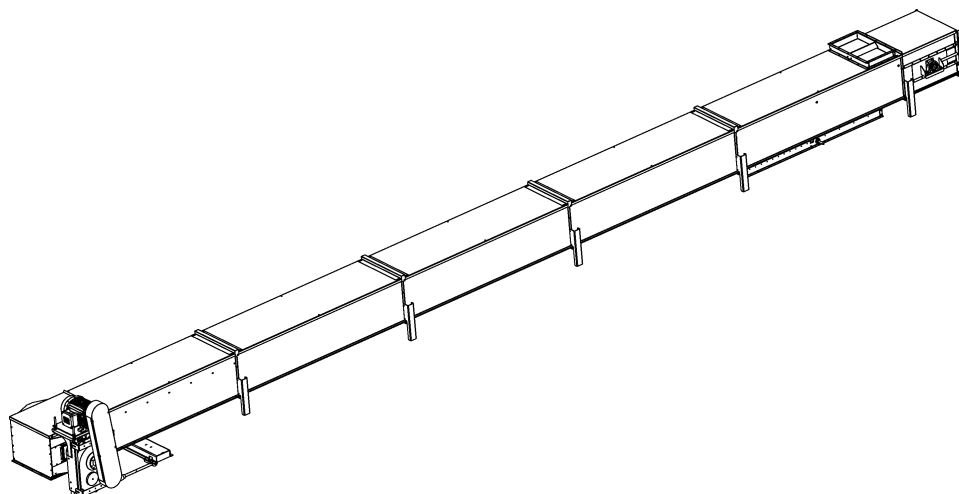




# En-Masse Conveyor

## Installation and Operation Manual

**PNEG-2110**

Version: 1.0

Date: 09-15-16



PNEG-2110

**All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.**

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## 1. Introduction

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### General Information

InterSystems reserves the right to improve its product whenever possible and practical to do so. We reserve the right to change, improve and modify products at any time without obligation to make changes, improvements and modifications on equipment sold previously.

This manual covers the installation and operation for the En-Masse Conveyor. This manual provides guidelines for installing the product. You must retain a qualified contractor to provide on-site expertise. INTERSYSTEMS IS NOT RESPONSIBLE FOR THE INSTALLATION OF THIS PRODUCT.

### General Safety Statements

1. The En-Masse Conveyor is designed and manufactured with operator safety in mind. However, residual hazards remain due to the nature of material handling, and specific material hazards. Use extreme caution at all times.
2. Modifications to equipment may cause extremely dangerous situations that could result in damage to the equipment as well as serious injury or death. Never modify the equipment.
3. InterSystems recommends that you contact the local power company to have a representative survey the installation to ensure wiring is compatible with their system and adequate power is supplied to the unit.

### Replacement Parts

The InterSystems, Inc. Conveyor is a quality built piece of machinery. As with any machine, parts do wear out and fail. It is InterSystems' recommendation that a small supply of spare parts be kept on hand to cover any minor breakdowns. A separate Spare Parts/Price List will be sent identifying the suggested spare parts. It is also necessary to check the certified drawings, which will list any special or custom components utilized on this equipment.

The certified drawings furnished with the conveyor list the components which are likely to require replacement. Replacements for any other components, including structural members can be supplied upon request.

For direct parts orders or requests for technical assistance to your sales representative or to:

**InterSystems**

9575 No. 109TH AVE

Omaha, NE. 68142

Phone: 800-228-1483

FAX: (402) 330-3350

Please have available the MODEL NUMBER, SERIAL NUMBER and CUSTOMER ORDER NUMBER of the equipment in question as well as the location where the conveyor is INSTALLED.

---

## **Safety Guidelines**

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Save these safety guidelines for future reference.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in **SERIOUS INJURY or DEATH**.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

**ST-0001-3**

### Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.



This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**



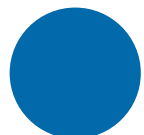
This symbol is used to address practices not related to personal injury.



This symbol indicates a general hazard.



This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

## Safety Cautions

### Use Personal Protective Equipment

- Use appropriate personal protective equipment:

**Eye Protection**



**Respiratory Protection**



**Foot Protection**



**Hearing Protection**



**Head Protection**



**Fall Protection**



**Hand Protection**



- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

### Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.



ST-0002-1

### Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.



ST-0003-1

## 2. Safety

### Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment and bins are properly grounded.



ST-0027-3

### Stay Clear of Hoisted Equipment

- Always use proper lifting or hoisting equipment when assembling or disassembling equipment.
- Do not walk or stand under hoisted equipment.
- Always use sturdy and stable supports when needed for installation. Not following these safety precautions creates the risk of falling equipment, which can crush personnel and cause serious injury or death.



ST-0047-1

### Operate Motor Properly

- All electrical connections must be made in accordance with applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe). Make sure equipment and bins are properly grounded.
- Lock-out power before resetting motor overloads.
- Do not repetitively stop and start the drive in order to free a plugged condition. Jogging the drive in this manner can damage the equipment and drive components.



ST-0009-3

### Stay Clear of Slide Gate

- Keep hands away from slide gate opening. Slide gates can crush and dismember. Motor can start at any time.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.



ST-0049-1



### Toxic Fume and Dust Hazard

- Remove paint before welding or heating.
- Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.
- Do all work outside or in a well-ventilated area. Dispose of paint and solvent properly.
- Remove paint before welding or heating:
  - If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
  - If you use solvent or paint-stripper, remove stripper with soap and water before welding.
  - Remove solvent or stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



ST-0043-1

### Fall Hazard

- Ladders, stairways and platforms are for use by competent and trained personnel only. Do not allow children or other unauthorized persons to have access to the equipment.
- Access to the equipment must be restricted by the use of security fencing and lockable gates.
- Lower sections of ladders must be fitted with a lockable safety gate to prevent unauthorized access.
- Make sure that hot surfaces have had adequate time to cool before working on or in the equipment.
- Lock out and tag out power supplies and fuel supplies to all equipment.
- Do not attach lifting equipment to ladders or platforms.
- Do not go outside of the safety rails provided on elevated platforms.
- Do not work at heights during high winds, rain, snow, or ice storms.



ST-0056-1

## 2. Safety

## Sharp Edge Hazard

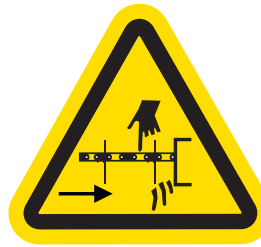
- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment



**ST-0036-2**

## Stay Clear of Moving Parts

- Entanglement in rotating sprocket or moving chain will cause serious injury or death.
- Keep all guards and covers in place at all times.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.



**ST-0017-1**

# Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

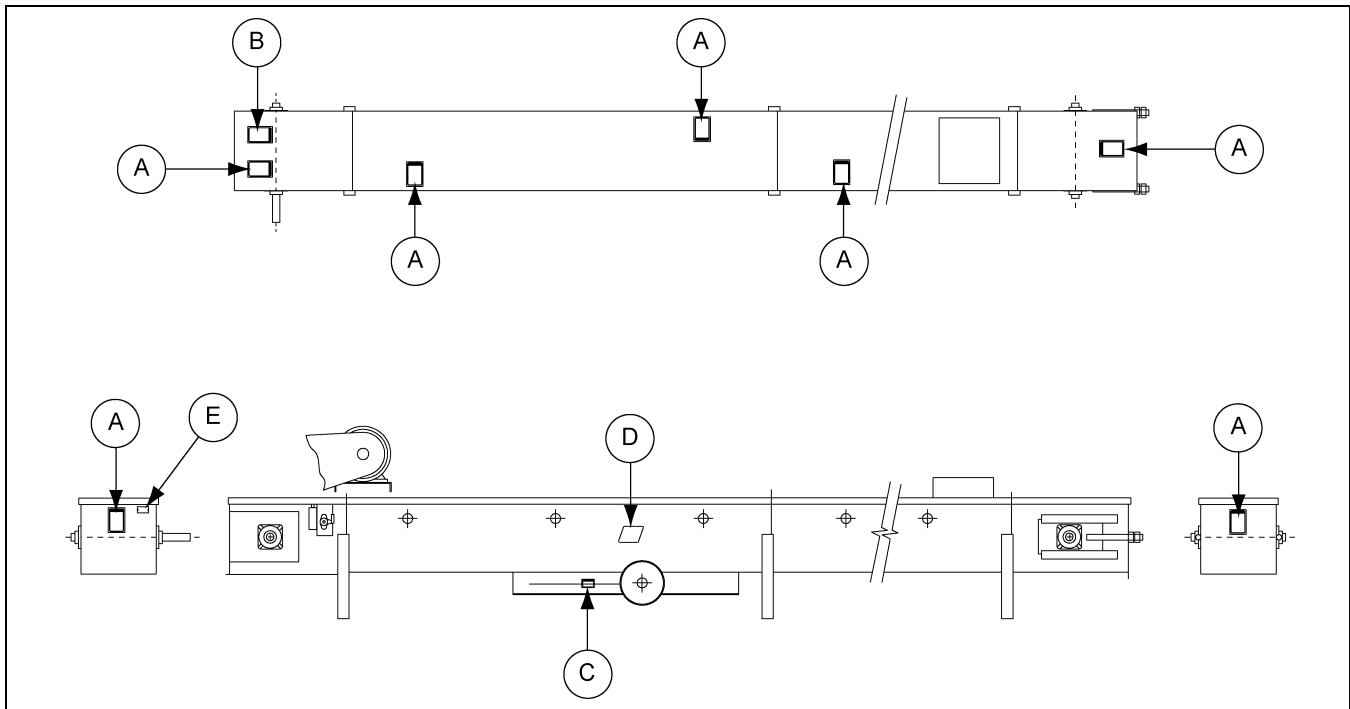
[illegible]

**ST-0007**

The safety decals on your equipment are safety indicators which must be carefully read and understood by all personnel involved in the installation, operation, service and maintenance of the equipment. To replace a damaged or missing decal, contact us to receive a free replacement.

#### InterSystems

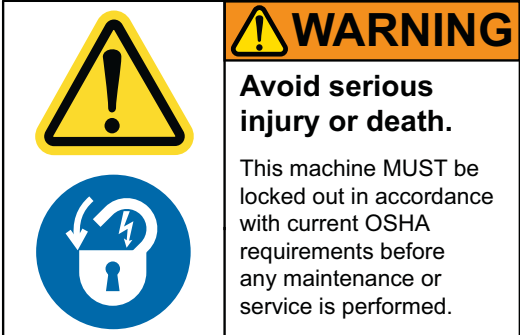
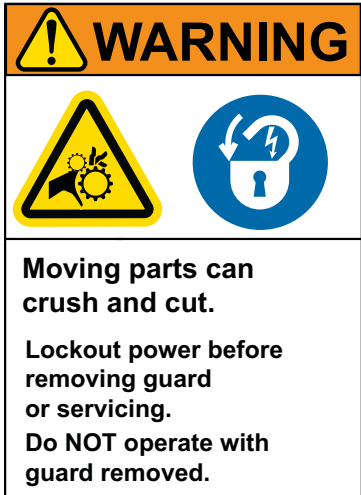
9575 N. 109th Ave.  
Omaha, Nebraska 68142  
Toll Free: (800) 228-1483



**Figure 3A** Safety Decals Location

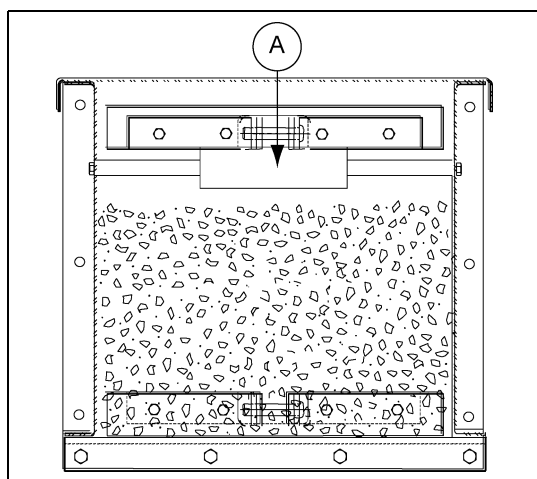
| Ref # | Decal #  | Decals                                                                              | Description       |
|-------|----------|-------------------------------------------------------------------------------------|-------------------|
| A     | EMC 27J3 |  | Exposed Conveyors |

### 3. Decals

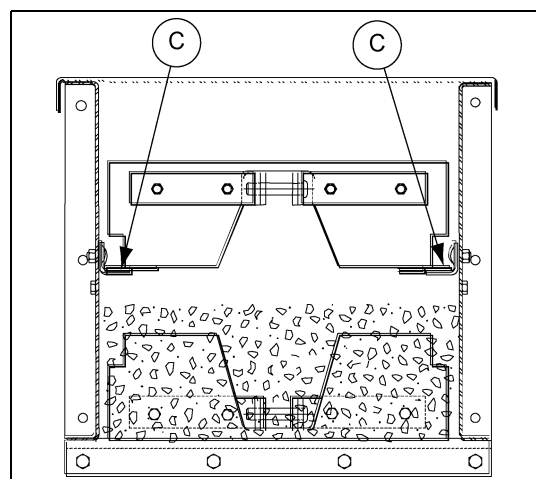
| Ref # | Decal #    | Decals                                                                                                                                                            | Description                    |
|-------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| B     | EMC 402 34 |  <p>© Clarion      Clarionsafety.com      16089      Reorder No. EMC 402 34</p> | Lock Out Machine               |
| C     | EMC 33 34  |  <p>©Clarion      12235      No. EMC 33 34</p>                                  | Moving Parts and Exposed Gears |
| D     | IS526X4    |                                                                                | InterSystems Logo              |
| E     |            |                                                                                | InterSystems Serial Number Tag |

## Receiving Inspection

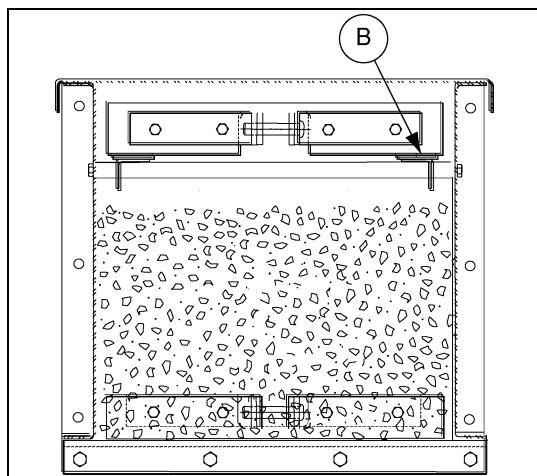
1. Carefully inspect the shipment for damage as soon as it is received. Verify that the quantity of parts or packages actually received corresponds to the quantity shown on the packing slip. One or more cartons containing the fasteners required for assembly are included with the shipment. Report any damage or shortage to the delivering carrier as soon as possible.
2. InterSystems responsibility for damage to the equipment ended with acceptance by the delivering carrier. Refer to the bill of lading for more detailed information.
3. Save all paperwork and documentation furnished with any of the En-Masse Conveyor components.
4. There are four (4) types of conveyors built by InterSystems. Refer to the certified drawing that came with your equipment to verify your conveyor type.



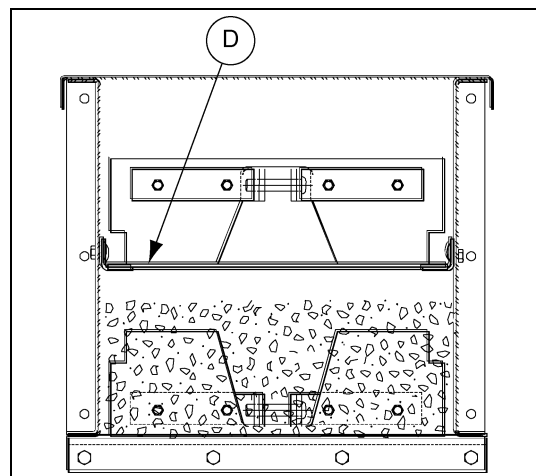
**Figure 4A** Roller Return Conveyor



**Figure 4C** Tall Flight Track Return Conveyor



**Figure 4B** Rail Return Conveyor



**Figure 4D** Tall Flight Divider Pan Return Conveyor

| Ref # | Description     |
|-------|-----------------|
| A     | Return Roller   |
| B     | AR Rail Returns |

| Ref # | Description      |
|-------|------------------|
| C     | AR Track Returns |
| D     | AR Pan Return    |

Pre-Installation Preparation

- 1. The MOST IMPORTANT preparations are retaining a licensed engineer to plan the installation and a qualified millwright or contractor to install the En-Masse Conveyor and the accompanying equipment and structures. Before starting the conveyor assembly installation, review this manual, the drawing(s) furnished with the equipment and other applicable documents, including but not limited to, O.S.H.A. Regulations and the National Electrical Code and all other applicable federal, state and local codes and regulations.
- 2. INTERSYSTEMS DOES NOT ASSUME RESPONSIBILITY FOR THE INSTALLATION.
- 3. The installation recommendations contained within this manual are for consideration only. The user or installer will want to consult a civil or structural engineer regarding the design, construction and supervision of the entire installation.
- 4. En-Masse Conveyors are not designed to be self-supporting structure or part of any truss system. Conveyor must be supported at each section joint. It is the responsibility of the owner/contractor to provide adequate conveyor support.

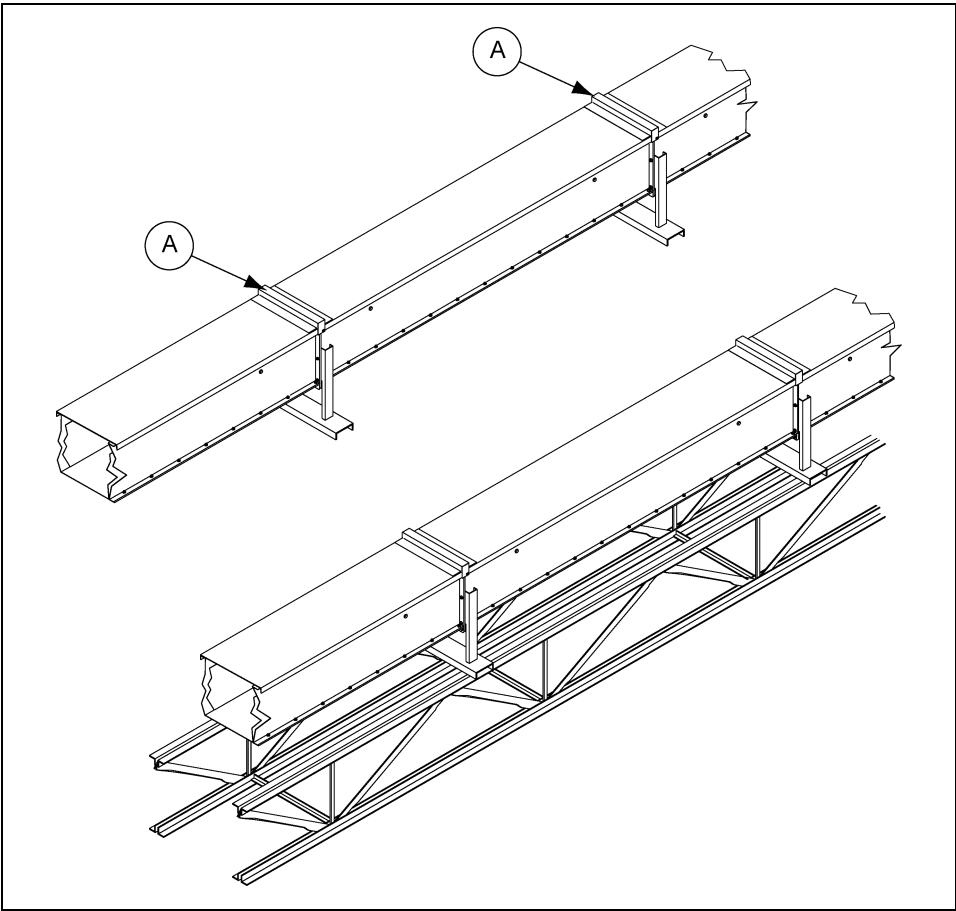


Figure 4E Conveyor Supporting Structures

| Ref # | Description                                     |
|-------|-------------------------------------------------|
| A     | Support conveyor at each (9'-8") section joint. |

## Conveyor Assembly

1. Remove all banding and crating material. Arrange the conveyor components so that they are easily accessible.
2. Locate sturdy items to serve as blocking (i.e. wood blocks, saw horses, etc.). Blocking is used to support the conveyor sections above the ground to help in assembly. Locate and place the conveyor sections on the blocking in order, starting with the head section and concluding with the tail section.
3. Conveyor installation usually start by positioning the Head section over the discharge chute.
4. Make sure that there is sufficient space for the drive to be assembled on the head shaft before the full conveyor is assembled. From that point, assembly works backwards through the intermediate sections, ending with the placement of the tail section.
5. Use a chalk line or other instruments to make sure that there is a correct alignment of the assembly in a straight manner and each section is squared.
6. After all sections are caulked and bolted, the inlet(s) is/are ready to be installed.
7. Make sure that the cross section of the conveyor is level in horizontal operations.
8. Check drive belts for tension. Also check the oil level in the speed reducer. REDUCERS ARE SHIPPED WITHOUT OIL.
9. This is the usually accepted procedure of conveyor installation. Installation procedures may require a different assembly order depending upon the situation.



***Do not attempt to hoist a completely assembled conveyor into position onto its supporting structure. Death or serious injury could result to anyone in the work area.***

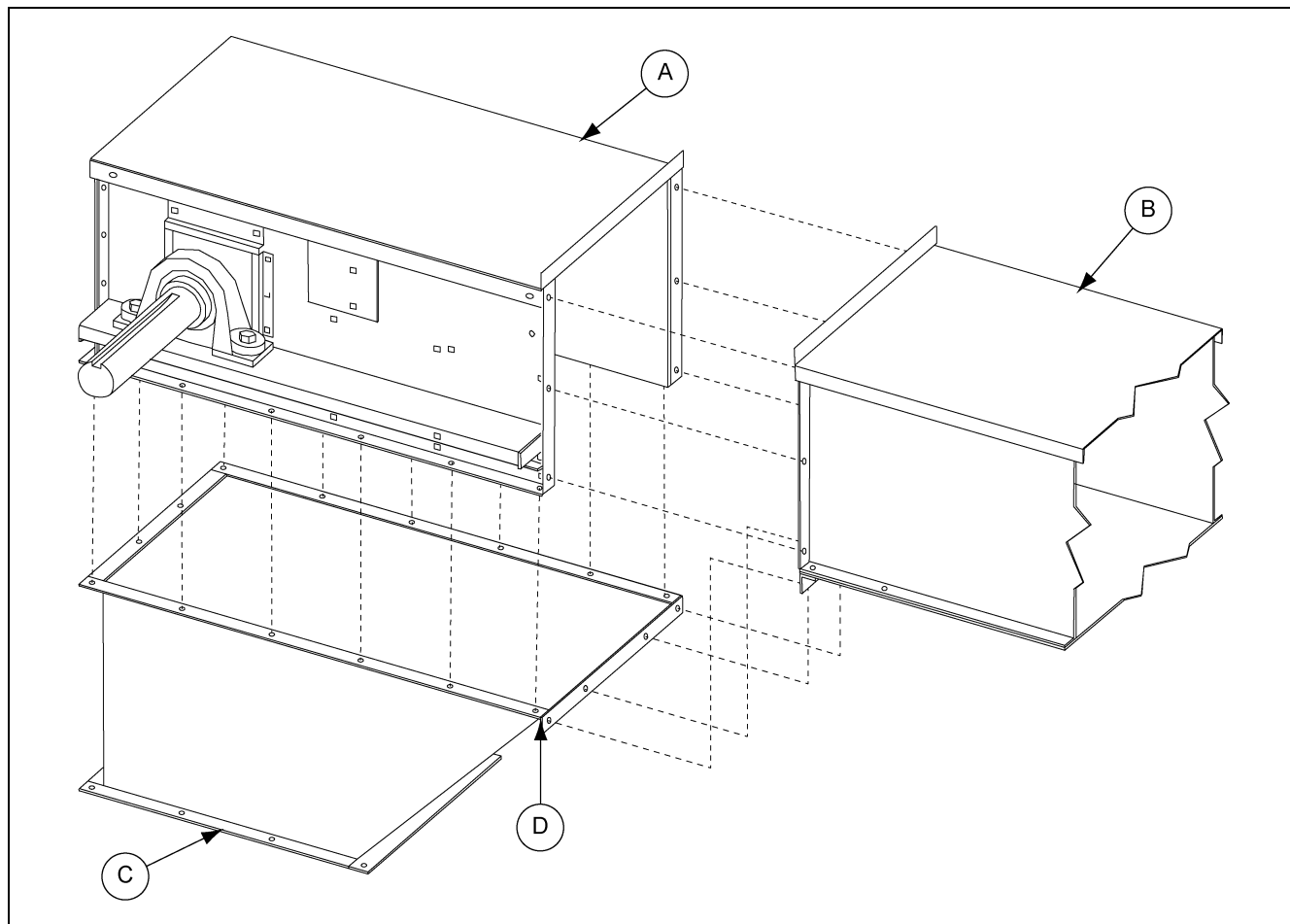
***Before lifting any of the conveyor sections, make sure hoisting machinery capacity exceeds the weight of the heaviest section.***

***Make certain that the chains, cables, or slings used are rated for overhead hoisting duty and of sufficient lifting capacity for the heaviest conveyor section to be lifted.***

## 4. Installation

### Head Section Installation

1. Position the head section (A) over the discharge chute. *(See Figure 4F.)*
2. The head is not self-supporting and must be attached to a transition or flange (C) to operate properly.
3. The transition must have a vertical flange on the intermediate section (B) side. *(See Figure 4F.)*



**Figure 4F** Head Section with Support Transition

| Ref # | Description                                                                      |
|-------|----------------------------------------------------------------------------------|
| A     | Head Section                                                                     |
| B     | Intermediate Section                                                             |
| C     | Discharge transition (by others) required for proper head support.               |
| D     | This side must have a vertical flange to mate with liner flange of last section. |



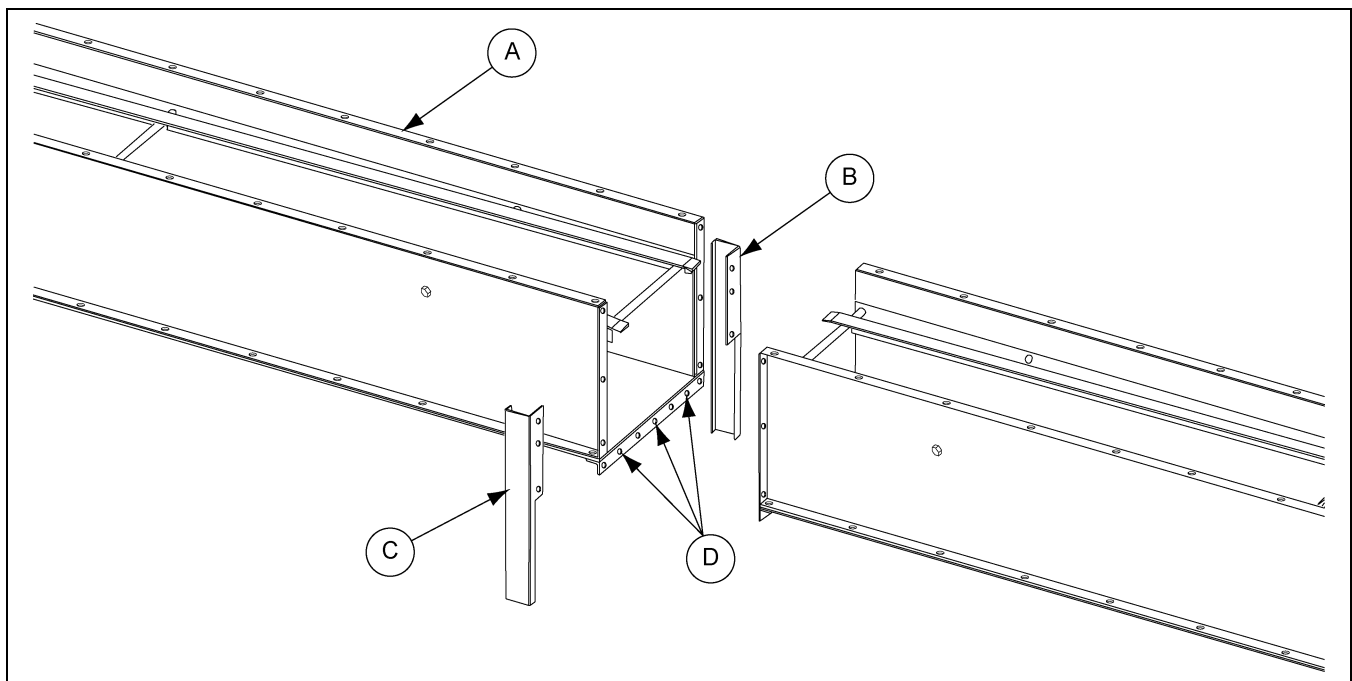
## Intermediate Section Installation

There will be one or more intermediate sections in a complete En-Masse conveyor.

1. Locate the first intermediate section (A) with the head section. Loosely fasten the sections together with 3/8" diameter hex head cap screws and nuts. *(See Figure 4G.)*

**NOTE:** Sections must be assembled in the order specified on the certified drawing.

2. Attach a pair of optional support legs and complete fastening the two (2) conveyor sections together. Do not tighten fasteners at this time.
3. Support legs are optionally furnished in right hand/left hand sets (B and C). One set is required at each conveyor section joint to ensure proper alignment and support.
4. The bottom flanges of each conveyor section have several 3/8" diameter holes.
5. Seal all section joints with silicone.



**Figure 4G** Intermediate Section

| Ref # | Description          |
|-------|----------------------|
| A     | Intermediate Section |
| B     | Left Hand Leg        |
| C     | Right Hand Leg       |
| D     | Alignment Pins       |

6. As each conveyor section is assembled to the preceding section, drive bull-nose alignment pins (D) through the matching pairs of the smaller 3/8" diameter holes.

## 4. Installation

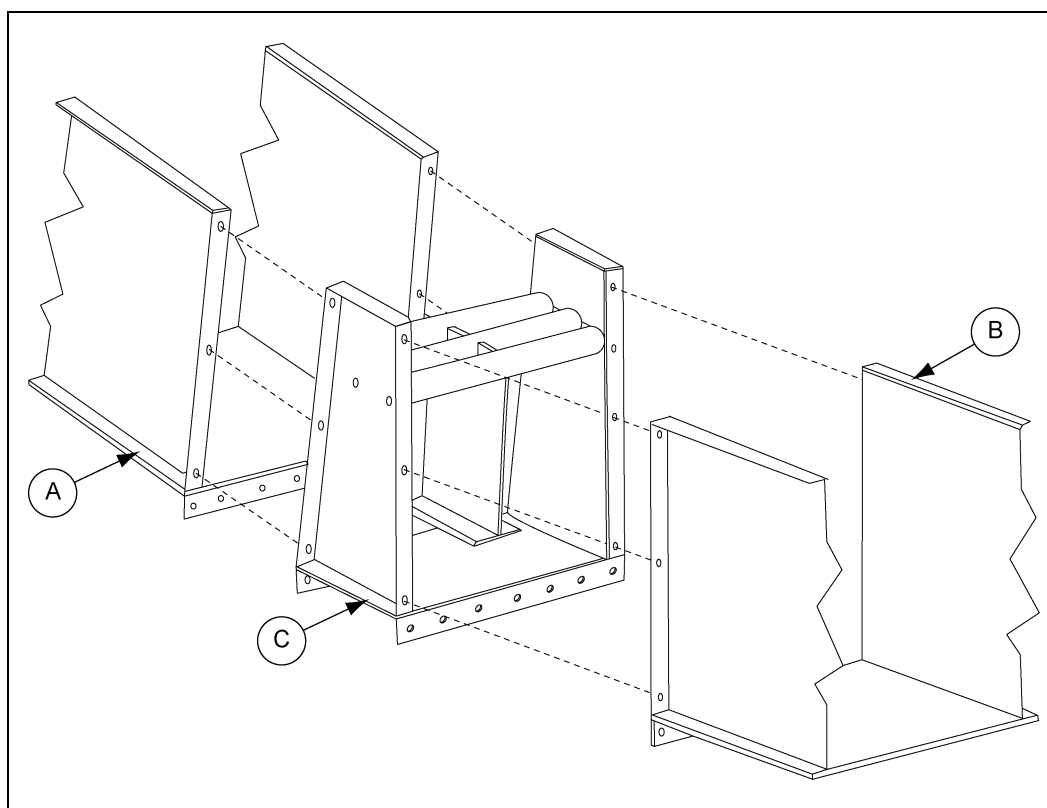
**IMPORTANT:** *This arrangement ensures that liners of adjoining conveyor sections form a smooth, even surface with no lip or ledge in which conveyed materials or flights might otherwise catch. Use a straightedge to verify that the liner surfaces of adjoining conveyor sections are even. If they are not, find and correct the problem.*

7. As each conveyor section is mated with the preceding section, remove the lids and connect the sections of chain. The connecting pins and cotter pins are pre-inserted in one of the end links from the factory.
8. Repeat procedure for each intermediate section (A).

### For Partially Inclined Conveyors Only (Optional)

A knee section assembly must be assembled to the conveyor at the point of transition between the horizontal and the inclined part of the conveyor. (See Figure 4H.)

**NOTE:** *Follow same installation procedure as standard sections.*



**Figure 4H** Knee Section, Partially Inclined Conveyors

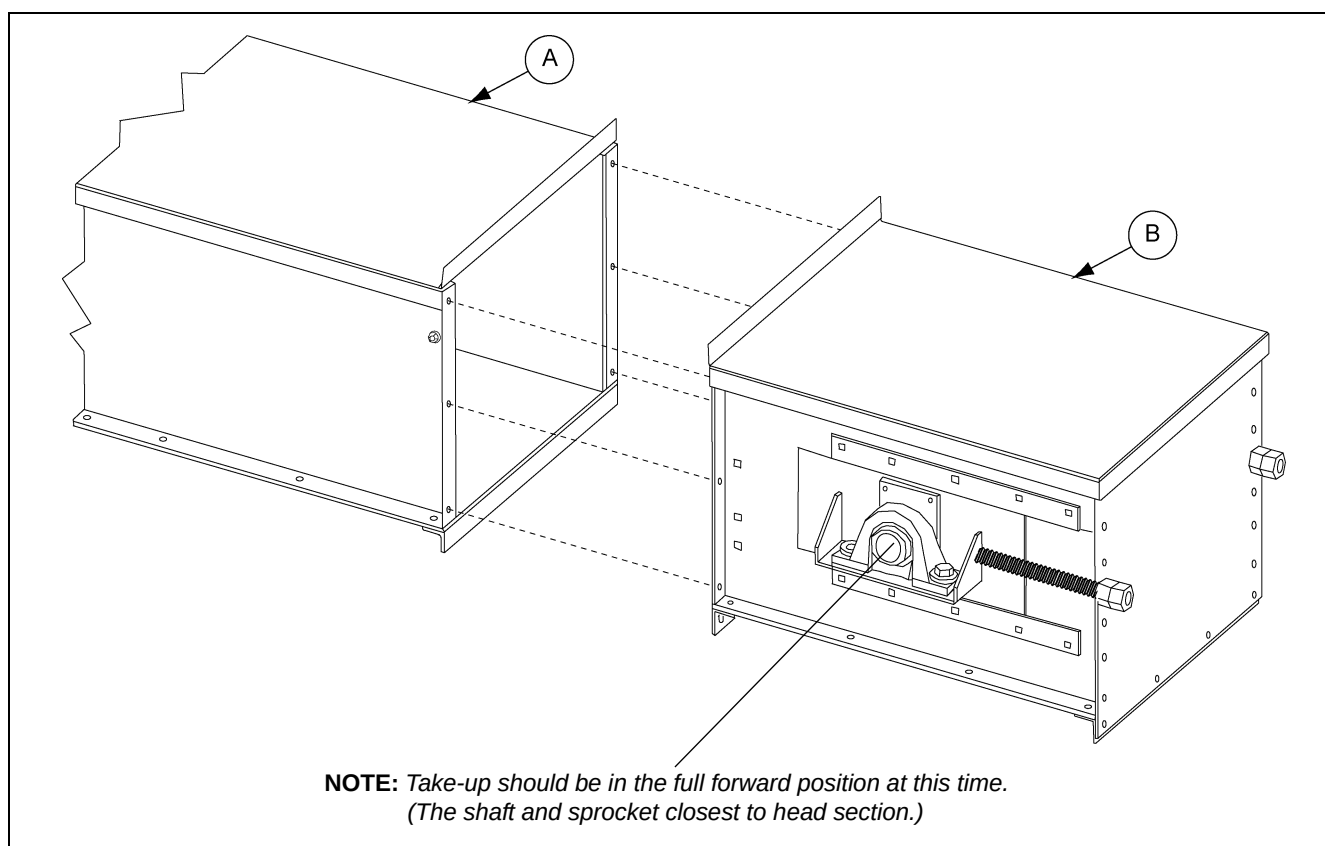
| Ref # | Description  |
|-------|--------------|
| A     | Head Section |
| B     | Tail Section |
| C     | Knee Section |

## Tail Section Installation

1. Install the tail section (B). *(See Figure 4I.)*
2. Make sure at this time that the take-up is in the full forward position to let the easy connection of chain.
3. Tighten all the fasteners.
4. Drive out the alignment pins. Replace them with 3/8" diameter hex head cap screws and nuts supplied with the conveyor.



**Failure to do so may make pins vibrate out and cause potential injuries to persons or property below the conveyor.**

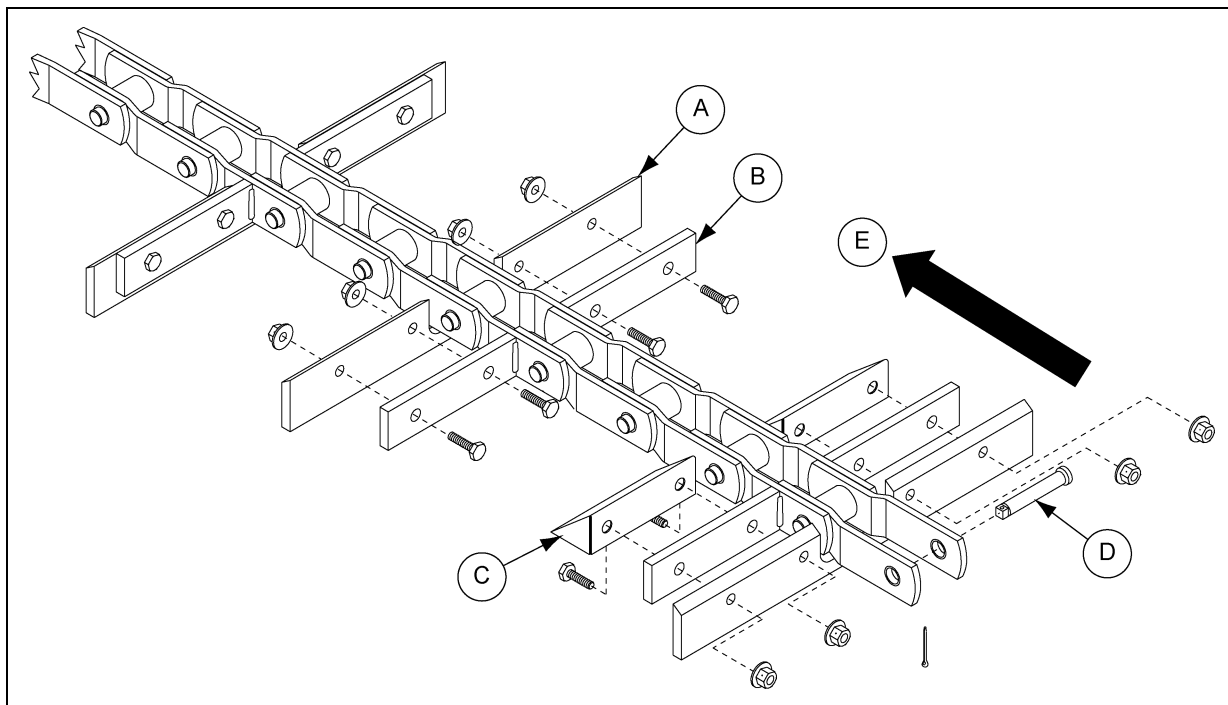


**Figure 4I** Tail Section Assembly

| Ref # | Description          |
|-------|----------------------|
| A     | Intermediate Section |
| B     | Tail Section         |

### Chain Assembly Installation

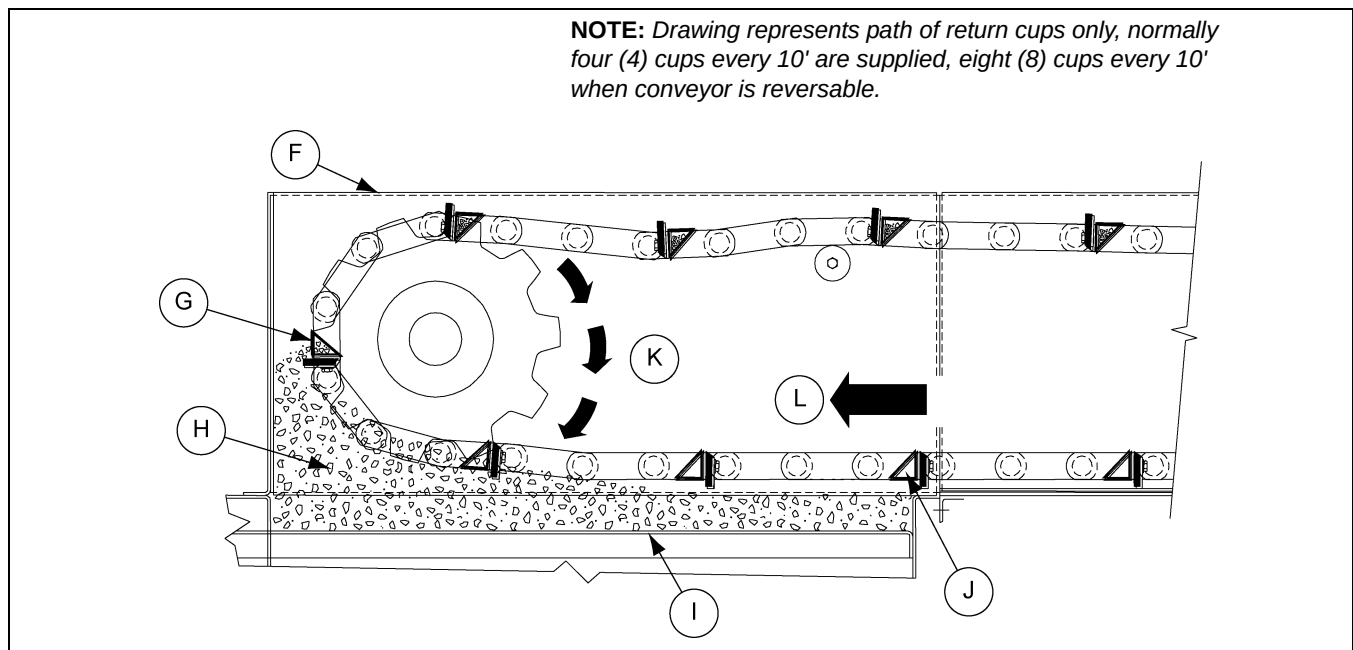
Once the conveyor section is set in place, make sure to position the chain flights along the direction of movement. It will be much easier to correct improperly assembled or positioned chain at this time before entire conveyor assembly is complete. Also note the location of the return cups (C) (if the conveyor has intermediate discharge gates). The cups must be in front of the flight to fill correctly. In the case of a reversing conveyor, the cups should alternate front and back. Refer to [Figure 4J below](#), [Figure 4K](#) and [Figure 4L on Page 21](#).



**Figure 4J** Conveyor Chain and Flight Details

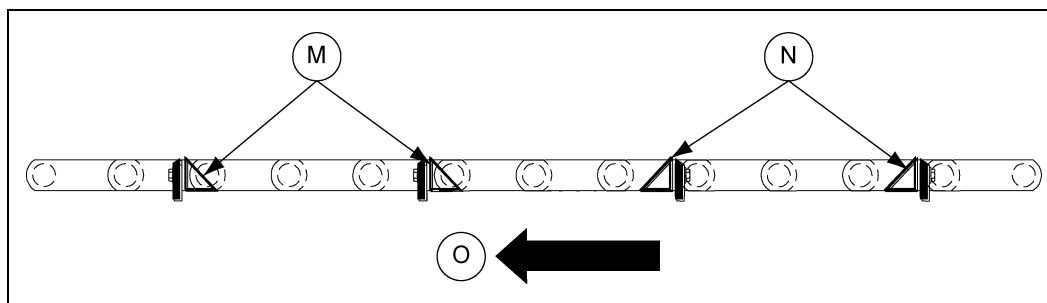
| Ref # | Description                      |
|-------|----------------------------------|
| A     | UHMW Poly Flight                 |
| B     | Steel Bar Flight                 |
| C     | Return Cup                       |
| D     | Chain connecting pin with cotter |
| E     | Direction of Grain Flow          |

1. Connect chain sections together with the connecting pins (D) supplied.
2. Make sure that all flights (A and B) and return cups (C) face the correct direction.



**Figure 4K** Return Cup Orientation for Standard Conveyors

| Ref # | Description                                                    |
|-------|----------------------------------------------------------------|
| F     | Head Section                                                   |
| G     | Return cup being loaded by flight                              |
| H     | Carry-over in head end with discharge gate closed.             |
| I     | Discharge Gate (Closed)                                        |
| J     | Return cup mounted in front of flight to allow proper loading. |
| K     | Sprocket Rotation                                              |
| L     | Chain Direction                                                |



**Figure 4L** Return Cup Orientation for Reversing Conveyors

| Ref # | Description                       |
|-------|-----------------------------------|
| M     | Reverse Direction                 |
| N     | Forward Direction                 |
| O     | Chain Moving in Forward Direction |

### Discharge Gate Installation

Two (2) styles of gates, cross-cut and inline, can be ordered with an En-Masse Conveyor or retrofitted at a later date. The installation procedure is the same for both conditions.

1. Cross-cut gates should be used with reversible conveyors where possible.
2. Inline gates should be installed with the “wings” facing the tail section, where possible.
  - A Steel template is supplied with the gate. Use the template to make a pattern to mark the cutout(s) for the gate.
  - DO NOT use the Steel template to torch cut the gate opening as it will deform.
  - The installer might use a piece of sheet metal cut to width so that it slides snugly between the sides of the conveyor.
  - Transfer the areas labelled CUTOUT onto the sheet metal, then cut out the openings.

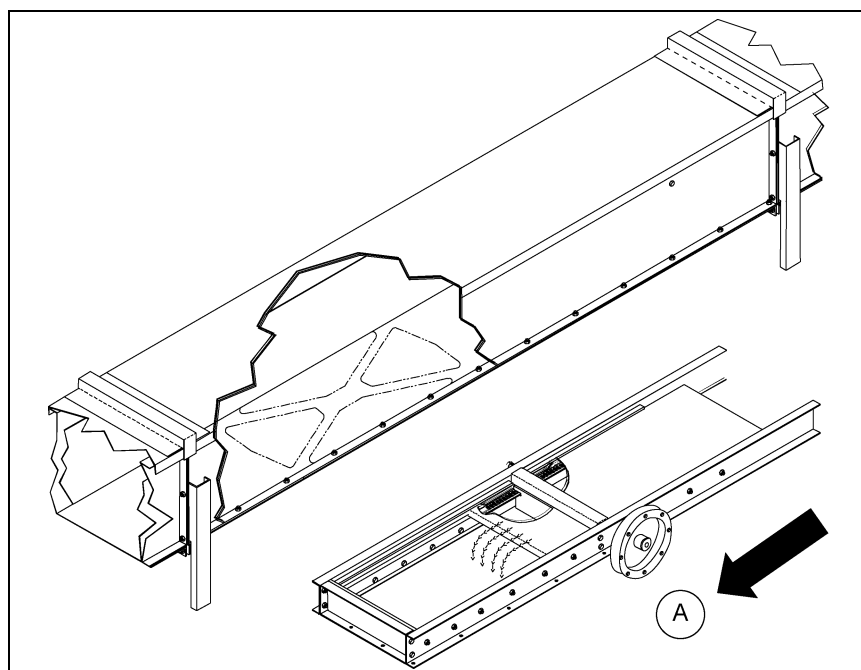


Figure 4M Discharge Gate Installation

| Ref # | Description             |
|-------|-------------------------|
| A     | Direction of Grain Flow |

3. At each position where a gate is to be installed, position the pattern down inside the conveyor on the trough floor. Find the cutout areas on the trough floor. Then cut out the indicated areas.
4. If a gate is to be installed on one of the seams in the bottom panel, the bottom panel flanges must be cut off. First make sure that the fasteners in the side flanges are tightened correctly so the conveyor sections do not shift relative to each other.

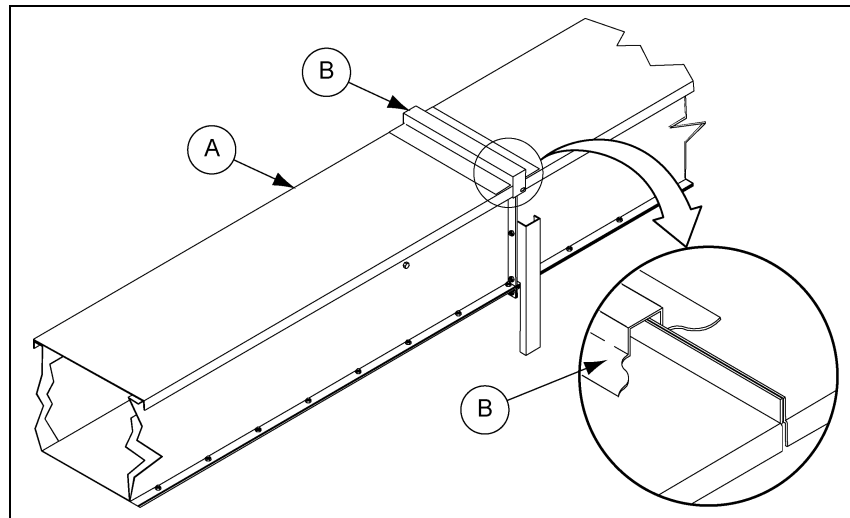


**Follow all federal, state, local, and corporate procedures when welding, grinding or cutting. Certain dust or other conditions can cause explosions. Death or serious injury may result.**

5. When the bottom flanges must be cut off for gate installation, the ends of the bottom panels must be welded to compensate for the loss of stiffness.
  - Angle the upper edges of the panels where they butt together.
  - Weld the butting edges of the panels.
  - Grind the welded joints smooth and level. This procedure ensures that liners of adjoining conveyor sections form a smooth, even surface with no lip or ledge in which conveyed materials or flights might otherwise catch.
6. Smooth out all the rough edges of the cutout areas. Any burrs or sharp edges will result in damage to the flights or rapid wear.
7. Position each gate under its cutout area. Drill mounting holes through the edges of the trough bottom panel and liner and through the flanges of the trough side panels.
8. Attach the gate to the conveyor trough.
9. Gates can be operated by multiple drives. The certified drawing will specify the type of gate operating mechanism ordered and supplied, if any. If InterSystems supplied an electric gate drive, refer to the suggested wiring diagram [on Page 28](#).

## Conveyor Lid Placement

1. The conveyor's lids must be in place before start up and also before any optional inlets can be installed. ([See Figure 4N.](#))
2. Intermediate section covers, tail section covers, and lid seals are held in position by provided nuts and bolts. USE ONLY extension spring clips to retain the head section cover as it must be free to lift if a choke conditions arises.



**Figure 4N** Conveyor Trough Covers

| Ref # | Description       |
|-------|-------------------|
| A     | Lid (Bolted)      |
| B     | Lid Seal (Bolted) |

### Inlet Installation

Make sure to maintain the minimum “A” dimension as shown, otherwise conveyed material will accumulate in the tail section (B) behind the tail sprocket and conveyor capacity may be reduced due to improper loading. This dimension changes with incline is specified on the certified drawings for each conveyor.

(See Figure 40.)

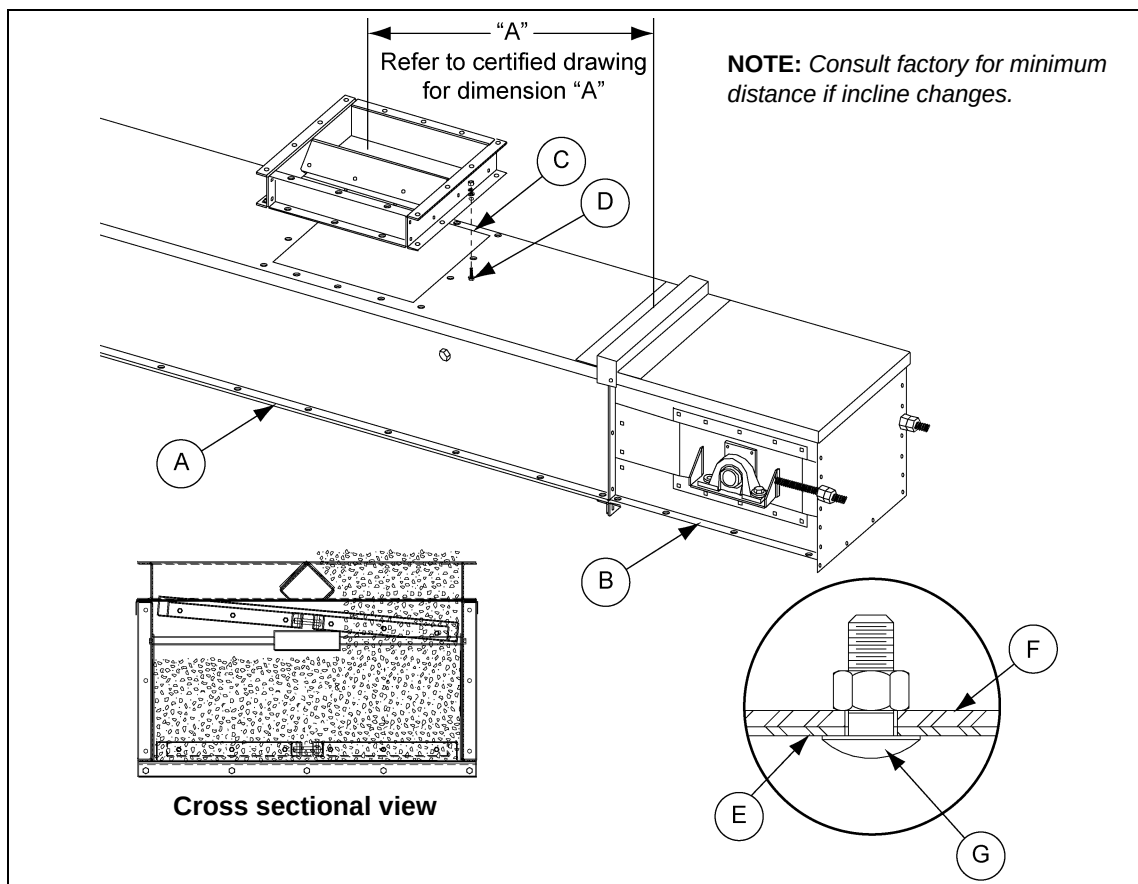


Figure 40 Inlet Installation

| Ref # | Description             |
|-------|-------------------------|
| A     | Intermediate Section    |
| B     | Tail Section            |
| C     | Cut Opening as Required |
| D     | Carriage Head Bolt      |

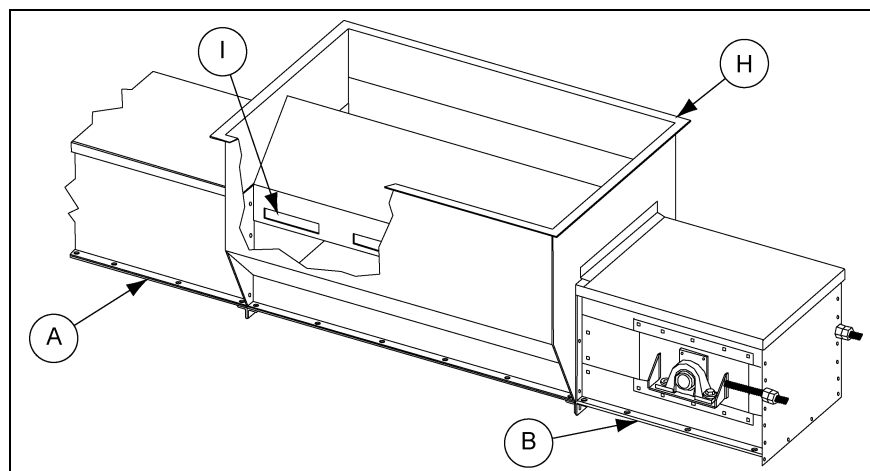
| Ref # | Description                                                                   |
|-------|-------------------------------------------------------------------------------|
| E     | Lid                                                                           |
| F     | Inlet Flange                                                                  |
| G     | Carriage head bolt required on inside of<br>conveyor so chain does not catch. |

Always make certain chutes or spouting to the inlet feeds the conveyor in the center and from the top. If fed too heavily on one side, conveyor capacity is reduced and uneven chain loading can result. In the case of conveyors with return rollers, chain and flights will “tip” if fed off center, which could damage roller assemblies and cause flight wear. Never allow an inlet to feed material onto a roller shaft assembly. If inlet location is not changeable, then move the roller shaft assemblies out from underneath the inlet opening, either toward the head or tail end of the conveyor.

Be certain the distance between roller shaft centers does not exceed 38". It may also be necessary, due to spout configuration, to add a rail beneath the chain flight tips to prevent the flights from tipping, caused by uneven material flow. Wider conveyors can be more susceptible to this condition.



## Divided Flow Inlet Assembly

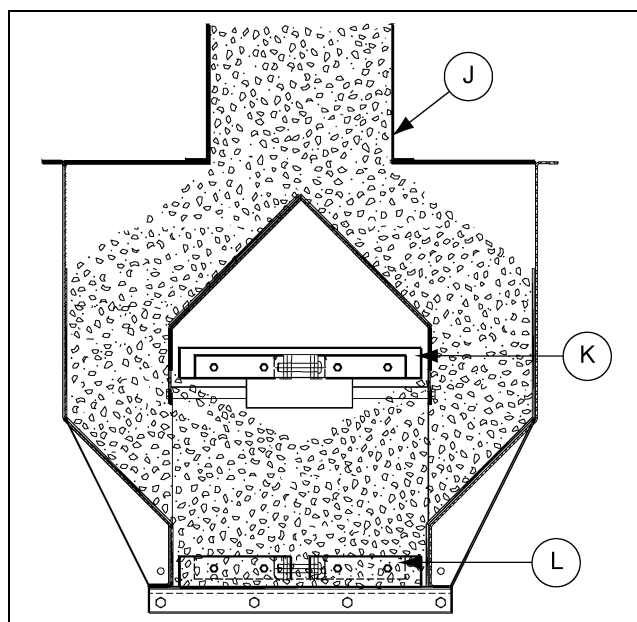


**Figure 4P** Divided Flow Installation

| Ref # | Description          | Ref # | Description                                                                                                               |
|-------|----------------------|-------|---------------------------------------------------------------------------------------------------------------------------|
| A     | Intermediate Section | I     | Baffle openings may need to be enlarged or blocked off depending on material, chain speed, incline and method of loading. |
| B     | Tail Section         |       |                                                                                                                           |
| H     | Divided Flow Inlet   |       |                                                                                                                           |

If the conveyor includes a divided flow inlet assembly (H), it is usually assembled to the conveyor immediately preceding the tail section (B). *(See Figure 4P.)*

A divided flow inlet is “self metering” in that the material is allowed to flow into the sides of the conveyor, and only fill the trough to the level equal to the angle of repose of the material. *(See Figure 4Q.)* Because all materials handle differently, the ports on the side wall may at times need to be enlarged upward to increase capacity, or in some cases, reduced or blocked off entirely if too much material is flowing in.



**Figure 4Q** Divided Flow Inlet Cross Section

| Ref # | Description               |
|-------|---------------------------|
| J     | Inlet Spout (By Others)   |
| K     | Return Strand of Chain    |
| L     | Conveying Strand of Chain |

### Installing the Drive (Shaft Mount Only)

Refer to the certified drawing and the equipment quotation for details of the drive components, if supplied. Refer to the manufacturer's data supplied with the reducer. For purposes of explanation, the installation of a Dodge Shaft Mount Torque Arm reducer is given. Installation of other reducer brands are very similar, differing only in minor details.

Drive components furnished can vary from simply providing an extended and key seated head (drive) sprocket shaft to a complete drive. The reducer has a hollow output shaft. Tapered bushings in the output shaft seat the reducer on the conveyor head shaft. The input shaft faces away from the conveyor. The reducer should be positioned close to the head shaft bearing while leaving sufficient clearance to tighten and loosen the screws that draw the tapered bushings tight on the head shaft.

1. Attach torque arm bracket (B) to trough bottom directly behind head (A). *(See Figure 4R on Page 27.)*
2. Attach the torque arm anchor bracket (B) to the reducer housing (C).
3. Rotate the torque arm turnbuckle to nearly full extension for maximum adjustment range.
4. Assemble the torque arm clevis bracket to the torque arm eye bolt.
5. Fasten the clevis bracket to the torque arm bracket (B).

**NOTE:** *Use existing holes if possible or drill new holes to fasten the clevis bracket to the torque arm bracket.*

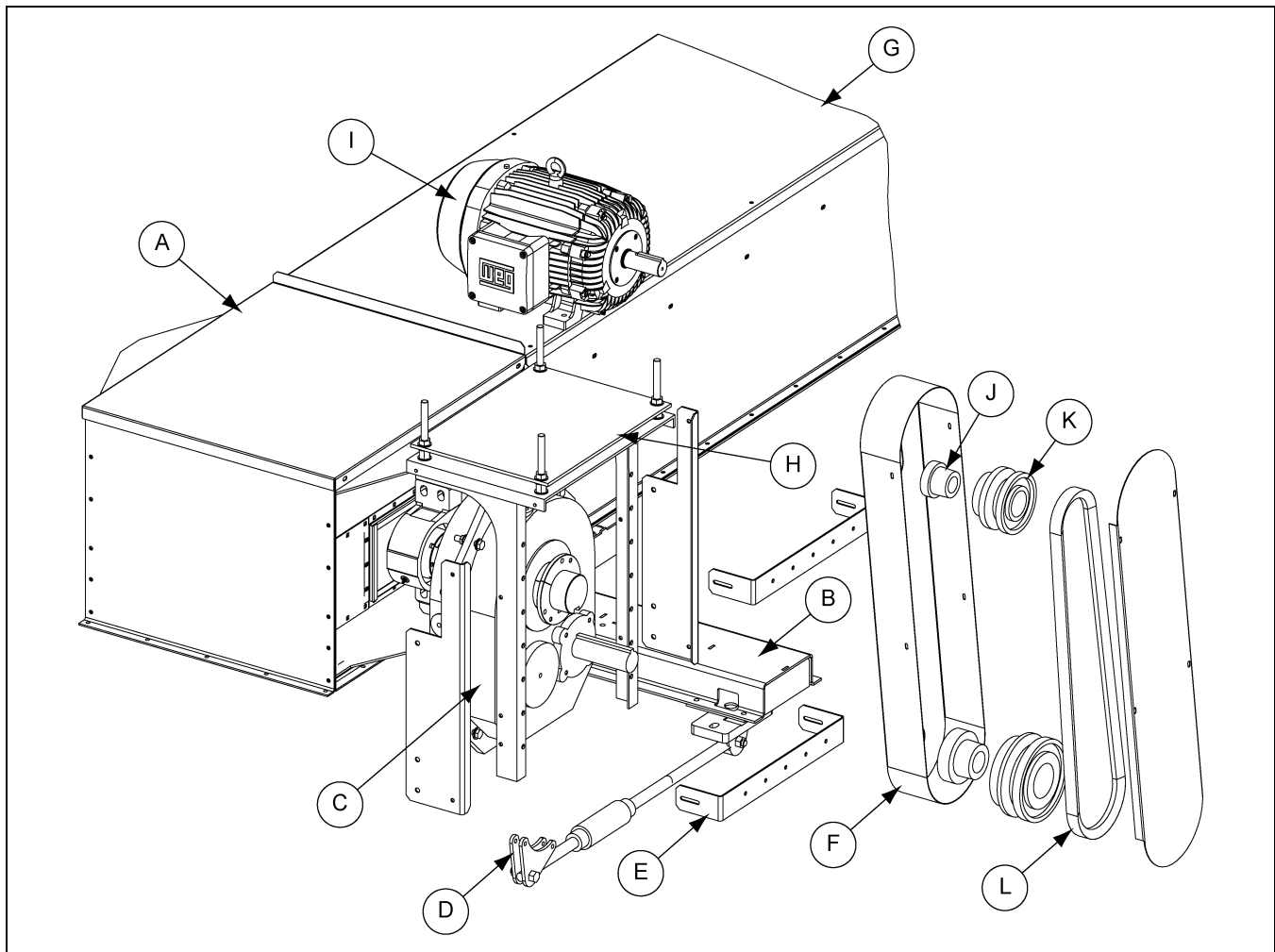
6. Adjust the torque arm (D) so that the reducer (C) is 90° to conveyor head.

**NOTE:** *Use the lock nut on the turnbuckle to prevent movement by vibration.*

7. Attach the front and back motor mount supports to the reducer (C).
8. Fasten the motor (I) to the motor mount (H).

**NOTE:** *The fasteners used will depend on the size and origin of the motor. DO NOT tighten motor mounting screws yet.*

9. Fasten the belt guard mounting brackets to the motor mount (H).
10. Loosely fasten the belt guard (F) WITH THE COVER REMOVED to guard mounting bracket. Shift the guard so that the elongated hole for the reducer input shaft is vertically aligned and so the full range of adjustment is available. Tighten the guard mounting fasteners.
11. Assemble the drive and driven sheaves on the motor and reducer input shafts. Align the sheave faces and tighten the "taper-lock" bushing set screws.
12. Fit the belts over the sheaves. Use the long screws in the motor bracket to take up the slack in the belt. Make sure the guard does not rub on either shaft. Then re-install the belt guard cover.
13. Tighten all the fasteners to the required torque specifications.



**Figure 4R** Typical Shaft Mount Drive Installation

| Ref # | Description        | Ref # | Description          |
|-------|--------------------|-------|----------------------|
| A     | Head Section       | G     | Intermediate Section |
| B     | Torque Arm Bracket | H     | Motor Mount          |
| C     | Reducer            | I     | Motor                |
| D     | Torque Arm         | J     | Bushing              |
| E     | Guard Bracket      | K     | Pulley               |
| F     | Drive Guard        | L     | V-Belt               |

## 4. Installation

### Field Wiring

All the power and control wiring must be in accordance with the appropriate National Electrical Code and all applicable federal, state, and local codes and regulations. Refer to [Figure 4S](#) for suggested wiring diagram.

#### NOTICE

**Standard electrical safety procedures should be used. A qualified electrician should make all electrical wiring installations. Follow all local or national electrical safety standards and ordinances when installing the equipment.**

Usually, a magnetic motor starter/circuit breaker is used to control the conveyor drive motor. The starter is typically located in an electrical panel located some distance from and out of sight of the conveyor. The National Electrical Code (NEC) requires that a fused, lockable disconnect switch be located near and in sight of the conveyor drive so that maintenance and repair personnel can see and discourage anyone who attempts to restore power without authorization.

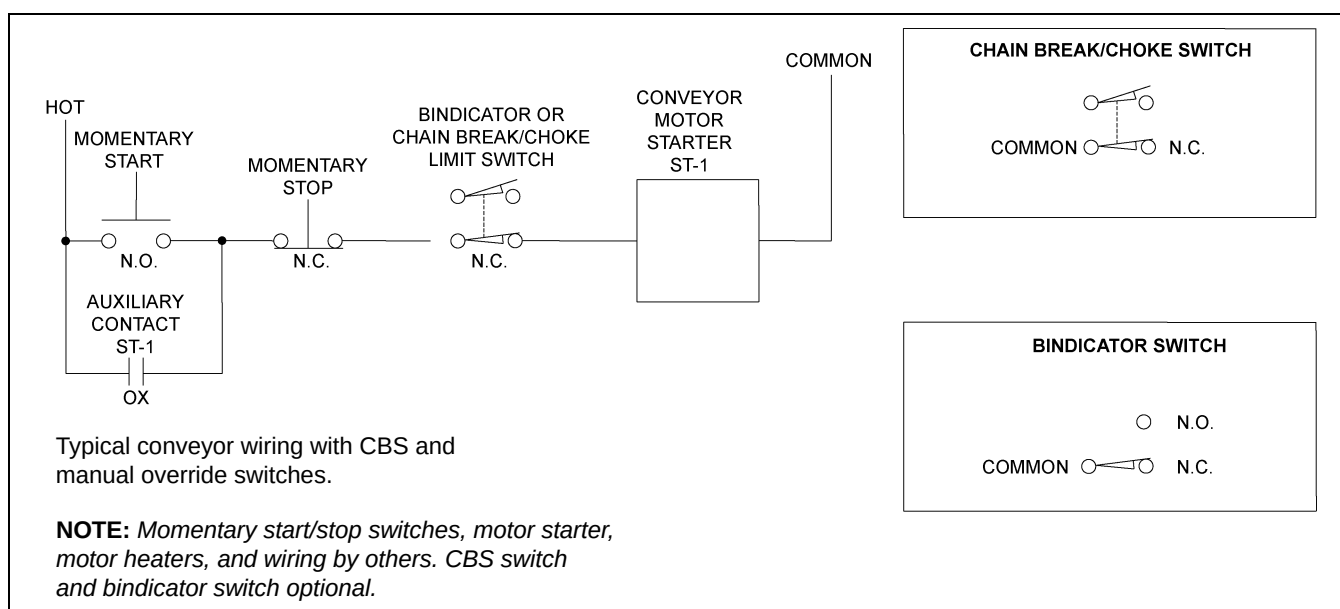


Figure 4S Suggested Wiring Diagram

### Chain Break/Choke Switch

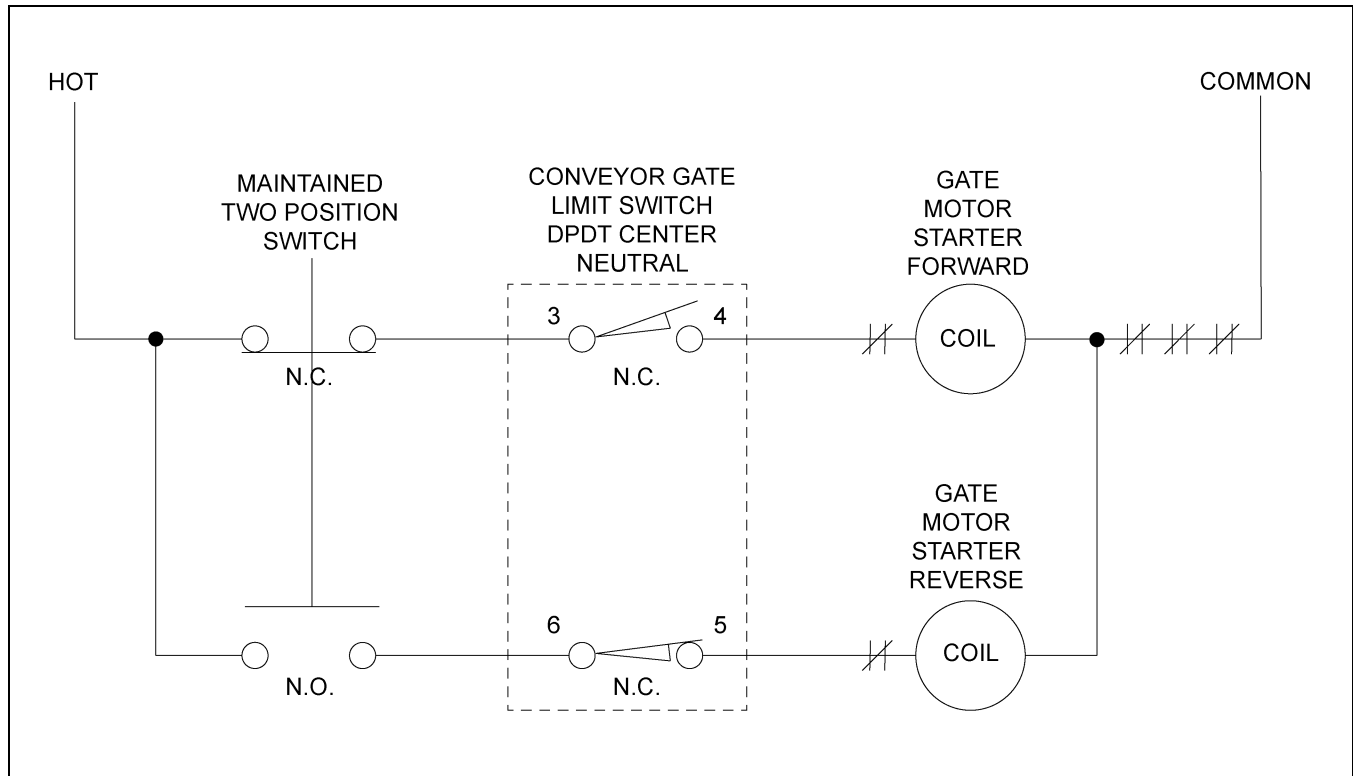
The chain break/choke switch has two (2) functions:

1. If the head section of the conveyor becomes choked or clogged with conveyed material, this switch is allowed to return to its normally open unactuated condition when the build-up of material lifts the cover. Refer to [Figure 6F](#), [Figure 6G](#) and [Figure 6H on Page 39](#) for theory of operation.
2. If the conveyor chain breaks, the chain and flights will begin to wrap around the drive sprocket. This results in the flights pressing down on the trip levers. The trip lever shaft rotates causing the head section cover to lift. The cover then lifts with the same result as in Function 1.

The switch contacts must be interlocked with momentary start/stop push button switches and the motor starter so that when either of the previously mentioned conditions occurs, the motor circuit will be interrupted, causing the conveyor and any other interlocked equipment to shut down.

## Electrically Operated Discharge Gate

A premounted C-face reducer along with motor is included with each gate. Each powered gate is provided with a limit switch actuated by the opening and closing of the gate. The user or installer must provide all other controls and indicators necessary for gate operation. Drive components are factory assembled and mounted. [See Figure 4T](#) for suggested wiring of intermediate gate, motor, and switches.



**Figure 4T** Suggested Wiring of Gate, Motor and Switches

### Pre-Startup Procedure

Do this before power is applied to the conveyor:

1. Make sure all guards and warning labels are in place and legible. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY.
2. Make certain all electrical connection box covers are in place and securely fastened. Check for exposed wiring and damaged conduit.
3. Inspect the inside of the conveyor for tools, or anything else that could cause damage on start-up.
4. Verify that all lids are bolted in place and the head assembly lid is firmly held in place by the appropriate extension spring clip assemblies.



***All power to the conveyor must be shut off and locked out before performing any pre-startup procedure. Death or serious injury can result if the conveyor starts while any service is being performed.***

### Initial Lubrication

#### Filling the Reducer with Lubricant

The conveyor's drive reducer is shipped without lubricant (dry). Refer to the documentation furnished with the optional reducer, fill the reducer gearcase with the recommended lubricant to the specified level. All lubricants to be supplied by others.

#### Mounted Bearings

The mounted bearings in the head and tail sections were filled with lubricant from the manufacturer and do not require relubrication at this time.

#### Conveyor Chain

DO NOT lubricate the conveyor chain. It is designed to run dry. Any lubricant will cause dirt and residue from the conveyed material to accumulate on the chain, causing rapid, premature wear.

### Head Shaft Alignment

Verify that the head shaft is truly perpendicular to the conveyor axis and that the sprocket is centered on the shaft. A misaligned shaft or incorrectly positioned sprocket will cause rapid chain, sprocket, and flight wear.

### Initial Tail Section (Take-Up) Adjustment

1. Remove the first unobstructed cover from the intermediate section nearest the tail section.
2. Turn the inner nuts to apply tension evenly to both take-up screws. The chain is properly tensioned when there is 1/4" to 1/2" sag between return rollers in a standard length intermediate section.  
**NOTE:** *If conveyor is equipped with rail return, check the chain as it comes off of the head sprocket, as this is where ALL the slack will accumulate.*

**NOTE:** *Too much chain tension imposes excessive load on bearings, shafts, and chain, resulting in increased wear.*

3. Verify that the tail shaft is perpendicular to the conveyor center axis and that the sprocket is centered on the shaft. A misaligned shaft or incorrectly positioned sprocket will cause rapid chain, sprocket, and flight wear.
4. If the conveyor has a knee section, the chain must have sufficient slack so that the upper or return strand of chain does not rub against the cover of the knee section.
5. Re-tighten the take-up screw locking nuts. Replace any removed lids.
6. After the conveyor has operated for approximately 100 hours, the chain may “stretch” or (wear), taking an initial set and requiring readjustment.

### Start-Up

1. For the initial start-up, the conveyor should be empty.
2. Depending on the conveyor length and configuration, station one or more persons to listen and watch for potentially dangerous or damaging conditions.
3. Turn the conveyor ON. If there is provision for JOGGING the conveyor, do so rather than operate it continually. Verify correct direction of motor rotation. Reverse conveyor operation may damage chain and flights. unless the conveyor was designed and furnished for reversible operation. If necessary, rearrange motor wiring for correct direction of motor rotation.
4. Regardless of the mode of operation, listen for any unusual sound indicating that foreign material was left in the conveyor and is dragging, scraping, or jamming the equipment. Listen carefully at each conveyor joint to make sure the flights are not catching or snagging any of the liner seams. If the conveyor has any discharge gates, listen carefully to make sure the flights are not snagging any of the cutout areas. If the conveyor includes a knee section, listen to make sure the chain moves through without jerking or contacting the cover.
5. Shut down the conveyor. Lock out all power.
6. Remove the cover from an intermediate section. Inspect the flights for any grooves which would indicate a burr or sharp edge somewhere in the conveyor. If a problem is discovered, find the cause and correct it immediately. Slight, even discoloration of the contact surfaces of flights and liner is normal. In fact, the mutual polishing action reduces friction.
7. Recheck chain tension as detailed in initial tail section (take-up) adjustment [on Page 30](#). Apply a protective coating to the take-up screw threads to prevent rust and corrosion. Future take-up adjustments will be much easier if this is done.
8. After correcting any problems detected during initial conveyor operation, replacing any guards or covers removed, and observing all safety precaution, proceed to test the conveyor with the product or material to be conveyed in normal operation. Since InterSystems, Inc. is not responsible for system integration or controls, a system test procedure is beyond the scope of this manual.

### Conveyor Dry Run Time

**NOTE:** *Do not run the conveyor empty for extended periods of time.*

It is important that conveyor dry run time with no material being conveyed kept to a minimum. Dry running in excess of 5 minutes will cause acoustic vibration of the bar flights and can lead to metal fatigue. This may result in bar flights becoming detached from chain, causing damage to the conveyor and any other equipment down stream. Conveyor should be electrically interlocked for proper operation sequences and shut down, and/or operating personnel given adequate training procedures.



**Before any maintenance is performed on the conveyor, power must be shut OFF and locked out to prevent accidental start-up.**

**Failure to observe all safety rules, written, implied, and those suggested by obvious common sense, can result in death, serious injury, and/or equipment damage.**

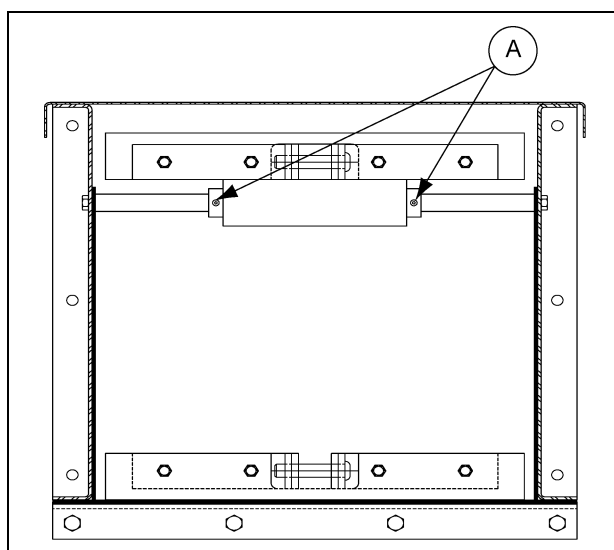
### General Maintenance

A good maintenance program involves thorough general housekeeping, adequate periodic relubrication, and timely adjustment of take-ups to maintain proper chain tension.

### Periodic Inspection

At regularly scheduled intervals, while observing all safety precautions, observe the conveyor as it operates. Inspect for:

1. Loose or missing hardware, in particular:
  - Flight mounting fasteners.
  - Return roller mounting screws and set collars.
  - Set screws that lock return roller locating setcollars to the roller shafts. If the rollers slip sideways on their shafts, the chain will bear directly on the shafts instead of the rollers. Rapid wear and extensive damage will occur very rapidly.
  - Check and tighten all sprocket set screws.
2. Noisy bearings, motor, or reducer.



**Figure 6A** Typical Return Roller Cross Section

| Ref # | Description |
|-------|-------------|
| A     | Set Collars |

3. Overheated bearings, motor, or reducer.



4. Structural damage.
5. Rust or corrosion.
6. Damaged wiring, including exposed conductors and connections.
7. Periodically shut off and lockout all power to the conveyor. Check the CHOKE/CHAIN BREAK switch to see that it actuates and restores smoothly.
8. Check chain and flights for damage due to foreign object caught in conveyor. Replace damaged poly-flights with new. Straighten bar flights which have been bent. If bars have been bent more than two (2) times, the chain section should be replaced. DO NOT ATTEMPT TO REWELD BARS ONTO THE CHAIN. Special preheating procedures must be followed or the heat treated chain side bars can become brittle and cause chain failure. Consult InterSystems on this procedure.
9. Make sure that all guards are in place and that all warning labels are in place and legible. Safety section explains the purpose and intended location of the warning signs and also lists the part numbers of the signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY.

## Lubrication

### Reducer

Refer to the documentation furnished with the reducer. The user must interpret the data therein in light of the severity of duty in each application. If there is any doubt, contact the manufacturer or a local supplier of the reducer for specific recommendations.

### Motor

Many motors have sealed and permanently lubricated bearings; with these, no relubrication is possible or desirable. If bearings of this type becomes noisy or overheat, they must be replaced.

Motors having bearings which can be re-lubricated are usually larger integral horsepower sizes. Special pressure lubricating equipment may be required. Refer to the documentation furnished with the motor.

### Mounted Bearings

Mounted bearings require periodic relubrication at appropriate intervals. The amount and frequency depends in large extent upon the severity of the operating environment and the duty cycle.

Inject each mounted bearing with an NLGI #2 grease, Lubri-Plate "Multi-Lube A" for example. Inject only enough lubricant so that a slight bead can be seen to form around the seal. The appearance of the bead indicates that the bearing has been filled adequately and helps purge and exclude contaminants from the bearing cavity.

### General Housekeeping

At frequent and regular intervals, remove the accumulated dirt from the motor and reducer to prevent overheating. Fan cooled motors depend upon unobstructed air flow over the housing for effective cooling.

Reducer gearcases must also be free of dirt for effective radiation of heat. Most reducers have a pressure vent which allows escape of vapors which may build-up internally. If dirt blocks a vent, internal pressure can rupture seals. Leaking lubricant can contaminate product and will result in reducer failure and equipment downtime. Some manufacturers have refused to honor warranties in such cases.

Keep the area around the CHOKE/CHAIN BREAK limit switch clear of accumulations of dirt and debris which might prevent the switch from functioning as intended.

### Head and Tail Shaft Removal

The En-Masse Conveyor has been designed to allow the removal of all head assemblies and of all tail shaft assemblies (except those in Series 12 conveyors) with all components mounted on the shaft in place. Rust, corrosion, and fretting of the components on the shaft can make it difficult or impossible to remove defective sprockets, bearings, or drive components from a shaft or to install replacements.

Shaft assembly repair is facilitated as the assembly can be moved as a unit to a shop where presses and pullers are available and where weather will not make repairs more difficult. Refer to [Figure 6B](#) for 12" and 17" heads and [Figure 6C on Page 35](#) for 26" heads.



**Turn OFF and lock out all power to the conveyor before removing guards or head or tail section covers. Death or serious injury could result.**

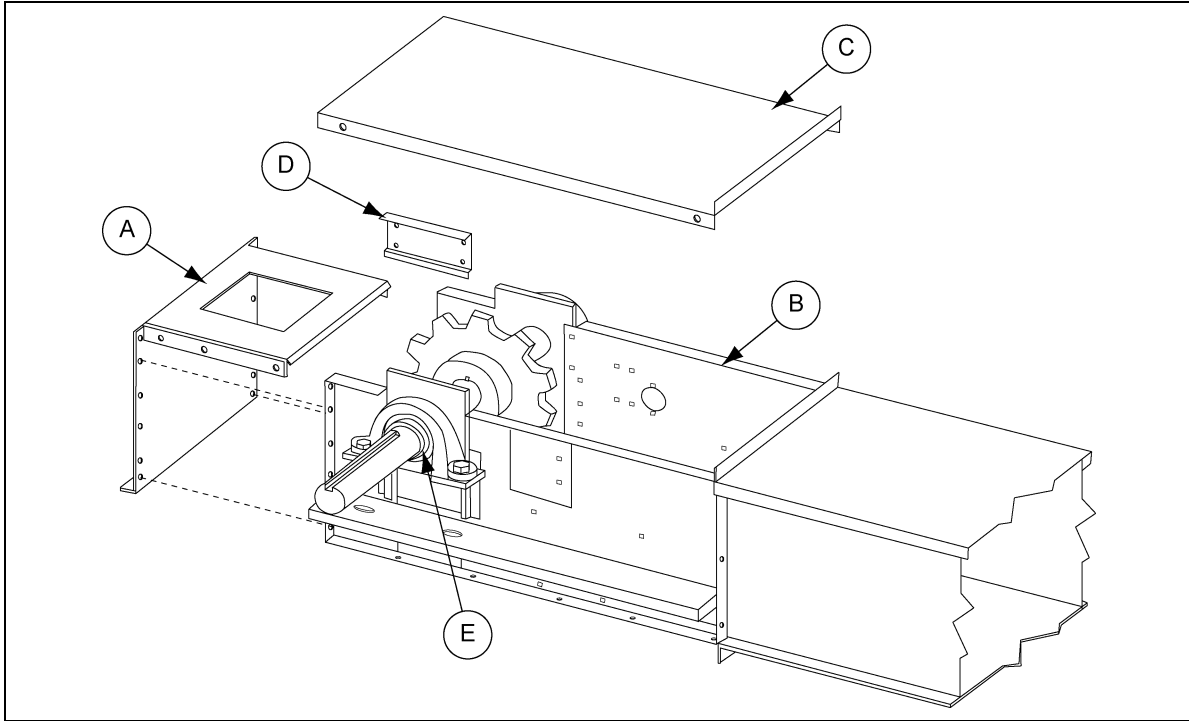
1. To remove the head or tail shaft assembly, it is necessary to separate two (2) sections of chain at the affected shaft assembly. A splice has a chain pin locked in the chain by a cotter pin as shown.
2. Remove the chain splice pin so that the chain can be disengaged from the sprocket.
3. Follow the instructions below for removal of the head or tail shaft.

### Removing the Head Shaft Assembly

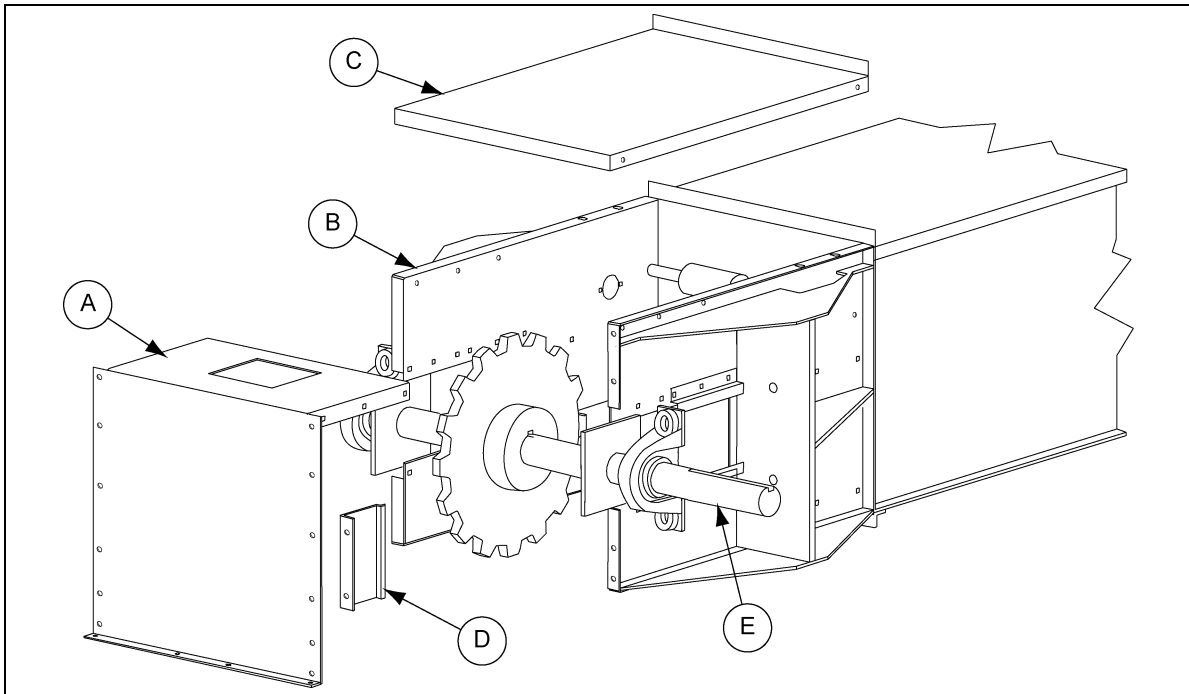
Remove the head shaft ONLY AFTER the chain has been separated at the head sprocket.

1. Reconfirm that all power has been shut off and locked out.
2. Disconnect electrical wiring to the motor. Pigtail the exposed connections and wrap with electrical tape so that if power is accidentally restored, no injury or damage can result.
3. Remove the end panel on 26" conveyors or HD style heads, or filler plate on standard head. Save the fasteners.
4. Remove the fasteners attaching the top seal plate retaining clips to the head section side panels (B). Save the fasteners.
5. Remove and save the fasteners attaching the pillow blocks to their supports.
6. If the conveyor has a separate drive, disconnect the chain, belts, or drive shaft. Then using a suitable hoist or lift raise the shaft assembly (E) clear of the head section. (OR) If the conveyor has a shaft mounted drive, FIRST secure the drive assembly to a suitable hoist or lift to support the weight of the drive and especially to prevent its pivoting around the drive shaft when the torque arm is separated from the reducer. Disconnect the torque arm from the reducer. Save the fasteners.

7. The head shaft assembly can now be lifted clear of the head section.



**Figure 6B 12" and 17" Head Shaft Removal and Re-Installation**



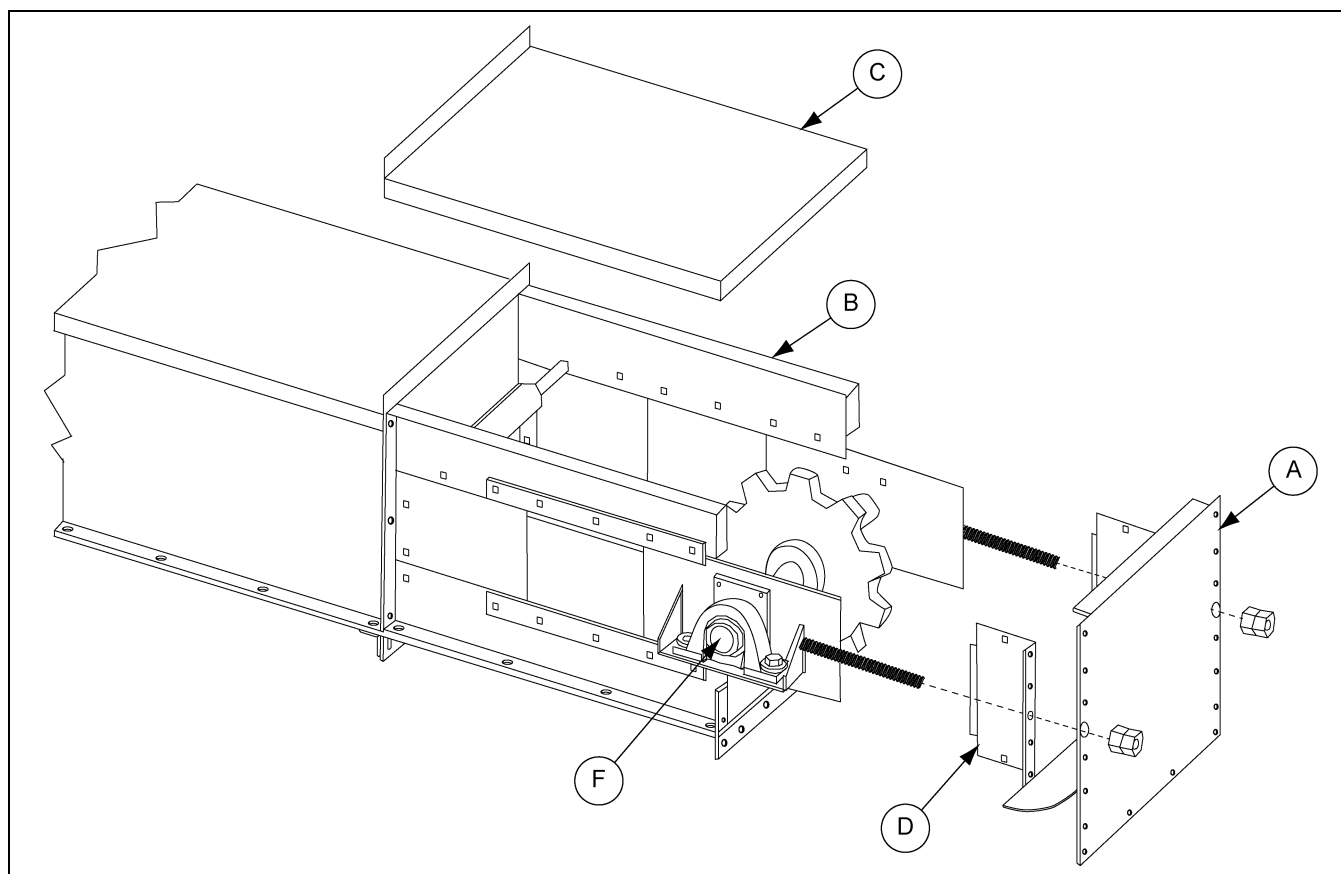
**Figure 6C 26" Head Shaft Removal and Re-Installation**

| Ref # | Description | Ref # | Description                                                        |
|-------|-------------|-------|--------------------------------------------------------------------|
| A     | End Panel   | D     | Side Cover Plate                                                   |
| B     | Side Panel  | E     | Head Shaft Assembly (Includes Shaft, Seals, Sprocket and Bearings) |
| C     | Cover       |       |                                                                    |

### Removing the Tail Shaft Assembly

Remove the tail shaft ONLY AFTER the chain has been separated at the tail sprocket. *(See Figure 6D.)*

1. Remove the fasteners and attaching the tail section end panel (A) to the side and bottom panel (B). Save the fasteners.
2. Separate the chain from the sprocket.
3. Pull the shaft assembly (F) from the tail section.



**Figure 6D** Tail Shaft Removal and Re-Installation

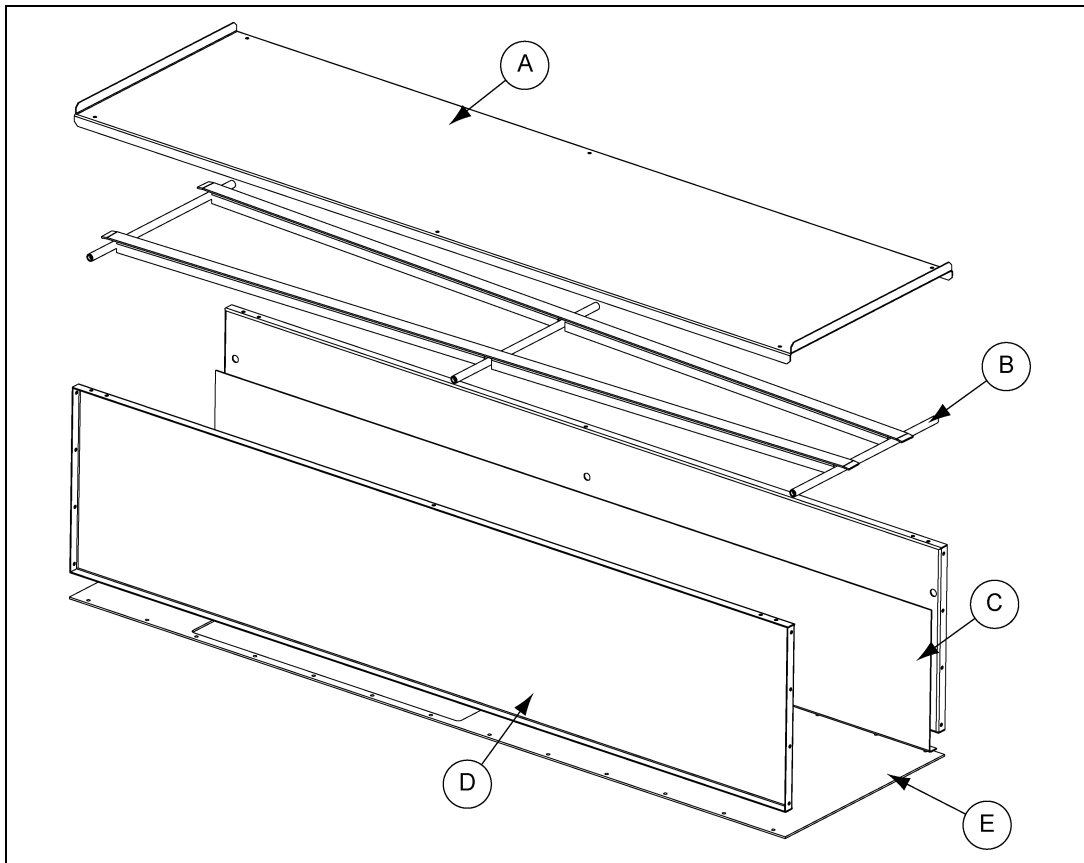
| Ref # | Description | Ref # | Description                                                                     |
|-------|-------------|-------|---------------------------------------------------------------------------------|
| A     | End Panel   | D     | Side Cover Plate                                                                |
| B     | Side Panel  | F     | Tail Shaft Assembly (Includes Bearings, Shaft, Seals, Sprocket and Side Plates) |
| C     | Cover       |       |                                                                                 |

### Re-Installing Head and Tail Shaft

Re-installation of either the head or the tail shaft is the reverse of the removal process. Then re-splice the chain. A comealong may be required to stretch the chain to allow it to be re-spliced after the shaft assembly is re-installed.

## Conveyor Trough Panel and Liner Replacement

Side panels and liners can be replaced without disconnecting the chain and flights. The following procedures reference side panel liner (C) replacement. Follow the same procedures for side (D) or bottom panel (E) replacement. (See Figure 6E.)



**Figure 6E** Trough Liner and Panel Replacement

| Ref # | Description          |
|-------|----------------------|
| A     | Lid                  |
| B     | Rail Return          |
| C     | Side Liner           |
| D     | Side Panel           |
| E     | Bottom Panel (Liner) |



***If despite the prohibition stated in the installation section of this manual, the conveyor has been employed as a stressed or tensioned support member, positively do not remove any side or bottom panels until shoring, staging, or other substantial support has been provided. Without adequate support, the conveyor can buckle or collapse entirely. Death or serious injury is possible.***

***If the conveyor was not emptied before beginning liner replacement, the product remaining in the trough could have considerable weight. Injury could result from falling material.***

### Side Liner Replacement

1. When replacing a side liner, it is necessary to remove all the fasteners on all flanges of the outer side panel. It will also be necessary to remove all the return roller shafts or rail assemblies in the conveyor section being repaired. If the other ends of the shaft were left attached to the opposite side panel, their weight and the weight of the chains and flights would damage the shafts and buckle the opposite panel.
2. Remove the old liner and attach the new liner to the side panel reusing the fasteners. BE SURE the heads of the carriage bolts bear against the liner, NOT outside against the side panel.
3. Position the side panel with new liner on the conveyor. Loosely re-install all fasteners in all panel flanges. Also loosely install the return rollers and shafts.
4. Making sure that adjoining inner surfaces of the liner are flush, tighten the fasteners in the side panel flanges. Then tighten all other fasteners.

### Bottom Panel Replacement

**NOTE:** *The bottom panel is also the bottom liner. If abrasion-resistant liners were ordered, the bottom panel will be fabricated from abrasion-resistant material.*

1. Remove and save all fasteners attaching the trough bottom panel to the rest of the conveyor.
2. Lift the new bottom liner into position beneath the trough. Make sure the hole patterns match; if they do not, redrill the holes as necessary. Re-fasten the new bottom liner to the side panel flanges.

### Discharge Choke/Chain Break Limit Switch and Mechanism

**Limitation of Purpose:** The only purpose of this switch is to signal that the conveyor's head section is choked or that the conveyor chain has broken. It is not designed to and must not be relied on to detect or warn of any problem such as an entire material handling system plug. The user must design and install such a detection system if required or desired.

This limit switch provides a means of signalling the control system if the discharge becomes choked or clogged with conveyed material or if the flight chain breaks. If suitable interlocked circuitry is employed, the En-Masse Conveyor and other associated equipment can be shut down automatically to prevent or minimize damage to the equipment and to prevent injury to personnel in the vicinity of the conveyor.

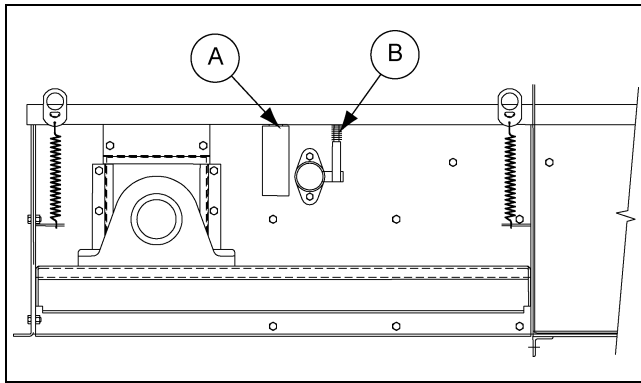
### Choke Condition Operation

If the conveyor discharge becomes choked, causing conveyed material to build-up in the head section, material build-up will begin to lift the head section coverplate. When the coverplate lifts, the CHOKE/CHAIN BREAK switch is allowed to return to its unactuated condition. The coverplate must seat firmly against the side panel flanges to reliably actuate the switch. It is possible for residue of the conveyed material to build-up between the coverplate and side panel flanges, lifting the coverplate and allowing the switch to restore. If this occurs, thoroughly clean all foreign material from the coverplate and side panel flanges. Then reposition the coverplate and re-engage the extension spring clip assemblies.

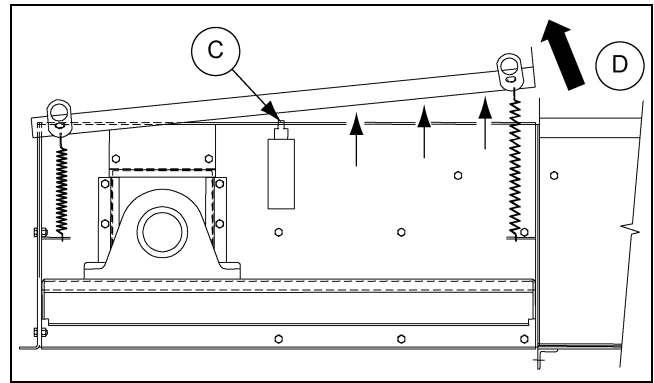
*Figure 6F* shows chain break switch in operating mode.

*Figure 6G* shows a choked condition where material has lifted the cover and activated the switch.

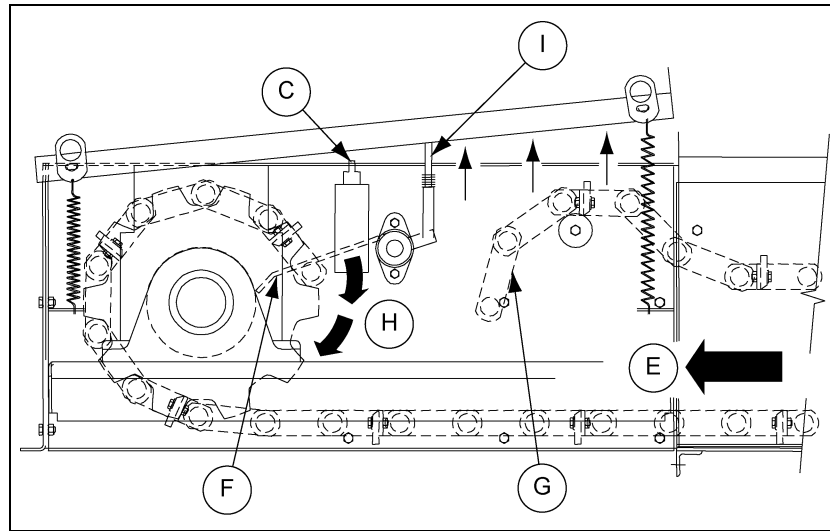
*Figure 6H* shows a broken chain condition where the trip lever has lifted the cover.



**Figure 6F** Discharge Choke/Chain Break Switch Mechanism in **Normal Operating Position**



**Figure 6G** Discharge Choke/Chain Break Switch Mechanism in **Material Choke Condition**



**Figure 6H** Discharge Choke/Chain Break Switch Mechanism in **Chain Break Condition**

| Ref # | Description                            | Ref # | Description                                                |
|-------|----------------------------------------|-------|------------------------------------------------------------|
| A     | Choke Switch (Closed Position)         | F     | Inside Trip Lever                                          |
| B     | Chain Break Switch Lever               | G     | Broken Chain                                               |
| C     | Choke Switch (Normally Open Position)  | H     | Sprocket Rotation                                          |
| D     | Over-Flowing Grain Forces Cover Upward | I     | Chain break switch outside trip lever forces cover upward. |
| E     | Chain Direction                        |       |                                                            |

## Chain Break Switch Mechanism Operation

The chain break lever system consists of a shaft which passes through the conveyor trough, a pair of trip levers mounted centrally on the shaft, and a trip lever mounted on the outboard end of the shaft on the same side of the head section as the CHOKE/CHAIN BREAK switch. During normal operation when the flight chain is unbroken, the trip levers are in position below the flights and on either side of the chain. When and if the chain breaks anywhere in the conveyor, the chain and flights begin to wrap around the back side of the drive sprocket. Considerable downward force is exerted on the trip levers and the shaft pivot, causing the cam on the outer end of the shaft to lift the pushrod which raises the head section coverplate. The CHOKE/CHAIN BREAK switch is allowed to restore to its unactuated condition just as if the discharge where choked.

### Switch Mechanism Adjustments

#### Switch Position

The switch position should not require adjustment unless it is removed or replaced. The switch position can be varied vertically through a narrow range by loosening the two (2) slotted round head machine screws inside the side panel. After the switch has been repositioned, retighten screws.

When limit switch is in closed position (held down by the coverplate) the switch's push rod must be depressed 0.202", the maximum amount of switch travel. When properly adjusted, the switch will restore to its normally open position when the plunger is allowed to lift 0.030", approximately 1/32".

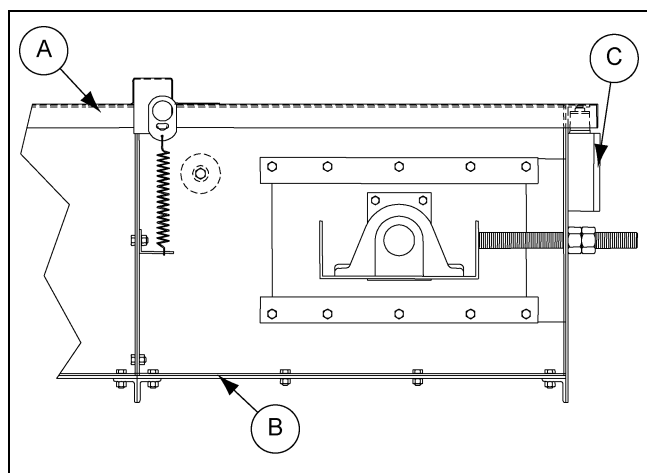
#### Trip Lever Mechanism Adjustment

The only adjustment required or possible is the separation between the trip levers and the lower edges of the flights in the return strand of chain. This adjustment is not critical and should not be required unless tampered with.

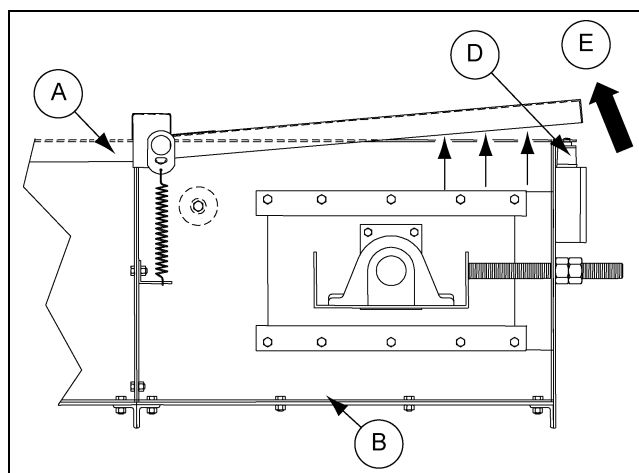
In normal operation with the chain intact, the trip levers should never contact the flights. Continuing contact between levers and flights would cause wear even if the CHOKE/CHAIN BREAK switch was not affected. Trip lever position is adjusted by means of the hex head machine screw threaded into the upper end spring holder pushrod assembly. The screw is accessible only when the top cover is removed. Turning the screw clockwise lowers the trip levers, increasing their separation below the chain and flights. Turning the screw counterclockwise raises the levers, bringing them nearer to the lower edges of the flights. During normal operation the levers should be an inch or more below the flights; there should be no contact.

#### Choke Switch With Reversing Conveyor

If a reversing conveyor is used, the choke switch on the head cannot indicate a choked condition when the conveyor is operating in the reverse direction. In this case, a tail choke switch is employed. It operates on the same principle as the head switch and uses the same wiring schematic as shown in [Figure 4S on Page 28](#). See [Figure 6I](#) and [Figure 6J](#) for theory of operation.



**Figure 6I** Tail Choke Switch, Normal Condition



**Figure 6J** Tail Choke Switch, Choked Condition

| Ref # | Description                    |
|-------|--------------------------------|
| A     | Intermediate Section           |
| B     | Tail Section                   |
| C     | Choke Switch (Closed Position) |

| Ref # | Description                            |
|-------|----------------------------------------|
| D     | Choke Switch (Normally Open Position)  |
| E     | Over-Flowing Grain Forces Cover Upward |



If a problem is experienced at start up, make sure that the conveyor has been installed and operated as stated in the quotation confirmation and shown on the certified drawing supplied with the conveyor.

### What you should know:

1. Is conveyor being used for inclined service is designed for such use?
2. Is conveyor designed for inclined service has the desired degree of inclination specified in the quotation?
3. In the case of drive not supplied by InterSystems, check the drive for different capacity or output speed than specified in the quotation?
4. Is the conveyor's capacity, either in terms of volume or weight per cubic foot of material being exceeded?
5. Is the conveyor used to convey material different than that for which the conveyor was originally specified as shown on the quotation and certified drawings.

If the answer to any of the preceding questions is yes, then there may not be a simple, quick solution to the problem. Contact your sales representative.

### Troubleshooting Guide

| Problem                   | Cause                                 | Solution                                                                                                                                                                                                                                                                                                                          |
|---------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Incorrect Capacity</b> | 1. Insufficient drive belt tension    | 1. Verify that the head shaft speed is what was ordered. If there is insufficient drive belt tension, the belts will slip and overheat, causing a potential fire hazard, and the conveyor will operate at less than normal speed.                                                                                                 |
|                           | 2. Conveyor not running full capacity | 2. Check for obstructions at the conveyor inlet(s) or in the bins, hoppers, or chutes feeding the conveyor.                                                                                                                                                                                                                       |
|                           |                                       | 3. Look for clumping of moist material on the flights and along the sides of the trough which are effectively reducing conveyor capacity.                                                                                                                                                                                         |
|                           | 3. Damaged chain and flights          | 4. Check chain and flights for damage due to foreign object caught in conveyor. Replace damaged poly-flights with new.                                                                                                                                                                                                            |
|                           | 4. Bent or missing flights            | 5. Straighten bar flights which have been bent. If bars have been bent more than two (2) times, the chain section should be replaced. DO NOT ATTEMPT TO REWELD BARS ONTO THE CHAIN. Special preheating procedures must be followed or the heat treated chain side bars can become brittle and crack, resulting in chain breakage. |
|                           |                                       | 6. Compare the depth of conveyed material to that specified on the certified drawings.                                                                                                                                                                                                                                            |

## 7. Troubleshooting

| Problem         | Cause                                   | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noisy Operation | 1. Improper sprocket alignment          | 1. Verify that drive and take up (tail) sprockets are centered on their shafts and that the set screws which lock them to the shafts are securely tightened. If a sprocket is loose on its shaft, the problem must be corrected as soon as possible. Fretting wear caused by a loose sprocket can quickly ruin the sprocket and shaft.                                                                                                                                                                |
|                 | 2. Improper chain tension               | 2. Check conveyor chain tension. There should be 1/4" to 1/2" sag between return rollers in a standard length intermediate section with rollers. Slack accumulates at the head sprocket with a rail return.                                                                                                                                                                                                                                                                                           |
|                 | 3. Damaged flights                      | 3. Check chain and flights for damage due to foreign object caught in conveyor. Replace damaged poly-flights with new. Straighten bar flights which have been bent. If bars have been bent more than two (2) times, the chain section should be replaced. DO NOT ATTEMPT TO REWELD BARS ONTO THE CHAIN. Special preheating procedures must be followed or the heat treated chain side bars can become brittle and crack, resulting in chain breakage.                                                 |
|                 | 4. Loose flights                        | 4. Check for loose or missing hardware, paying particular attention to: <ul style="list-style-type: none"> <li>a. Flight mounting fasteners</li> <li>b. Return roller mounting screws and rail return mounting screws.</li> <li>c. Set screws that lock return roller location set collars to the roller shafts. If the rollers slip sideways on their shafts, the chain will bear directly on the shafts instead of the rollers. Rapid wear and extensive damage will occur very rapidly.</li> </ul> |
|                 | 5. Other noises from drive and conveyor | 5. Monitor the motor, reducer, and bearings for noise levels. Any change in sound level or pitch indicates trouble.                                                                                                                                                                                                                                                                                                                                                                                   |
|                 |                                         | 6. Inspect the conveyor for damage such as dents or punctures and for bowed panels or lids.                                                                                                                                                                                                                                                                                                                                                                                                           |
|                 |                                         | 7. Check the equipment that interfaces with the conveyor. In some circumstances, the En-Masse conveyor can transmit and/or amplify noise originating in some other piece of equipment.                                                                                                                                                                                                                                                                                                                |

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This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.



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