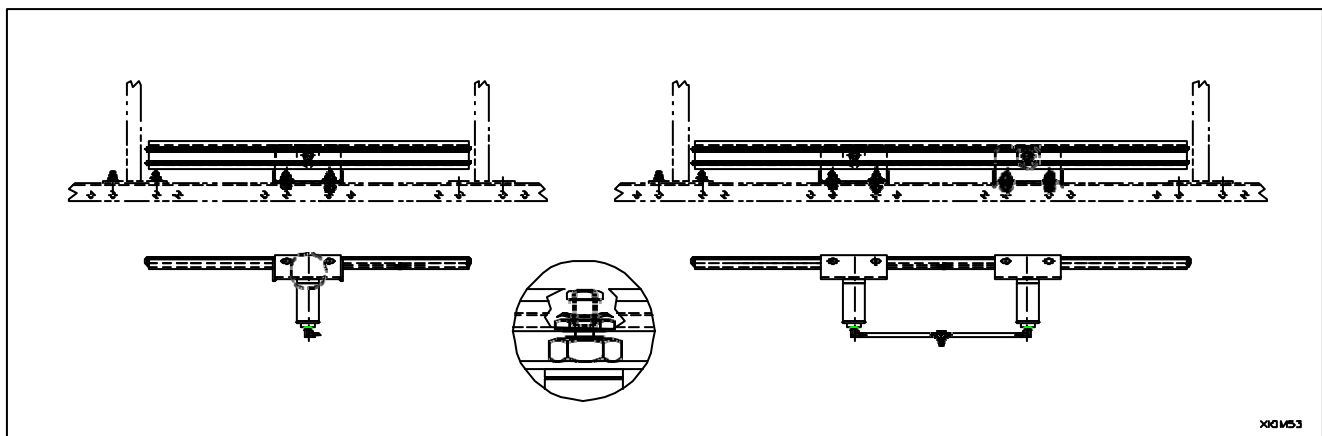
To ensure total stoppage of the rollers over the brake, air pressure should be set at approximately 60 PSI. If required, this may be increased to a maximum of 80 PSI.

Normally XenoBRAKES are factory mounted in the conveyor bed; however, they may be purchased separately and mounted at 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 and 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.

### ALIGNMENT ADJUSTMENT

XenoBRAKES 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.

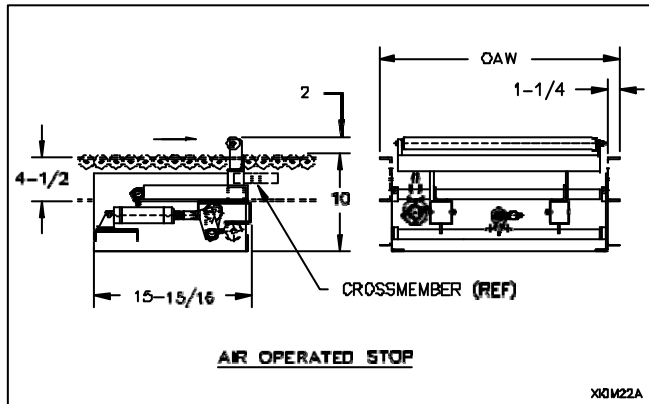
Due to the space between the XenoBRAKES pad and the 1-3/8" dia. rollers, a flow control valve may be used to reduce actuation noise.



*Brakes 2'-0" in length and under have one air cylinder.*

## PRODUCT STOP

The product stop has a gravity roller which raises above the powered rollers to be contacted by the product. The arm which supports this stop roller pivots so the roller falls away from the product when retracted. A double acting pneumatic cylinder is connected to a pivoting cam which raises and lowers the roller mounting bracket. The side plates are approximately 16" long requiring a minimum length bed of 2'-0" for attaching. A crossmember cannot fall within the stop frame. The stop roller may be adjacent to a crossmember on the upstreamside.



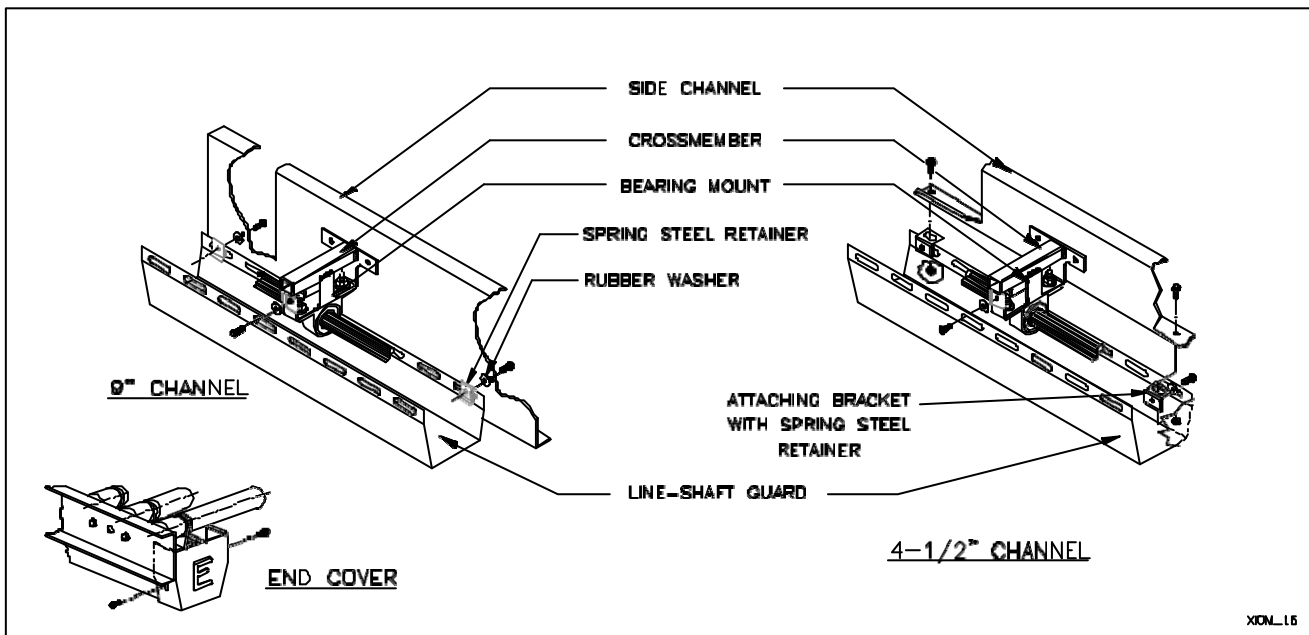
Recommended air pressure is 60-80 PSI. Maximum product weight should not exceed 80 lbs. at 60 FPM. Held accumulation should not exceed 30' with IDR drive type or 60' with standard drive.

## INSTALLATION

Product 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 gravity roller in the case stop must be removed from the conveyor bed. At least two rollers will need to be temporarily removed over the pivot point of the bracket containing the stop roller. 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 cylinder and the actuating controls.

In addition to the air operated product stop, foot and hand operated stops are also available. A foot operated product stop uses a cable to connect the foot pedal to an eye bolt on the pivot arm. The 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 actuates the lift arm.

Since only one powered roller is replaced by the pivoting stop roller, XR30 conveyors with standard belt arrangement (driving two rollers with one belt) will no longer have a drive belt to the roller previously paired with one removed. With individually driven rollers (IDR) this will not be the case and only the product stop roller will be non-driven.



XION\_L16

### LINE-SHAFT GUARDS

Line-shaft guarding is installed at the factory on curves, transfers and merges. Gates, jump chains and other accessories have the short length pieces pre-installed. During installation, only straight sections need to be mounted to the underside of the conveyor frames.

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 bed 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 the retainer to isolate the guard from noise resonance. Tighten the bolts in the bottom flange of the side channel holding the attaching bracket.

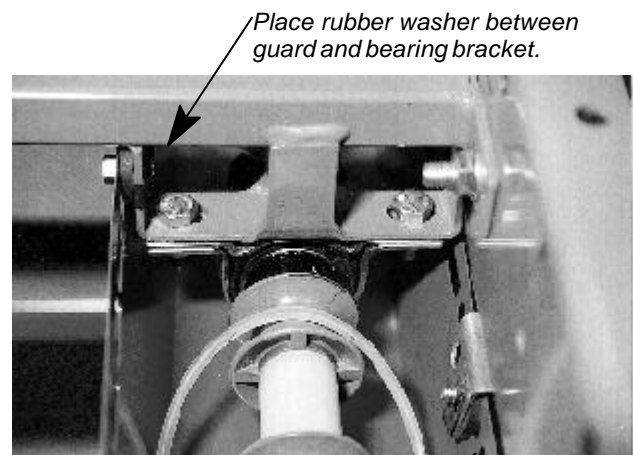
#### *Guards for Inclined Straight Sections*

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 may bridge across the universal, provided no gaps are created. If the angle causes a gap to occur, the top cover must be bent to maintain a tight fit.

### WARNING

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

**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.**



Place rubber washer between guard and bearing bracket.

Place rubber washer between guard and bracket attached to frame side channel.

### WARNING

**Universal joints used in curves can be dangerous. The curve line-shaft guards and universal joint covers must always be in place when operating unit.**



## GUARD RAILS

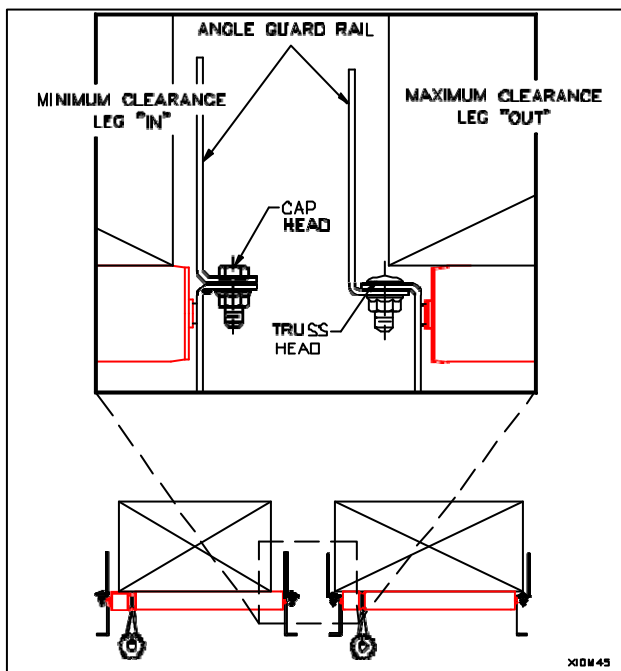
### ANGLE GUARD RAIL

Angle guard rails are bolted to the conveyor frames top flange. They are either bolted with the horizontal leg "out" for minimum clearance or leg "in" for maximum clearance.

For minimum clearance the horizontal leg is placed on top of the frame and attached with truss head bolts. For maximum clearance the horizontal leg is placed under the top flange of the frame and 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 the bolt heads.

For a smoother more rigid joint, offset the angle rail 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 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 rails as follows:

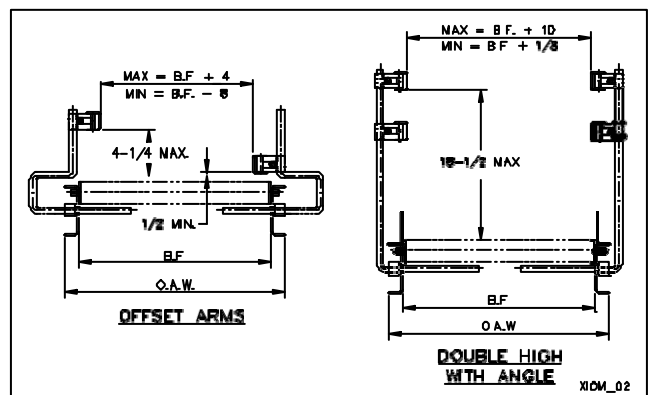
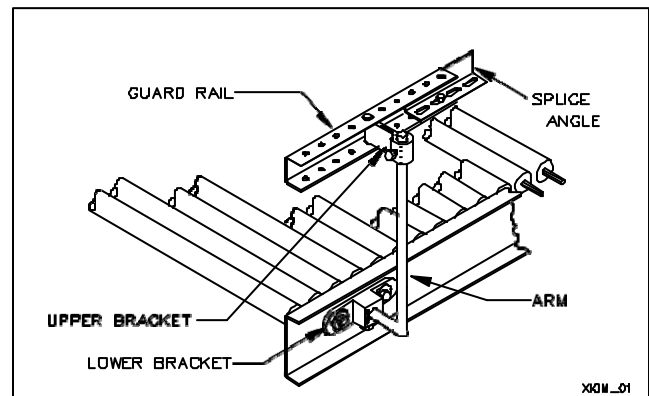
1. Bolt one end of the guard rail to the top flange of the curve bed.
2. Bolt the opposite end of the guard rail to the top flange. If the holes do not align, clamp the guard rail in place and drill new holes.
3. Bolt the guard rail to the curve with the appropriate number of truss head bolts.

### ADJUSTABLE CHANNEL GUARD RAIL

Adjustable channel guard rail is used to better match the width between 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, arm clamp, bracket and splice angle.

Bolt the brackets to the frame and insert the horizontal leg of the arms into the brackets. Attach the clamps to the arms at the proper height and attach the guard rail to the clamps. Set the width between the guard rails and tighten the set screws in the brackets. Splice channels 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.

# ELECTRICAL

## GENERAL

### WARNING

**Allelectrical 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 that on its label. Personnel may experience electrical shock; the motor may malfunction.**

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 volt. If primary voltage is changed, the transformer must be changed according to the wiring diagram found on the transformer.

#### Note:

All controls equipment is covered by the original manufacturer's equipment warranty.

*NEMA type enclosure rating designations 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 pushbutton is pushed, prior to the conveyor starting. 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 must be protected by an emergency stop. Operators should not have to leave their position to actuate the emergency stop.

Conveyors in areas of high pedestrian traffic should also be protected by emergency stop devices.

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.

Actuating an emergency stop must drop-out the start circuit, requiring restarting the system using the start pushbutton provided.

### 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.

## ERMANCO CONTROL MODULES (ECM)

### SAVE COST ON CONVEYOR CONTROLS AND WIRING USING COMPACT CONTROL MODULES

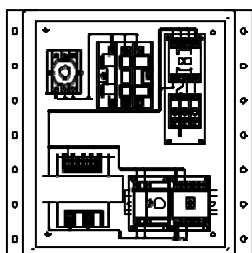
Smaller systems requiring only basic controls located at or near each conveyor drive can utilize Ermanco control modules. The Ermanco Control Module (ECM) and accessory components fulfill the need for basic control devices in a compact, standard package. This provides substantial savings over individual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

Example of ECM-2:

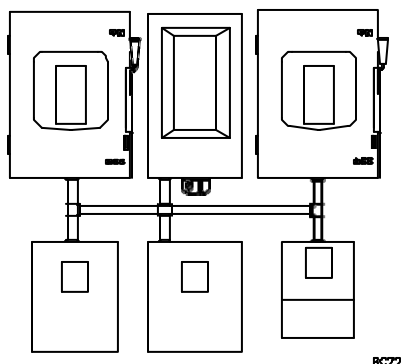
Includes Prewired:

- Lockable 30AMP disconnect
- 3 Pole fuse block
- 3 Phase starter

Provides additional space to mount:  
Transformer, relay and timer, on a din rail provided



**THIS**



**REPLACES THIS**

Separately enclosed, mounted and field wired :

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

Controls engineering quotation is available upon request. Please contact Ermanco Sales Engineering Department.

# COMMISSIONING OF EQUIPMENT

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 and 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 will be taken that would endanger the safety of any commissioning personnel. All personnel must familiarize themselves with all safety features of the system such as emergency stops and motor disconnects. Listed below are some of the final adjustments commonly associated with the Commissioning Phase.

## Commissioning of Mechanical Installation

- Check roller direction
- Check guard rail to product clearance
- 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
- Any spare parts shipped with conveyors turned over to appropriate personnel
- Proper roller to roller height at bed joints and interfaces
- Pneumatic connections
- All jump chains installed per print
- Coupler chains proper relative to drive length
- Any pneumatic speed controls adjusted

## Commissioning of Electrical Installation

- Adjust timing functions
- Adjust limit switches
- Adjust photo controls \* (see below)
- Verify circuitry
- Verify proper line voltage
- Verify function of all safety shut-off 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
- All devices are labeled and numbered to match documentation (Ex. PE 12, for photoeye No. 12 or SOL43 for solenoid valve No. 43)

\* Adjust photoeyes as follows:

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

After commissioning conduct operator training on all safety and operational aspects of the system. This must include system start-up, location of emergency stops and familiarity with all operator controls.

# 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.

## 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 eliminate 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 applies 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 if broken.

## Semi-Yearly

- Lubricate rollers with unsealed bearings 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.
- Regreasable bearings.

## Yearly

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

## CAUTION

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

# LUBRICATION GUIDE

Item	Use	Procedure	Recommended Lube
Chain Drives	Drives, External & Internal Jump Chains & Slave Drives	See Page 43	20 to 40°F SAE20 40 to 100°F SAE30 100 to 120°F SAE40 120 to 140°F SAE50
C-Face Speed Reducers	Drive packages using Reliance Relialube reducers  Drive packages not using Reliance Relialube reducers	See Page 32 and 45	Mobil SHC-634 for gearbox For input bore and motor shaft use Fel-Pro C5A AntiSieve or MobilTemp 78 Grease  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 AngleConnections	See Page 45	Mobil DTE Extra Heavy Oil (936133160)
Guide Posts	Lift Table (Urethane Belt Transfer)  Coat Guide Post Surface. (This should not be required in most circumstances.)	See Page 34	Light Machine Oil
Rollers	Product support and driving rollers	See Page 33	Light Machine Oil
Air System	Actuate Pneumatic Devices	See Page 49	American Oil Co.  Gulf Oil Co.  Mobil Oil Co. Non Fluid Oil Corp. Shell Oil Co. Sinclair Oil Co. Sun Oil Co. Texas Oil Company
Universal Joints	Curves, merges, diverters, incline/decline	See Page 34	Below 200 FPM SAE 140-25D  Over 200 FPM Extreme Pressure (EP) Grease with Lithium Soap Base meeing NLG1 Grade 1 and 2
Note: See "Maintenance Schedule" for frequency of lubrication.			

# PREVENTIVE MAINTENANCE

## GENERAL

The key to ensuring the expected return on investment is to protect against premature failure with a well planned and followed 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 hearing 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 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 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.

### 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.**

Keep the chain clean and lubricated. Chains may 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 31 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 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.

## ROLLERS

Rollers require lubrication every six months. If the rollers have unsealed bearings, lubricate them by removing them from the bed and place several drops of a good grade light machine oil in the small opening around the inner race hub. Repeat for each end of the roller. Roughness in a bearing may indicate that dirt has gotten into the ball races. To remove this dirt, immerse each end of the roller in a solvent, spinning the axle until all dirt is flushed out. Spin the axle to air dry the bearing. Then relubricate as described above. 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.

### WARNING

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

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

## 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® XR30. Periodically replace any broken belts. If belt shows sign of abrasion, check for belt rub against any object or foreign matter in roller groove.

## LINE-SHAFT BEARINGS

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

1. Twist the collar in the direction of shaft rotation.
2. Set by using a spanner or set screw wrench.
3. Tighten the set screw.
4. Recheck every six months.

Standard line-shaft bearings are sealed for life and do not require lubrication.

## 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:

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

## UNIVERSAL JOINTS

U-joints are primarily used to "bend" the line-shaft in the XenoROL® system, such as in merges, right angle transfers, and small incline and decline angles.

To ensure proper lubrication of all four bearing assemblies on Muncie universal 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 FPM, (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 FPM, a high quality extreme pressure (EP) grease recommended by lubricant manufacturers for universal joints should be used. Lithium soap base greases meeting National Lubricating Grease Institute (NLG) Grade 1 and Grade 2 specifications are preferred.

Relubrication cycles for universal joints will vary with service requirements and operating conditions. Under normal operating conditions, the U-joints should be relubed every 150-200 hours.

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.

## WARNING

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

## 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. (See installation of coupler chains.)

## 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 SYSTEM

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. Replace filter cartridges when dirt is showing. Check for proper PSI settings on air regulators.

# TROUBLESHOOTING REFERENCE 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.

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.

## **WARNING**

**Do not perform maintenance on the conveyor until the start-up 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.



## REFERENCE GUIDE - MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
1.	Insufficient drive	Not enough rollers being driven	Drive more rollers, if available
		Poor bottoms on product	Improve product conveyability or install belts with highest tension
		Overloading or product	Remove overload
		Lubricant on line-shaft	Clean shaft with solvent (Ref. p. 45)
		Lubricant on belts, rollers or drive spools	Clean belts, rollers, and spools (ref. p. 45)
		Weak drive belts	Replace belts
		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. p. 46)
		Accumulating distance excessive	Break up pressure with XenoBRAKES
3.	Rollers not turning/turning slowly	Weak belts	Replace belts (Ref. p. 46)
		Faulty bearing in rollers	Replace rollers affected
		Interference with roller or belt	Make clearance
		Roller bent	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 (Ref. p. 46)
		Ultraviolet rays (sun)	Replace belt with UV block type (Ref. p. 46)
6.	Belt out of groove	Line-shaft location	Move shaft to reduce belt angle
		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. 14). Add diagonal sway brace to supports. Change speed to 20 FPM up or down
		Bent shaft	Replace shaft
		Misalignment in coupling	Realign coupling (Ref. p. 16 & 17)
		Universals out of phase	See "Phasing-Universals (Ref. p. 18)

## REFERENCE GUIDE - MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
8.	Roller pulsation after curve or merge	Angle or alignment of universals not equal	Readjust universals (Ref. p. 18)
9.	Line-shaft bearing noisy	Misaligned line-shaft	Temporarily loosen any noisy bearing plus bearing on each side, start motor, stop and retighten
10.	Product over XenoBRAKE will not hold	Pad or tubing not contacting all rollers	Shim padded channel
		Padded channel bent	Replace padded channel
		Accumulation 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"). 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. 43)
		Misalignment	Check alignment with straight edge along side of chain (Ref. p. 43)
		Dry chain	Lubricate on proper intervals (Ref. p. 31)
15.	Nonsymmetrical wear on sprockets or rollers	Connected shafts not parallel	Relalign shafts (Ref. p. 43 & 44)
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. 43)
17.	Wear on tips of sprocket teeth	Chain elongated excessively	Replace chain (Ref. p. 43 & 44)
		Loose chain	Tighten chain (Ref. p. 43)
18.	Broken chain parts, sprocket teeth	Drive overloaded	Avoid overloading
		Excessive slack causing chain to jump teeth	Periodically adjust tension (Ref. p. 43)
		Foreign object caught in chain	Remove object and prevent entry
		Inadequate lubrication	Maintain proper lubrication intervals (Ref. p. 30)
		Shock load too high	Reduce shock load Soft start motors Replace with larger components

## REFERENCE GUIDE - MECHANICAL

MECHANICAL PROBLEM		POSSIBLE CAUSE	REMEDY
19.	Excessive chain noise	Chain contacting stationary parts	Remove objects
		Worn sprockets or chain	Replace both (Ref. p. 44)
		Inadequate lubrication	Maintain proper lubrication intervals (Ref. p. 30)
		Broken or missing chain rollers	Repair or replace chain (Ref. p. 44)
		Sprockets misaligned	Align and tighten all fasteners
		Check shaft and sprocket	Realign (Ref. p. 43)
		Insufficient chain tension	Adjust tension (Ref. p. 43)
		Chain jumping sprocket teeth	Adjust chain tension; check for wear (Ref. p. 43)
20.	Excessive vibration	Broken or missing chain roller	Replace chain and sprockets (Ref. p. 44)
		Broken sprocket teeth	Replace chain and sprockets (Ref. p. 44)
21.	Pulsing chain	Insufficient chain tension	Reposition drive sprocket shaft (Ref. P. 43)
		Misalignment of chain guard	Align sprockets and tighten down (Ref. p. 43)
		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; 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. 31)
		Rusty chain	Remove source of corrosion or use noncorrosive chain; increase lubrication schedule
23.	Sprocket loose on shaft	Loose set screws	Realign sprockets (Ref. p. 41)
		Worn or damaged key	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. 43)
25.	Chain climbs on sprocket	Improper chain/sprocket alignment	Realign sprockets (Ref. p. 41)
		Material build-up in sprocket teeth	Clean sprockets and readjust chain (Ref. p. 43)
26.	Broken coupler chain	Improper chain installation	Replace chain (Ref. p. 16 and 17)
		Misalignment of line-shaft	Realign shafts (Ref. p. 16 and 17)

## REFERENCE GUIDE - MOTOR/REDUCER

MOTOR/REDUCER PROBLEM		POSSIBLE CAUSE	REMEDY
27.	Reducer running excessively hot	Low reducer oil level	Check oil level in gearcase and be sure breather plug is open (non Reliablube reducers)
		Drag on conveyor	Check and inspect all bearings on conveyor Check for excessive productload Check all rollers for free rotation
28.	Reducer or motor noisy	Insufficient reducer lubricant or motor shaft bearing	Add recommended oil to gearcase (Ref. p. 31)
		Damaged gears	Replace unit
		Output shaft or chain rubbin chain guard	Adjust guard
		Bent fan housing Worn brushes Worn bearing	Repair or replace part Repair or replace part Repair or replace part
29.	Repeated stalling	Electrical	Check circuits and panel
		Motor wiring	Check heater size and amp draw Check motor wiring
		Drag on conveyor	Check all bearings
30.	Drive slow to start	Electrical	Check circuits and panel Take ampere reading
31.	Motor will not start	No line voltage	Check fuses nad 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 reepair station
		Failure of photo-electric control	Check photo-electric control

## REFERENCE GUIDE - MOTOR REDUCER

MOTOR/REDUCER PROBLEM		POSSIBLE CAUSE	REMEDY
32.	Motor reducer 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
33.	Reducer oil leakage (non 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
34.	Motor overload protectors kicking out	Incorrect size	Check overload size and replace if necessary
		Short in motor	Replace motor
35.	Motor runs, line-shaft does not turn	Drive chain broken or disconnected	Replace chain (Ref. p. 44)
		Sprockets loose	Install key, tighten set screws and check oine-shaft for wear
36.	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 See also items 28, 29 and 30	Check for excessive product
37.	Electrical shorts	Loose connection	Check all wire connections
		Improper voltage	Consider adding additional transformer. Check fuses

# 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 14 & 15). 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.lbs.

## CHAINS & SPROCKET

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.

### UNIVERSALS 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 FPM (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 18.

### LINE-SHAFT BEARINGS (STANDARD)

Line-shaft bearings have a double set screw to secure the inter race collar to the line-shaft.

If a collar is loose:

1. Check for loose set screws.
2. Tighten set screw (1/4-20 to 6 ft.lbs.)
3. Recheck every six months.

#### 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 cut off. A solvent containing no lubricant, which does not harm plastic or urethane and drying without leaving film, must be used. Success has been found with some brake cleaners, isopropyl alcohol and certain CRC contact cleaner products.

Flush thoroughly 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

### *Lubrication and Inspection*

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
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 conform to AGMA Standard Specification No. 250.03 applying to the AGMA Lubricant Number indicated for the required ambient range. Service life and efficiency of gear 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 chart page 29.

## 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 vent 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. Repeat 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, or several or even all belts, 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.

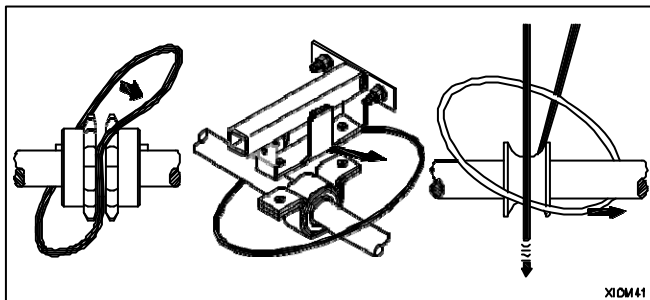
When replacing all belts only use original type belts with the following procedure.

### 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 page 17.)
- 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.**

Reference complete drive belt listing for XR30 on page 59.

## XenoBRAKES

XenoBRAKES are used as an indirect stop to hold product. The brake is a steel channel with a solid rubberlike pad 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.

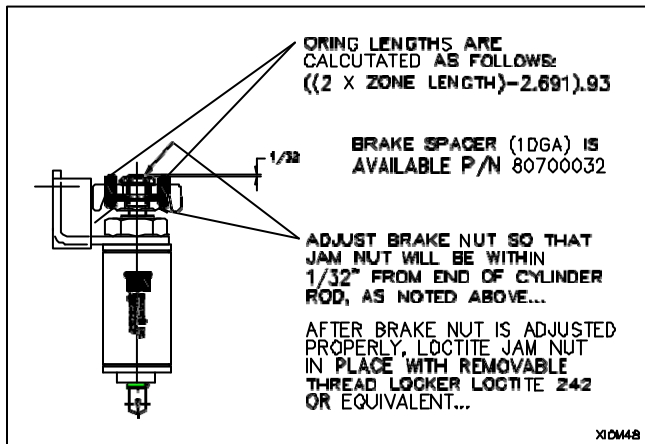
XenoBRAKES use solid pads when used with coated rollers. The rollers are coated (usually with plastisol) to increase the friction between the rollers and product to hold accumulating pressure of additional products. Urethane tubing is used over the brake channel with single products stopped on noncoated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

### Valve Removal and Replacement

- Open the wire cover for the manifold on which defective valve is mounted.
- Remove solenoid wire 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 coil as described above. (For double solenoid, remove both coils.)
- Carefully remove detent body, spool and spring, noting their orientation. (For double solenoid, remove detent assembly and spool.)
- Using a blunt plastic rod (a plastic pen or probe about 3/8" dia.), push spring retainer through valve body, which will remove both the spring retainer and sleeve assembly from the valve. (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 lock-out the main incoming service. If only the panel disconnect is off, the incoming side will still be hot.**

### 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 redistributed dust and dirt. Compressed air can damage and displace relay contact and springs.

### SENSING SWITCHES

The sensing switch 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.

## AIR SYSTEMS

The best preventive maintenance for any air operating device is clean air. Refer to filters in this section to maintain clean air. Dirty air will make pneumatic devices sticky, and they will not operate properly.

### WARNING

**Care should be taken when servicing any conveyor to prevent accidental injury. Improper or incomplete servicing could also result in operational problems, serious personal injury, and damage to the conveyor equipment.**

## FILTERS

Air leaving the filter is much clearer and more oil free than the air you are breathing. Two maintenance steps are required to ensure the continued performance of filters:

1. Monitor auto drain operation every week for the first 60 days of manually draining the bowl. To manually drain the bowl, first remove hose and clamp from the unit. Carefully turn knurled drain valve counterclockwise until you hear air escaping. Let all accumulated liquid drain and close valve by turning clockwise. Replace hose and clamp. After the initial 60 days have passed, repeat every 30 days.
2. Remove and replace clogged elements as required by filter condition indicator. Indicator is mounted on top of the filter housing.

## LUBRICATION

It is not recommended that a lubricated air system be used; 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.

An important criterion is viscosity. If an oil is too heavy, it will not be atomized and carried downstream to the component requiring lubrication. Often it will break down in the pipe. While it is impossible to guarantee the success of any lubricating oil because of the variables, we have found the following oils perform quite well:

MANUFACTURER	BRANDNAME
American Oil Company	Rykon No. 11 American Oil No. 15 (was Stanoil No. 15)
Gulf Oil Company	Harmony No. 43AW Harmony No. 44
Mobil Oil Company	D.T.E. Light
Non Fluid Oil Corporation	Air Lube 10w/NR
Shell Oil Company	Tellus No. 27
Sinclair Oil Company	Dura No. 150
Sun Oil Company	Sunvis No. 701 Sunvis No. 706
Texas Oil Company	Regal "A" R & O

### CAUTION

**If an internal (light oil) lubricator is to be used, EXTREME CARE must be taken NOT to over lubricate.**

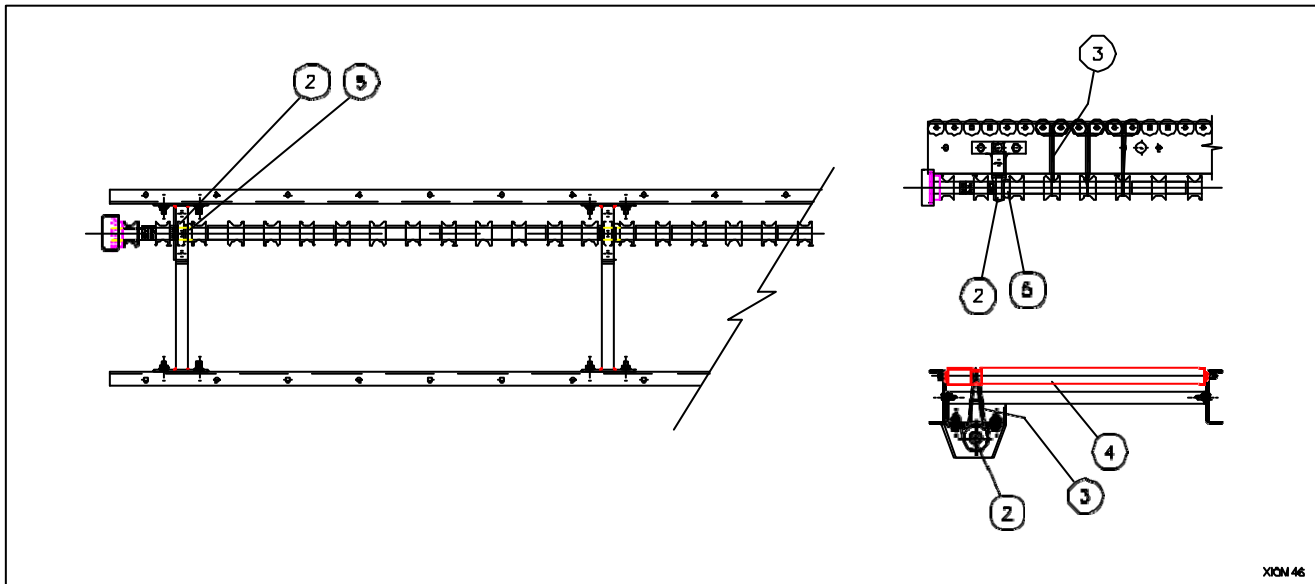
## PARTS IDENTIFICATION

This section is used to identify parts that may require replacement during the life of the conveyor. 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 originator of the purchase order approximately (2) weeks after the order is received. It includes part numbers, description, price and recommended quantity to be kept for maintenance.

# PARTS IDENTIFICATION

## INTERMEDIATE BEDS



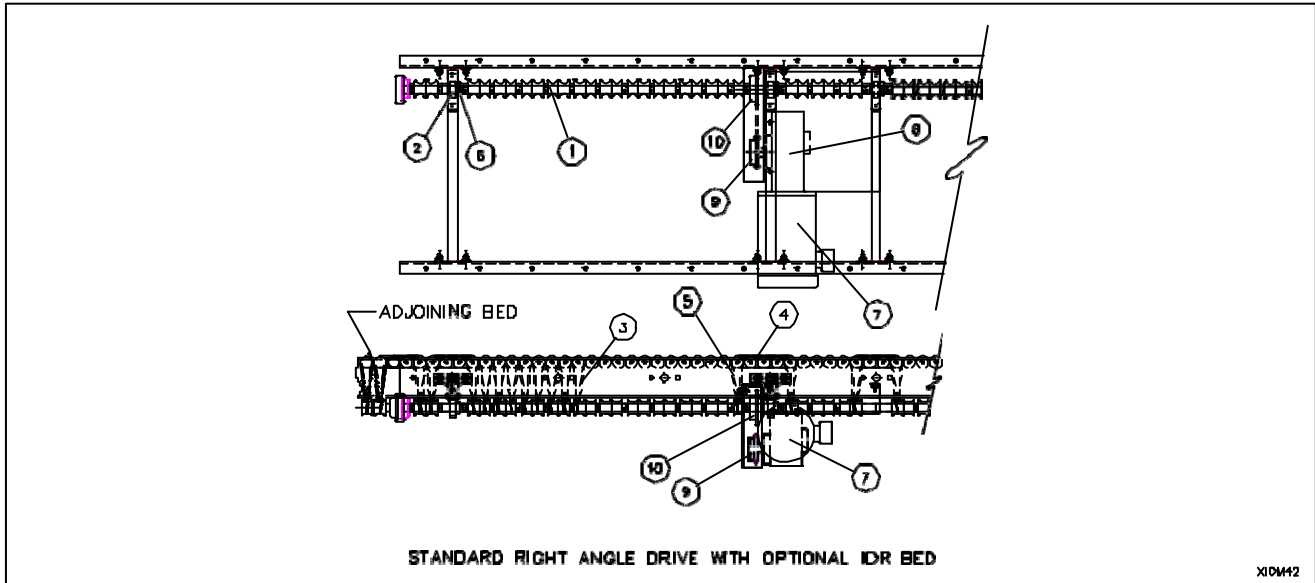
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INTERMEDIATE BEDS		
Item No.	Description	Part Number
1	Pulley, 1" Bore	90801200
2	Bearing, 1" Bore	90050103
3	Drive Belt	90530077
4	Collar, 1" Bore	90140011
5	Roller	See Roller Chart (Page 61)



# PARTS IDENTIFICATION

## DRIVE BEDS



DRIVE BEDS		
Item No.	Description	Part Number
1	Pulley, 1" Bore	90801200
2	Bearing, 1" Bore	90050103
3	Drive Belt 1/8" x 12-11/16"	90530013
4	Slave Belt 1/8" x 6-1/8"	90530004
5	Drive Belt 5/32" x 11-7/8" BLK	90530082
6	Collar, 1" Bore	90140011
7	Motor	SEE CHART
8	Reducer	
9	Drive Sprocket	
10	Driven Sprocket	

# PARTS IDENTIFICATION

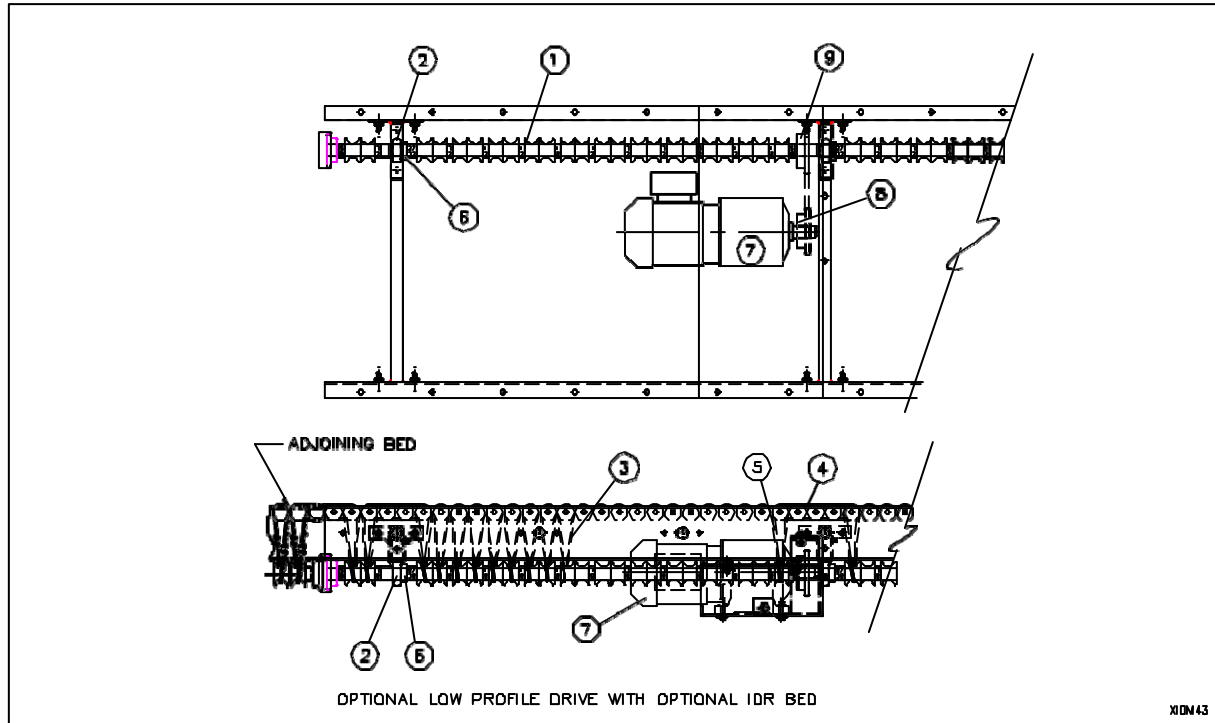
## DRIVE BEDS CONT'D

DRIVE BED						
HP	FPM	Reducer	Drive Sprocket	Bore	Driven Sprocket	Bore
1/2-1	15	56/262-40	5016	1-1/8	5018	1"
1/2-1	20	56/262-30		1-1/8		
1/2-1	30	56/175-20		7/8		
1-1/2	30	56/262-20		1-1/8		
1/2-1	35	56/175-15	5014	7/8		
1-1/2	35	56/262-15		1-1/8		
1/2-1	40	56/175-15	5016	7/8		
1-1/2	40	56/262-15		1-1/8		
1/2-1	45	56/175-15	5018	7/8		
1-1/2	45	56/262-15		1-1/8		
1/2-1	50	56/175-10	5014	7/8		
1-1/2	50	140/262-10		1-1/8		
1/2-1-1/2	55	56/175-10	5015	7/8		
1/2-1-1/2	60		5016			
2	60	140/262-10		1-1/8		
1/2-1-1/2	65	56/175-10	5017	7/8		
2	65	140/262-10		1-1/8		
1/2-1-1/2	70	56/175-10	5019	7/8		
2	70	140/262-10		1-1/8		
1/2-1-1/2	75	56/175-10	5020	7/8		
2	75	140/262-10		1-1/8		
1/2-1-1/2	80	56/175-10	5018	7/8	5015	
2	80	140/262-10		1-1/8		
1/2-1-1/2	85	56/175-10	5019	7/8		
2	80	140/262-10		1-1/8		
1-1/2	90	56/175-5	5012	7/8	5018	
	95		5014		5020	
	100		5015			
	105		5014		5018	
	110		5016		5020	
	115				5019	
	120				5018	

HP	Motor	Reducer	
1/2	90480106	56/175-5	90655005
3/4	90480111	56/175-10	90655009
1	90480116	56/175-15	90655014
1-1/2	90480120	56/175-20	90655016
3/4	90480111	56/262-15	90655038
1	90480116	56/262-20	90655018
1-1/2	90480120	56/262-30	90655023
2	90480125	56/262-40	90655027
1/2	90480106	140/262-10	90655011

# PARTS IDENTIFICATION



## OPTIONAL LOW PROFILE BED



EURODRIVE BEDS		
Item No.	Description	Part Number
1	Pulley, 1" Bore	90801200
2	Bearing, 1" Bore	90050103
3	Drive Belt 1/8 x12-11/16"	90530013
4	Slave Belt, 1/8"x6-1/8"	90530004
5	Drive Belt 5/32" x 1-7/8" Blk	90530002
6	Collar, 1" Bore	90140011
7	Gearmotor	See Chart
8	Drive Sprocket	See Chart
9	Driven Sprocket	90800542

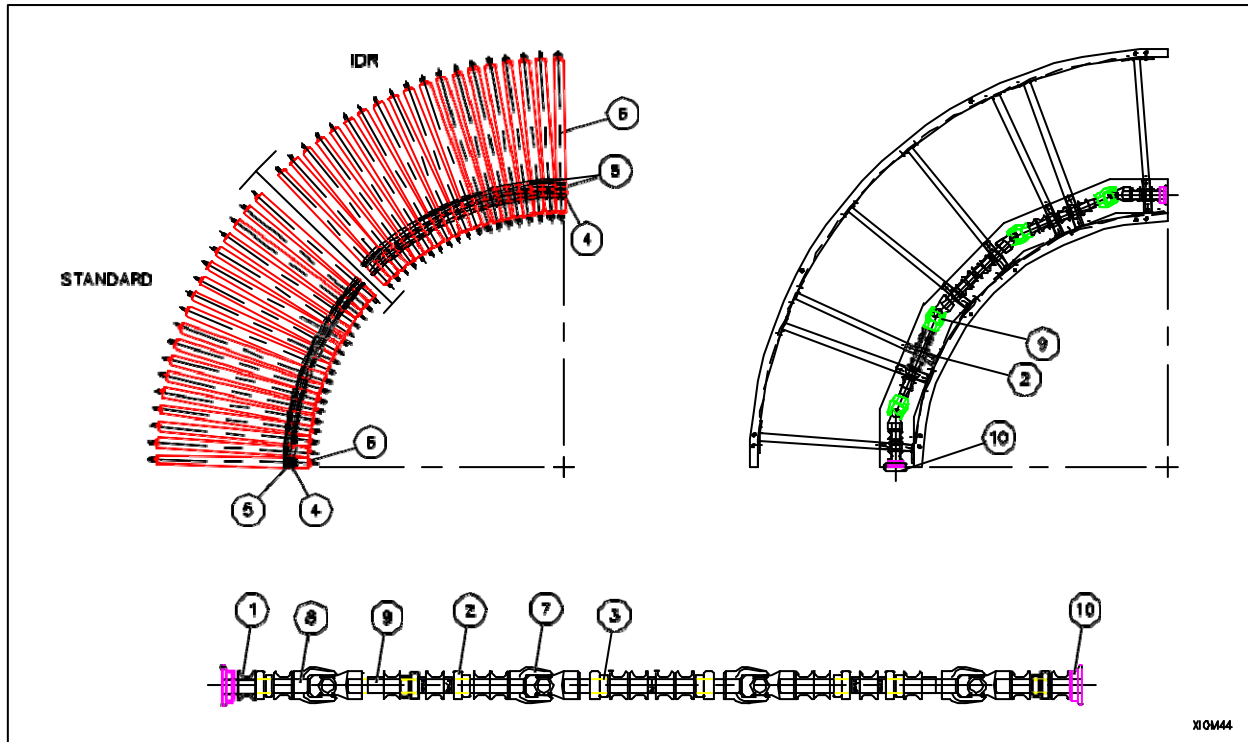
# PARTS IDENTIFICATION

## OPTIONAL LOW PROFILE BED

EURODRIVE BED 				
HP	FPM	Reducer 	Drive Sprocket	Bore
1/2	30	R32-DT71D4	90800559	3/4"
3/4-1		R40-DT80D4	90800537	1"
1/2	45	R40-DT71D4	90800542	
3/4-1		R40-DT80K4		
1-1/2		R40-DT90S4		
1/2	60	R40-DT71D4	90800531	
3/4		R40-DT80K4		
1-1/2		R40-DT90S4		
2		R40-DT90L4		
1/2	75	R40-DT71D4	90800537	
3/4-1		R40-DT80K4		
1-1/2		R40-DT90S4		
2		R40-DT90L4		
1/2	90	R40-DT71D4	90800583	3/4"
3/4		R40-DT80K4		
1-1/2		R32-DT80N2	90800537	1"
2		R40-DT90L4	90800537	
1/2	105	R40-DT71D4	90800542	
3/4-1		R40-DT80K4		
1-1/2		R40-DT90S4		
2		R40-DT90L4		
1/2	120	R32-DT71C2	90800531	3/4"
3/4-1		R32-DT71D2		
1-1/2		R32-DT80N2		
2		R40-DT90L4	90800524	1"

# PARTS IDENTIFICATION

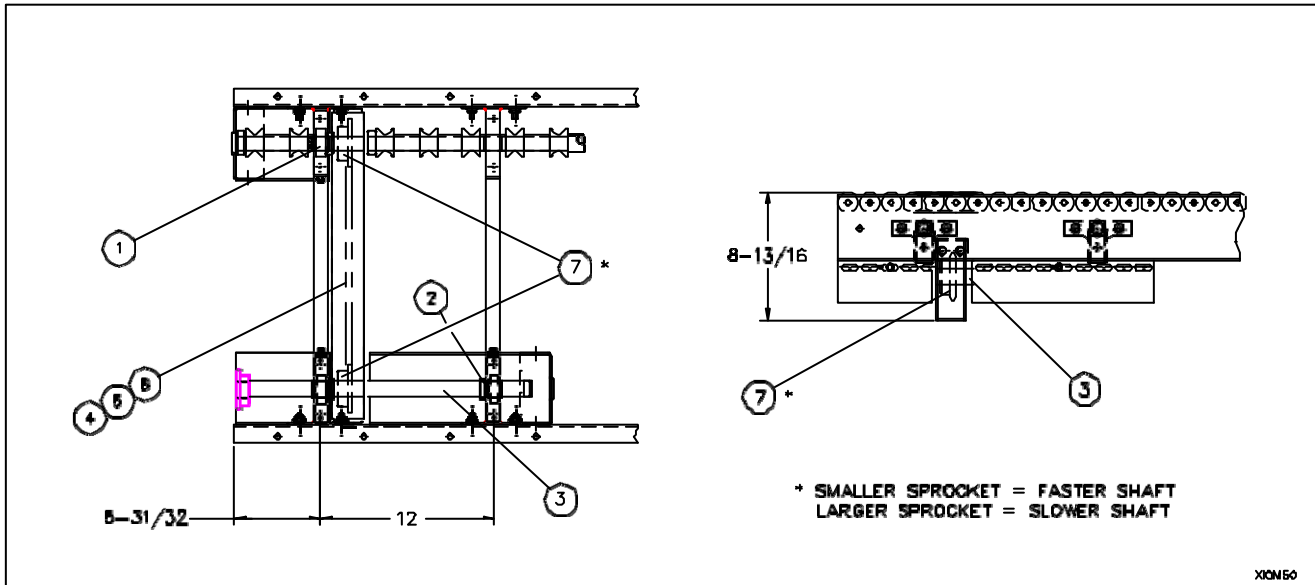
## CURVES



Item No.	Part Number by Width				
	Description	12-1/2	15-1/2	18-1/2	24-1/2
1	Pulley, 1" Bore	90801200			
2	Bearing, 1" Bore	90050103			
3	Collar, 1" Bore	90140011			
4	Belt Drive 5/32"	See Belt Summary			
5	Belt SLV 1/8"				
6	Roller STD Tru Taper Roller FDR Tru Taper	30212905 30212915	30215905 30215915	30218905 30218915	30224905 30224915
7	U-joint	90895001			
8	Shaft Input	See Chart			
9	Shaft Mid	See Chart			
10	Sprocket 4016-1"	90800505			
Angle of Curve		30°	45°	60°	90°
8	Shaft, Input	1x3-13/16" 40713001	1x6-3/16 40719002	1x8-13/16 40716001	1x6-3/16 40719002
9	Shaft, Mid	1x6-15/16 40713002	1x12-9/16 40719003	1x17-7/8 40716002	1x12-9/16 40719003

# PARTS IDENTIFICATION

## JUMP CHAIN

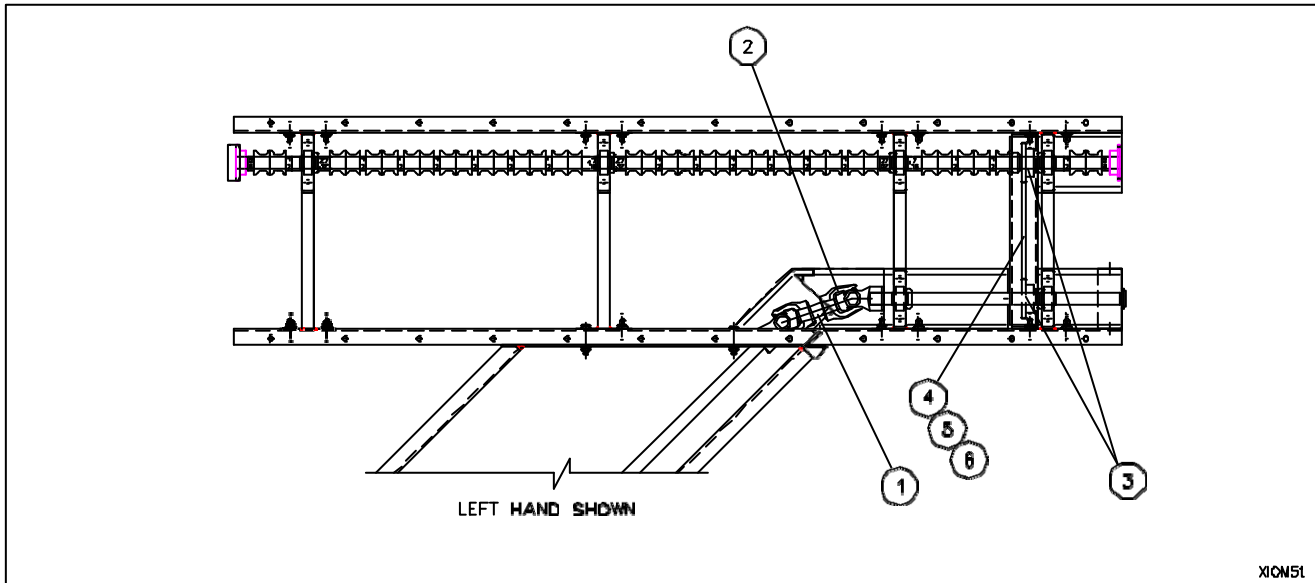


JUMP CHAINS		
Item No.	Description	Part Number
1	Bearing, 1" Bore	90050103
2	Collar, 1" Bore	90140011
3	Shaft, 20-3/8"	40700000
4	Chain RC50 Length as needed	90140029
5	Link, Connection	90440106
6	Link, Offset	90440111
7	Sprocket	See Chart

ITEM 7 SPROCKET RATIOS						
15	16	17	18	19	20	Sprocket Teeth
1.07	1.14	1.21	1.29	1.36	1.43	14
1.00	1.07	1.13	1.20	1.27	1.33	15
		1.06	1.13	1.19	1.25	16
			1.06	1.12	1.18	17
				1.06	1.11	18
					1.05	19

# PARTS IDENTIFICATION

## MERGE ASSEMBLY

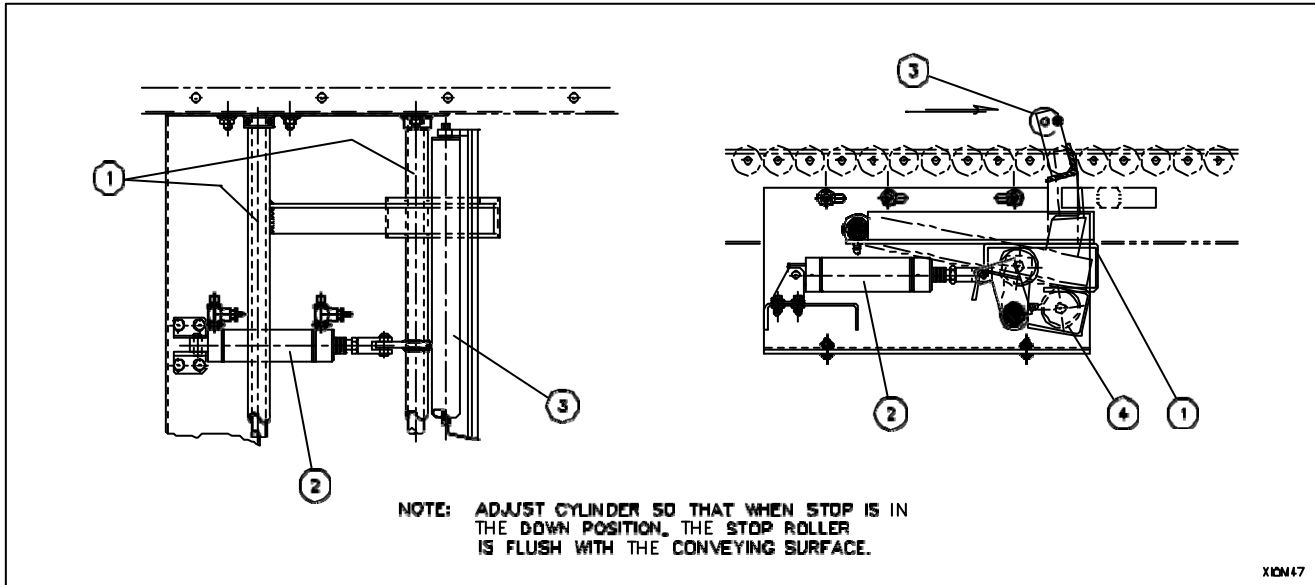


MERGE ASSEMBLY		
Item No.	Description	Part Number
1	Shaft, 4"	41700000
2	U-joint	90895001
3	Sprocket H5015T	9080524
4	Chain RC50	Length as needed
5	Link, Connection	90440106
6	Link, Offset	90440111



## PARTS IDENTIFICATION

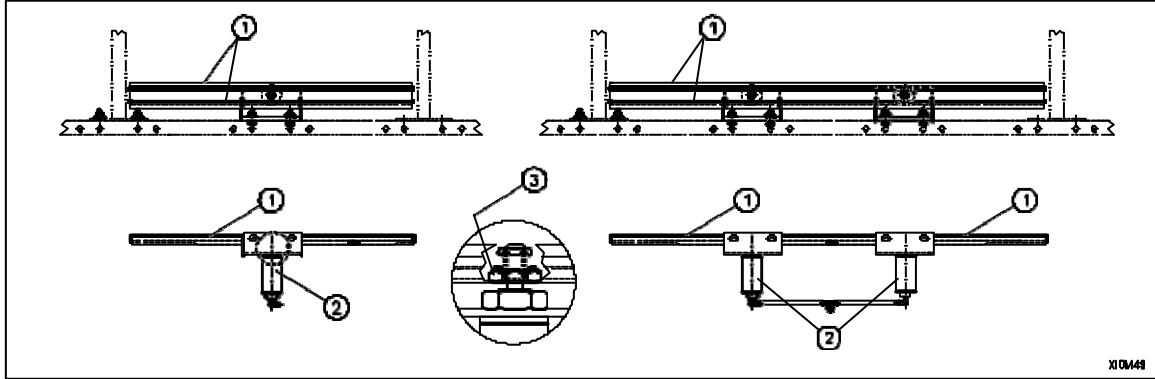
### STOPS



Item No.	Description	12-1/2	15-1/2	18-1/2	24-1/2
1	Cam Weldment, Standard	81600712	81600715	81600718	81600724
	Cam Weldment, Foot/Hand	81601712	81601715	81601718	81601724
2	Cylinder Air, Standard	89000056			
	Spring, Foot	90800266			
	Cable, 1/8 Coated, Foot	90130500			
3	Roller	81200112	81200115	81200118	81200124
4	Skatewheel, 1-7/8"	90930100			
Foot Operated Assembly No.		81111712	81111715	81111718	81111724
Hand Operated Assembly No.		81111612	81111615	81111618	81111624

# PARTS IDENTIFICATION

## XENOBRAKE

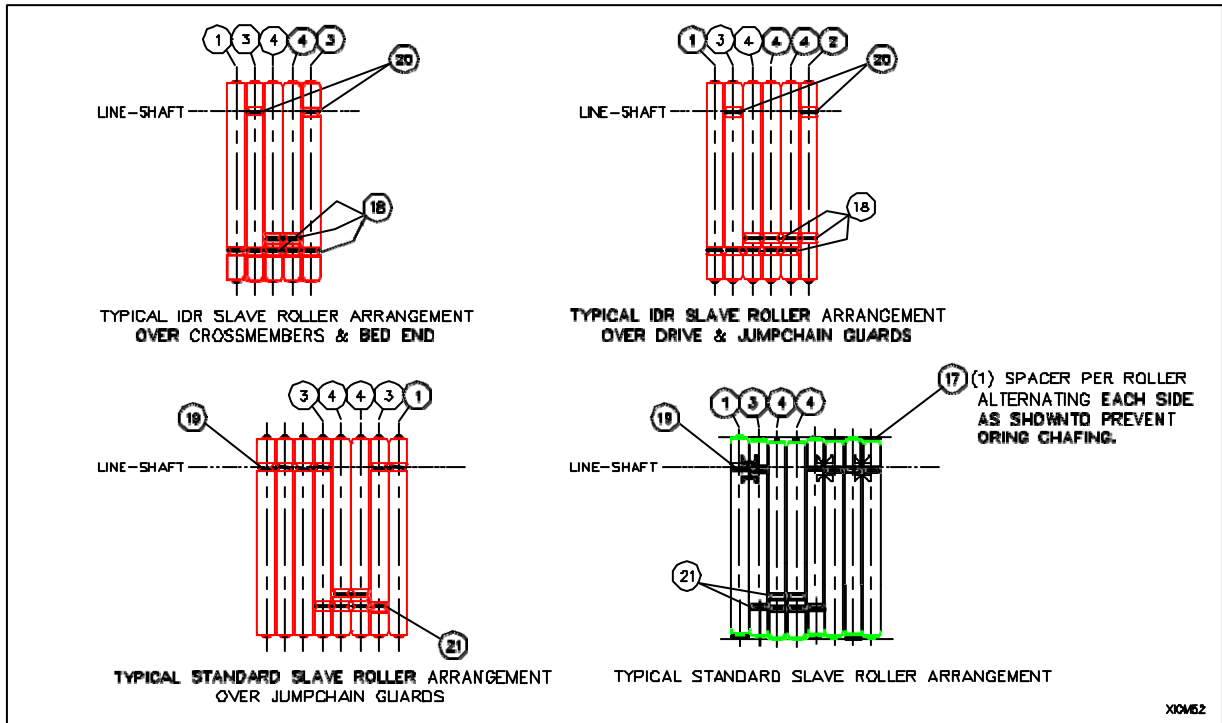


BRAKE		
Item No.	Description	Part Number
1	Tubing, Urethane .250 OD, .159 ID	89000580
2	Cly, Air 1.5 NSR x 1	89000020
3	Washer, 5/8" Wave	95300019

Brake Zone	Assembly Part No.	③ Quantity	① Length
36	81000436		64-1/4
33	81000433		58-3/4
30	81000430		53-1/4
27	81000427		47-3/4
24	81000424		42
21	81000421	1	36-3/4
18	81000418		31
15	81000415	1	25-1/2
12	81000412		19-3/4

# PARTS IDENTIFICATION

## STANDARD/IDR ROLLERS



Item No.	Description	Part Number by Width				Type
		12-1/2"	15-1/2"	18-1/2"	24-1/2"	
1	Roller, 1-3/8" Dia	30212011	30215011	30218011	30224011	STD\IDR
2		30212411	30215411	30218411	30224411	IDR
3		30212111	30215111	30218111	30224111	STD\IDR
4		30212211	30215211	30218211	30224211	STD\IDR

## BELT SUMMARY

Item No.	Belt Application	Centers	"L" Length	Part Number	Dia.	"Duro"
19	Drive Pulley to Roller (2 ROL DR)	5-1/8"	17-1/2"	90530077	1/8"	83A
20	Drive Pulley to Rollers (IDR)	5-1/8"	12-11/16"	90530013	1/8"	83A
20	Drive Pulley to Roller (IDR) (Black)	5-1/8"	11-7/8"	90530082	5/32"	83A
18	Roller to Roller (Slave)	1-1/2"	6-1/8"	90530004	1/8"	83A
21	Roller to Roller (Slave)	3"	8-3/4"	90530018	1/5"	83A
4	Curve Drive Pulley to Roller	5-5/16"	10-3/4"	90530080	5/32"	83A
5	Tapered Roller to Tapered Roller	1-1/2"	5-1/8"	90530011	1/8"	83A

# 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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