intersystems

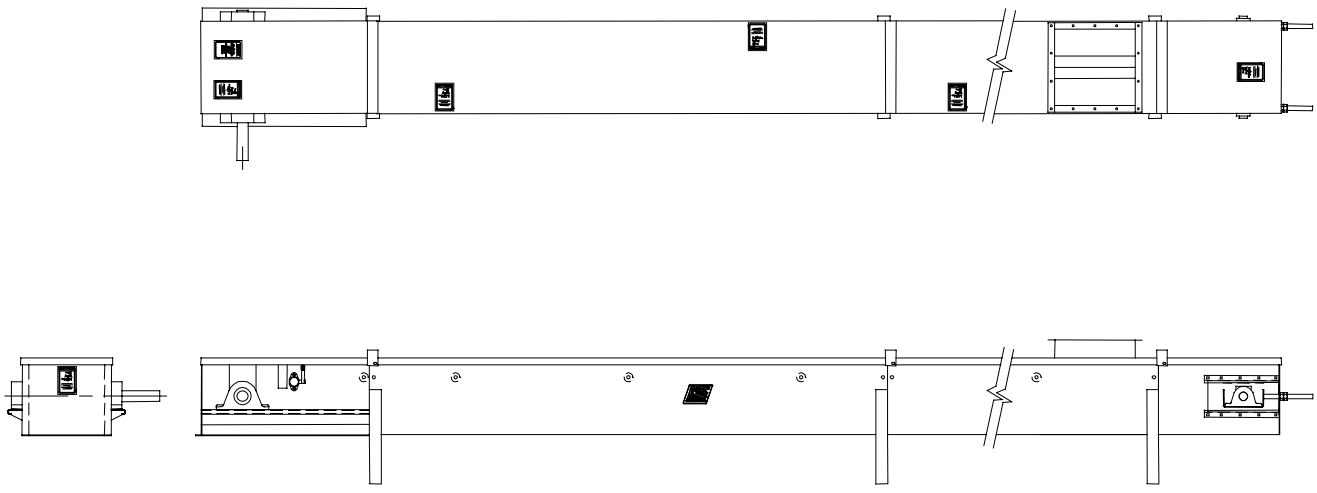
En Masse Conveyor Manual

Safety

Installation

Operation

Maintenance



PC 520293B

Revision Date 2/13/95

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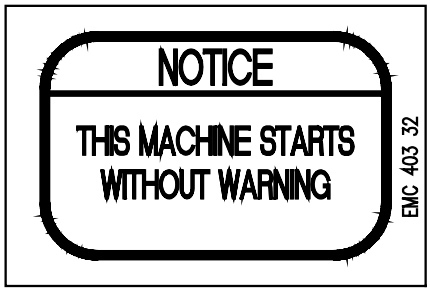

STARTS W/OUT WARNING
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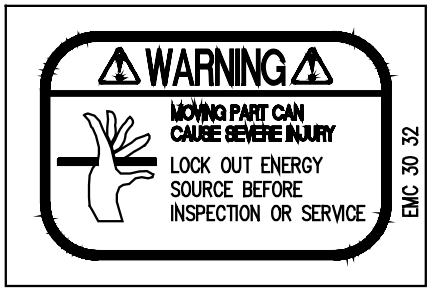

MOVING PART
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SAFETY FIRST! The symbols shown above are examples of the safety labels and signs to be found on Intersystems equipment. They are affixed to the equipment to warn of danger to persons and of possible equipment damage. THESE SIGNS MUST NEVER BE REMOVED, TAMPERED WITH, PAINTED OVER OR OBSCURED IN ANY WAY.(See Page 4 for label locations). If labels are damaged or become unreadable, replacement labels are available from Intersystems. User must institute a continuing program to instruct all personnel in safe operating and maintenance procedures and to insure that all safety devices, guards, and covers are intact and operable and that all safety signs are legible. The user organization should institute a continuing safety program to instruct all personnel in proper, safe operating and maintenance procedures and to insure that all safety devices,guards and covers, and all safety signs are intact and legible.

DO NOT exceed the conveyor's rated capacity. A certified drawing or drawings furnished with each conveyor lists its capacity in BPH or CFH (Bushels Per Hour or Cubic Feet per Hour) and materials to be conveyed. The drawing also specifies the operating speed of the conveyor chain. Consult Intersystems before making any changes to the conveyor or its operating environment, in particular, any change that necessitates increasing the speed or power of the conveyor drive. DEATH OR SERIOUS INJURY TO PEOPLE COULD RESULT AS WELL AS GREATLY REDUCED SERVICE LIFE.

NEVER PERFORM ANY SERVICE ON THIS CONVEYOR OR ANY OTHER POWERED EQUIPMENT UNTIL ALL POWER HAS BEEN SHUTOFF AND LOCKED OUT SO THAT IT CANNOT BE RESTORED WITHOUT THE CONSENT AND KNOWLEDGE OF THE PERSON WHO INTERRUPTED POWER. Power includes electrical, fluid, pneumatic, mechanical (cable, belt, chain, shaft, etc.), or gravity where the load or part of the equipment is suspended.

FAILURE TO OBSERVE ALL SAFETY PRECAUTIONS, INCLUDING THOSE DICTATED BY ORDINARY COMMON SENSE, CAN RESULT IN: DEATH OR SERIOUS INJURY TO PERSONNEL, LOSS OF PRODUCT (conveyed material), AND DAMAGE OR DESTRUCTION OF THE EQUIPMENT!

1.1 En masse Conveyor Safety Label Locations

II. INSTALLATION & STARTUP

2.1 Receiving Inspection

Carefully inspect the shipment for damage upon arrival. Verify that the quantity of parts 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.

The four types of conveyors built by InterSystems are illustrated below. (Figure 1-1, 1-2, 1-3, and 1-4) Refer to the certified drawing that came with your equipment to verify your conveyor type.

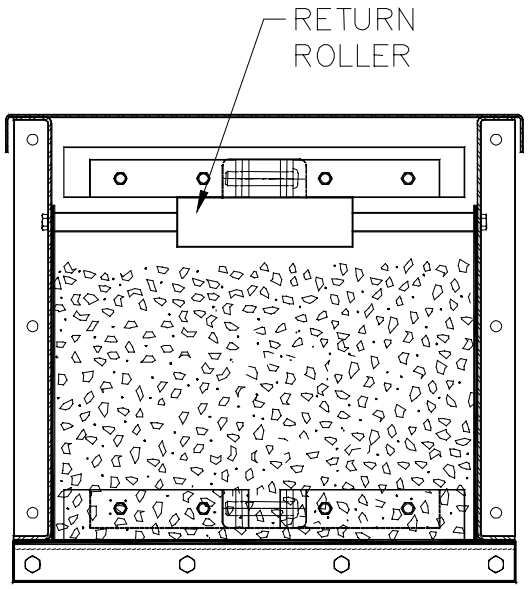

Figure 1-1 Roller Return Conveyor

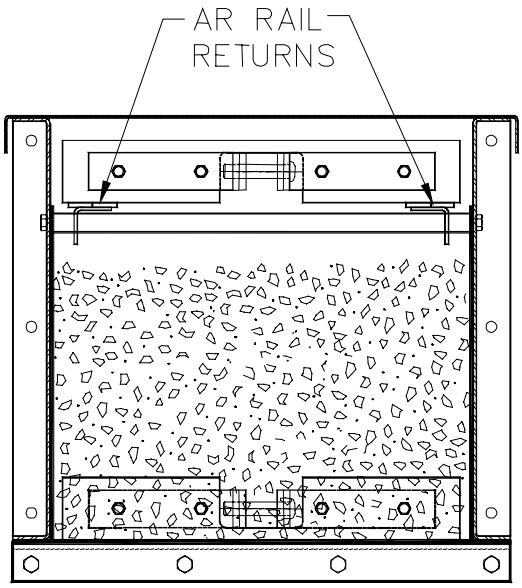

Figure 1-2 Rail Return Conveyor

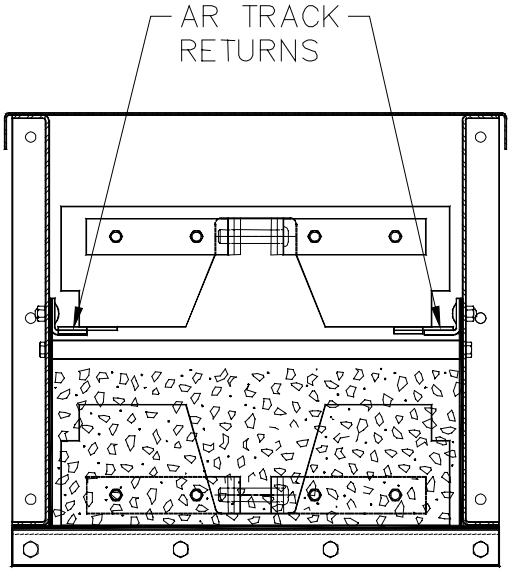

Figure 1-3 Tall Flight Track Return Conveyor

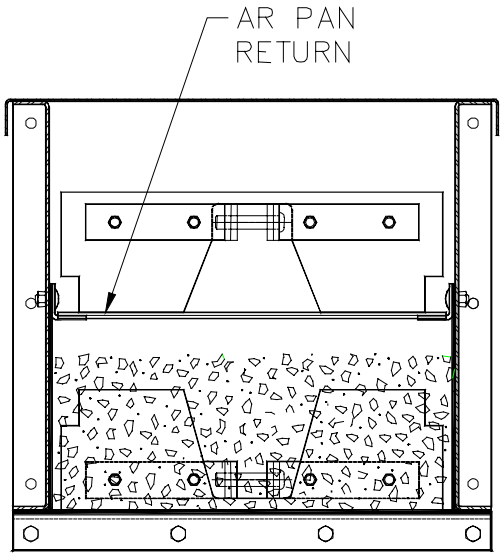

Figure 1-4 Tall Flight Divider Pan Return Conveyor

IMPORTANT

REPORT ANY DAMAGE OR SHORTAGE TO THE DELIVERING CARRIER AS SOON AS POSSIBLE. Intersystems' responsibility for damage to the equipment ended with acceptance by the delivering carrier. Refer to the bill of lading. Save all documentation furnished with any of the conveyor components; for example, motor and reducer installation and lubrication instructions, etc

2.2 Pre-installation Preparation

Before starting conveyor installation, study this manual, the certified drawing(s) furnished with the equipment, and other applicable documents, including but not limited to, OSHA Regulations and the National Electrical Code.

Intersystems Conveyors are not designed to be self-supporting when erected. The conveyor does require a structure for horizontal and vertical support. The conveyor has not been designed to support other equipment such as cleaners, distributors, spouting, etc. Separate structures must be provided for any accessory equipment.

Intersystems is the vendor of the conveyor and certain of its optional accessories only, and does not assume responsibility for the installation. 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, including the bracing system. The MOST IMPORTANT preparations are retaining a licensed engineer to plan the installation and a qualified millwright or contractor to erect the conveyor and the accompanying equipment and structures. En Masse Conveyors are not designed to be part of any truss system. **Figure 2-1** illustrates the general type of acceptable support structure. Conveyor must be supported at each section joint.

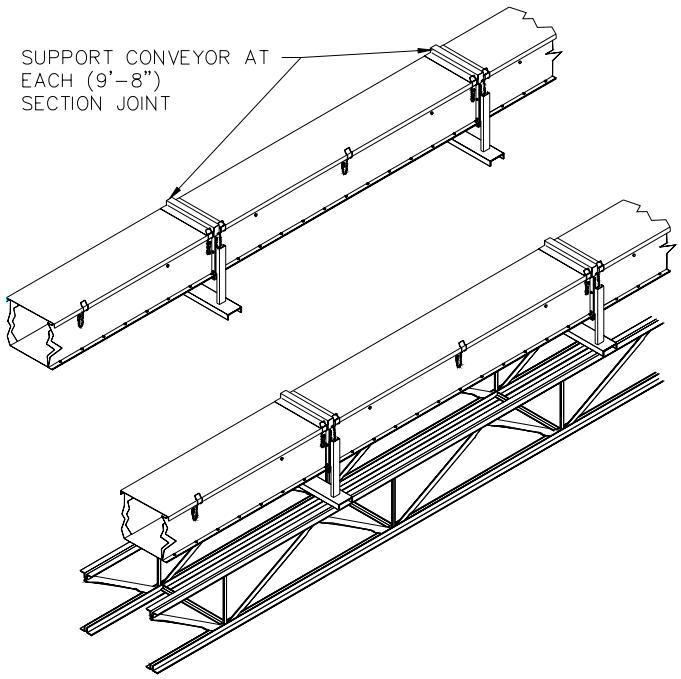

Figure 2-1, Conveyor Supporting Structures

2.3 Placing Conveyor Sections on the Supporting Structure

The supporting structure should be in place and completely assembled before hoisting conveyor sections in place for assembly.

2.4 Conveyor Assembly

Conveyor installation usually begins by positioning the Head section over the discharge chute. Make certain there is sufficient room to allow the drive to be assembled on the head shaft before the entire conveyor is assembled. From that point, assembly works backwards through the intermediate sections, ending with the placement of the tail section. This is the generally accepted practice of conveyor installation. Your situation may dictate that assembly be done in some other order.

DANGER

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. ALSO 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.

Study the drawing of the chain and flight details, **Figure 2-2.** As each conveyor section is set in place, verify that the chain flights are positioned as shown with respect to the direction of movement. It will be much easier to correct improperly assembled or positioned chain now than after conveyor assembly is complete. Also note the location of the return cups (if conveyor is equipped with intermediate discharge gates)See **Figure 2-2A.** The cups must be in front of the flight in order to fill properly. In the case of a reversing conveyor, the cups should alternate front and back. See **Figure 2-2B.**

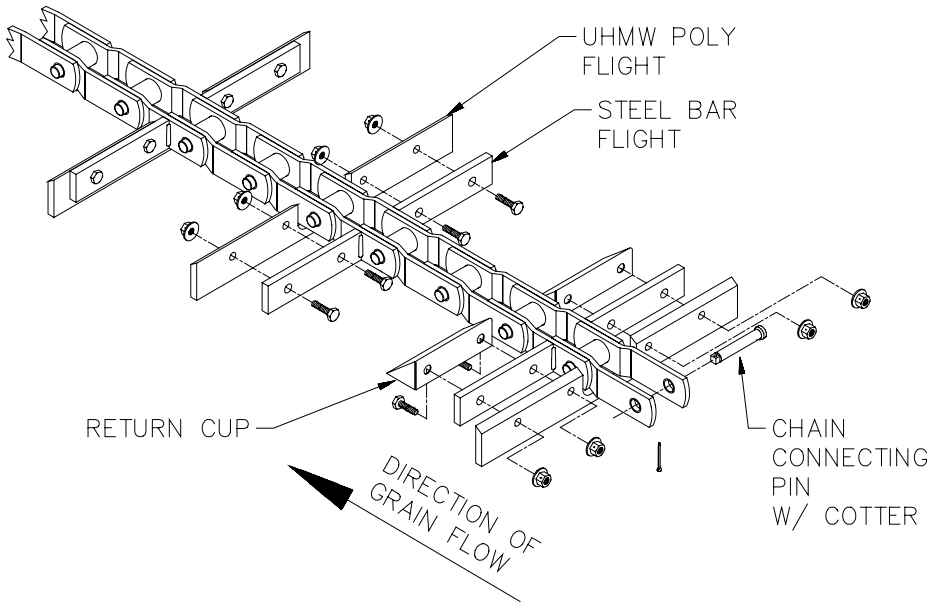

Figure 2-2, Conveyor Chain and Flight Details

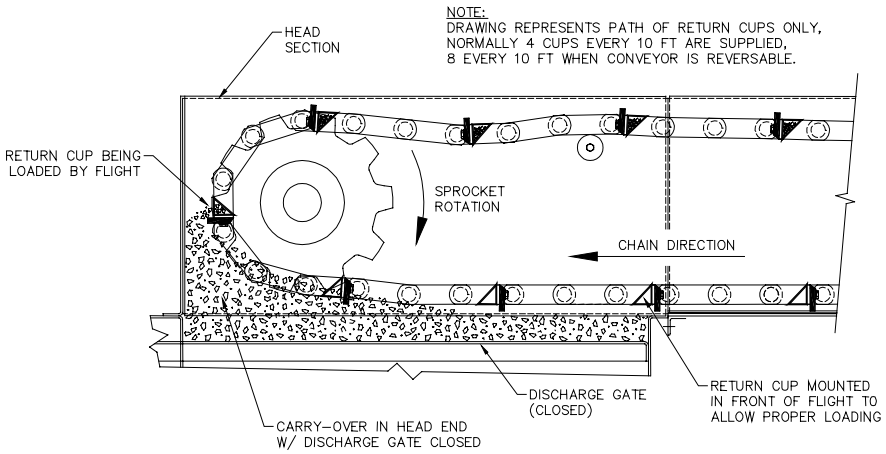

Figure 2-2A, Return Cup Orientation for Standard Conveyors

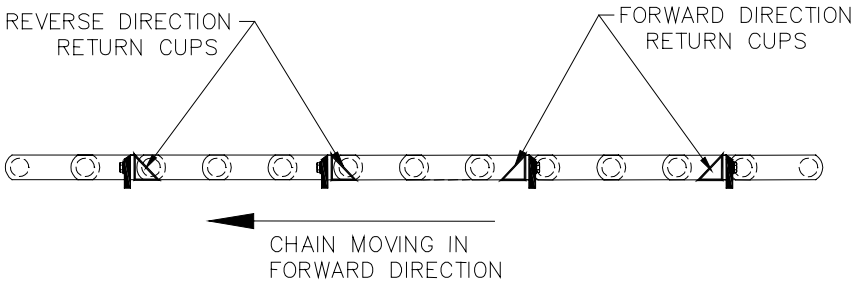

Figure 2-2B, Return Cup Orientation for Reversing Conveyors

A. Position the head section over the discharge chute. Refer to **Figure 2-3A**. Note that head is not self supporting and must be attached to a transition or flange to operate properly. The transition must have a vertical flange on the intermediate section side.

B. There will be one or more intermediate sections in a complete En Masse conveyor. Mate the first intermediate section with the head section. Loosely fasten sections together with 3/8" diameter hex head capscrews and nuts. Sections may be assembled in any order unless otherwise specified on the certified drawing.

C. Attach a pair of optional support legs and complete fastening the two conveyor sections together as shown in **Figure 2-3B.** DO NOT TIGHTEN FASTENERS AT THIS TIME. Support legs are optionally furnished in right-hand/left-hand sets. One set is required at each conveyor section joint to insure proper alignment and support.

D. Referring to **Figure 2-3B,** notice also that the bottom flanges of each conveyor section have several 3/8" diameter holes. As each conveyor section is assembled to the preceding section, drive bull-nose alignment pins through the matching pairs of the smaller 3/8" diameter holes. This arrangement insures 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.

E. As each conveyor section is mated with the preceding section, remove the lids and connect the sections of chain. The connecting pins and cotterpins were inserted in one of the end links at the factory.

F. FOR PARTIALLY INCLINED CONVEYORS ONLY! A Knee Section Assembly must be assembled to the conveyor at the point of transition between the horizontal and the inclined portions of the conveyor. Refer To **Figure 2-4.** First temporarily remove the carriage bolts which fasten the liners to the conveyor sides at the junction where the Knee Section is to be installed. Next loosely bolt the side and bottom flanges of the Knee Section to the flanges of the other conveyor sections. Next, reinsert the carriage bolts through the holes in the shoe weldment tabs, through the liners, and the trough sides.

G. CONVEYORS WITH DIVIDED FLOW INLETS ONLY! If the conveyor includes a Divided Flow Inlet Assembly, it is usually assembled to the conveyor immediately preceding the tail section. See **Figure 2-7B**.

H. Continue to assemble conveyor sections as explained in Steps B through E until all conveyor sections are assembled.

I. Install tail section as shown in **Figure 2-3C**. Make certain at this time that the take-up is in the full forward position to allow easy connection of chain.

J. Tighten all the fasteners.

K. Drive out the alignment pins. Replace them with 3/8" diameter hex head capscrews and nuts which have been furnished with the conveyor. This is done to prevent pins from vibrating out and potentially causing injury to persons or property below the conveyor.

L. Connect chain sections by pressing in the provided connecting pins. Make certain all flights and return cups are facing the correct direction. (See **Figure 2-2, 2-2A & 2-2B**).

M. This completes the assembly of the basic conveyor.

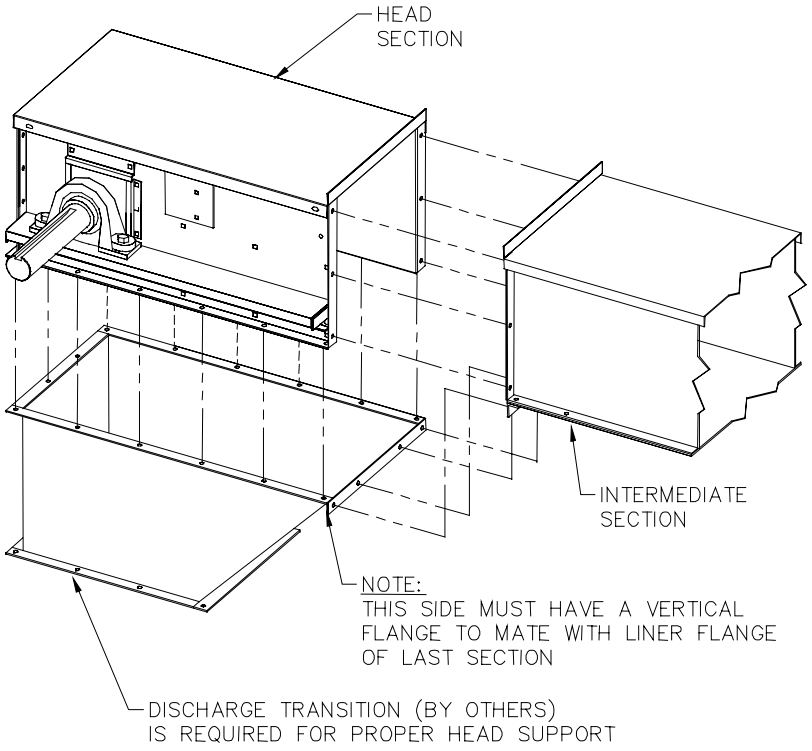

Figure 2-3A Head Section With Support Transition

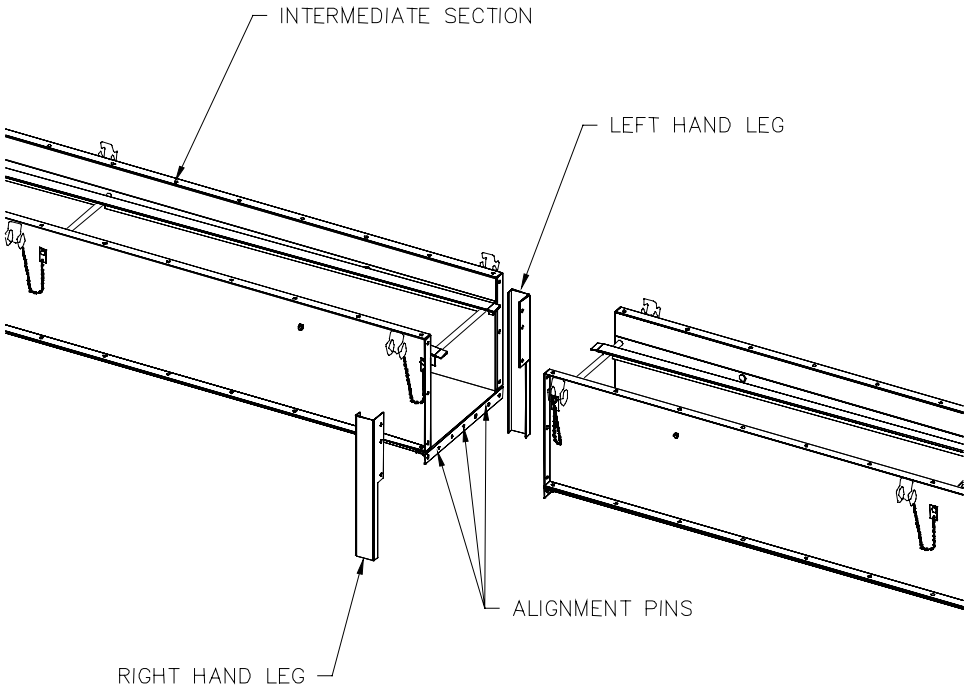

Figure 2-3B, Conveyor Section Assembly

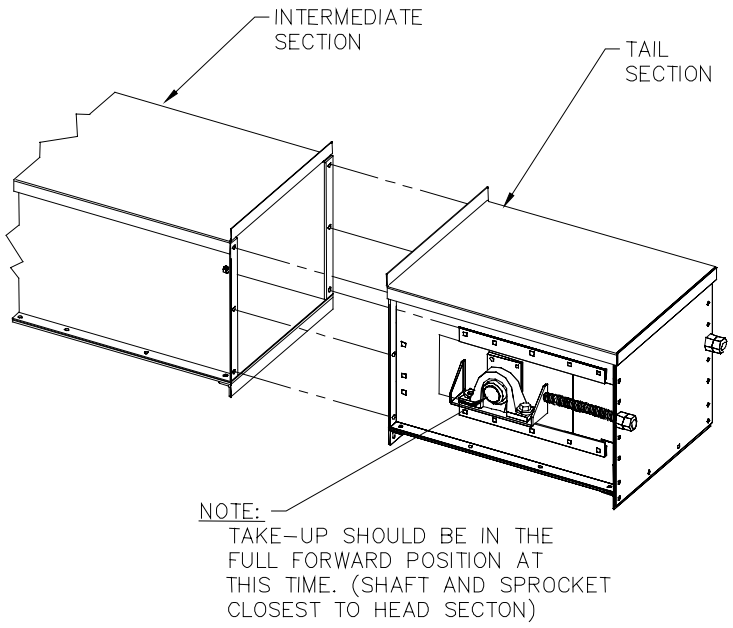

Figure 2-3C Tail Section Assembly

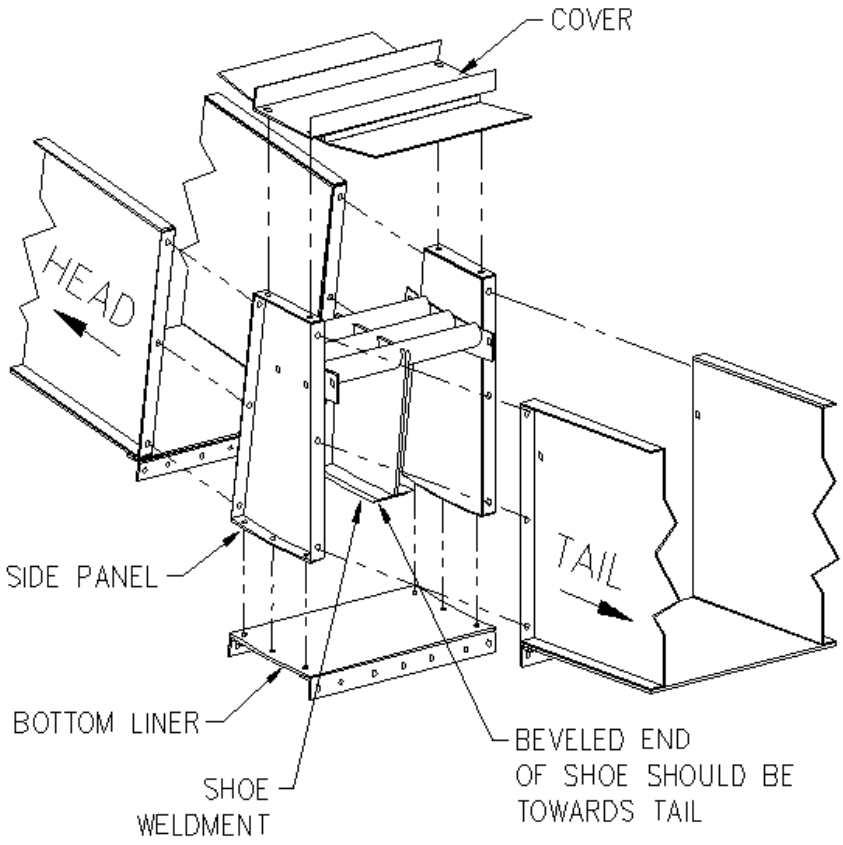

Figure 2-4, Knee Section, Partially Inclined Conveyors

2.4.1 Discharge Gate Installation

Two 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 similar in either case. Refer to **Figure 2-5.**

A. Cross-cut gates should be used with reversible conveyors where possible.

B. Inline gates should be installed with the "wings" facing the tail section, where possible, as shown in **Figure 2-5**.

1. A mylar template is supplied with the gate (s). Use the template to create a pattern to mark the cutout(s) for the gate(s). DO NOT use the mylar template to torch cut the gate opening; it is flammable. 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 labeled CUTOUT onto the sheet metal, then cut out the openings.

C. At each position where a gate is to be installed, position the pattern down inside the conveyor on the trough floor. Trace the cutout areas on the trough floor. Then cut out the indicated areas.

D. 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 certain that the fasteners in the side flanges are tightened securely so the conveyor sections do not shift relative to each other.

DANGER

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.

E. When the bottom flanges must be cut off to allow installation of a gate, the ends of the bottom panels must be welded to compensate for the loss of stiffness.

1. Bevel the upper edges of the panels where they butt together.

2. Weld the butting edges of the panels.

3. Grind the welded joints smooth and level. This procedure insures 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.

F. Deburr all the rough edges of the cutout areas. Any burrs or sharp edges will result in damage to the flights or rapid wear.

G. 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.

H. Fasten the gate(s) to the conveyor trough.

I. Gates can be operated by handwheels, chainwheels, or by remote controlled powered 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, **Figure 2-9.**

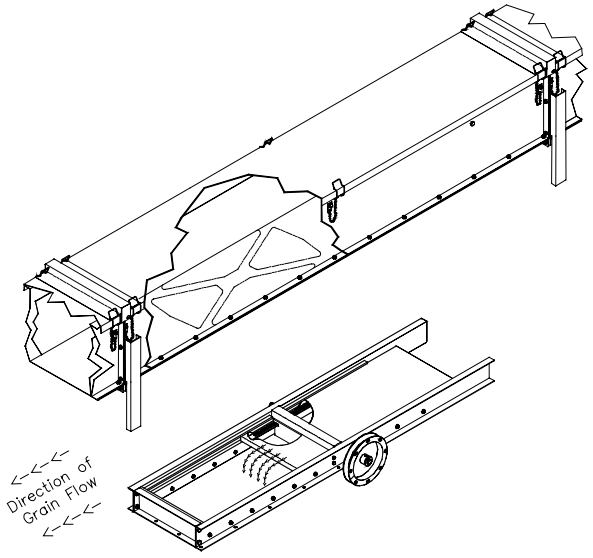

Figure 2-5, Discharge Gate Installation

2.4.2 Conveyor Trough Cover Placement

The conveyor's trough covers must be in place before startup and also before any optional inlets can be installed. Intermediate section covers, tail section covers, and seal caps are held in position by snap lid clips. USE ONLY extension spring clips to retain the head section cover as it must be free to lift if a choke conditions arises.

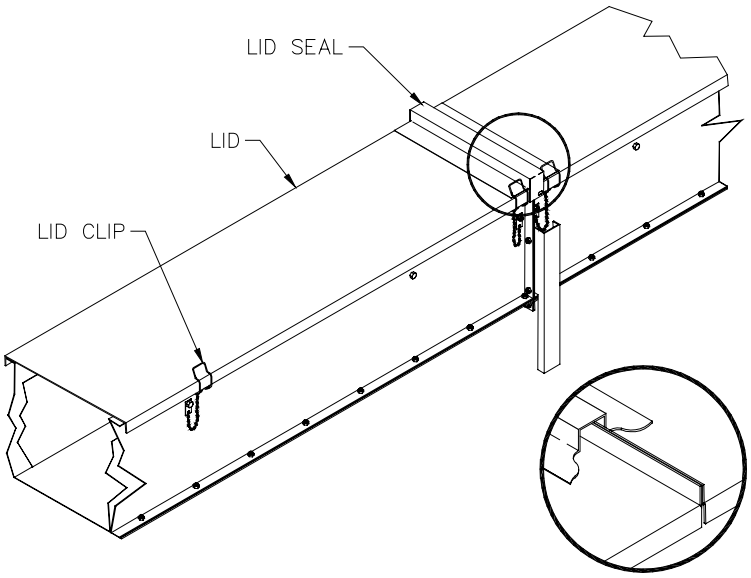

Figure 2-6, Conveyor Trough Covers

2.4.3 Inlet Installation

Figure 2-7A illustrates the procedure required to attach a standard inlet. Be sure to maintain the Minimum "A" Dimension as shown, otherwise conveyed material will accumulate in the tail section behind the tail sprocket and conveyor capacity may be reduced due to improper loading. This dimension changes with incline and is specified on the certified drawings for each conveyor. Always make certain chute work 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. (See **Figure 2-7A** inset). Wider conveyors can be more susceptible to this condition. If the conveyor includes a **Divided Flow Inlet Assembly**, it is usually assembled to the conveyor immediately preceding the tail section. See **Figure 2-7B**.

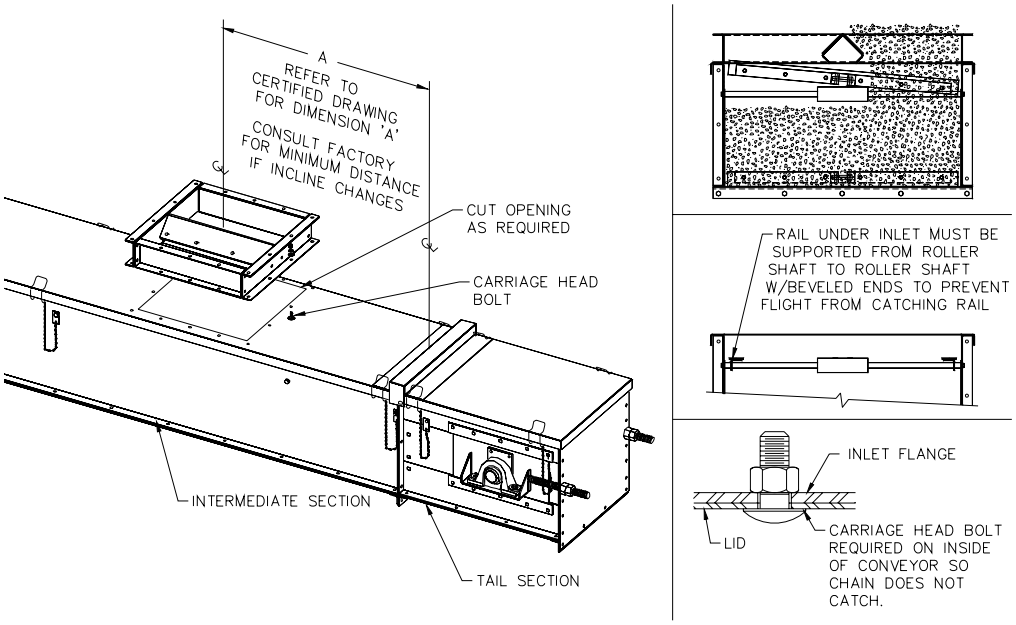

Figure 2-7A, Inlet Installation

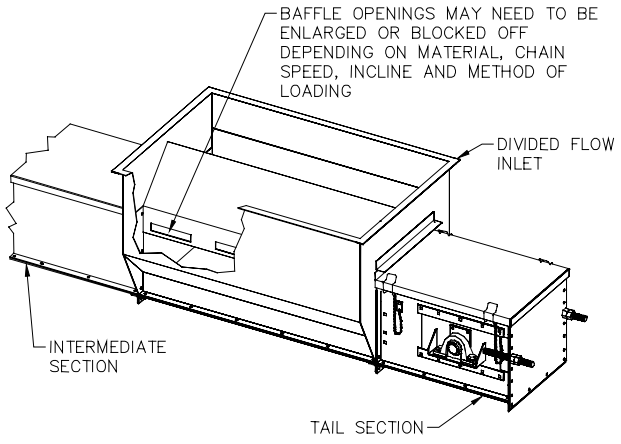

Figure 2-7B Divide Flow Installation

Figure 2-7B shows the installation of divided flow type of inlet. 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 2-7C** for theory of operations. 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.

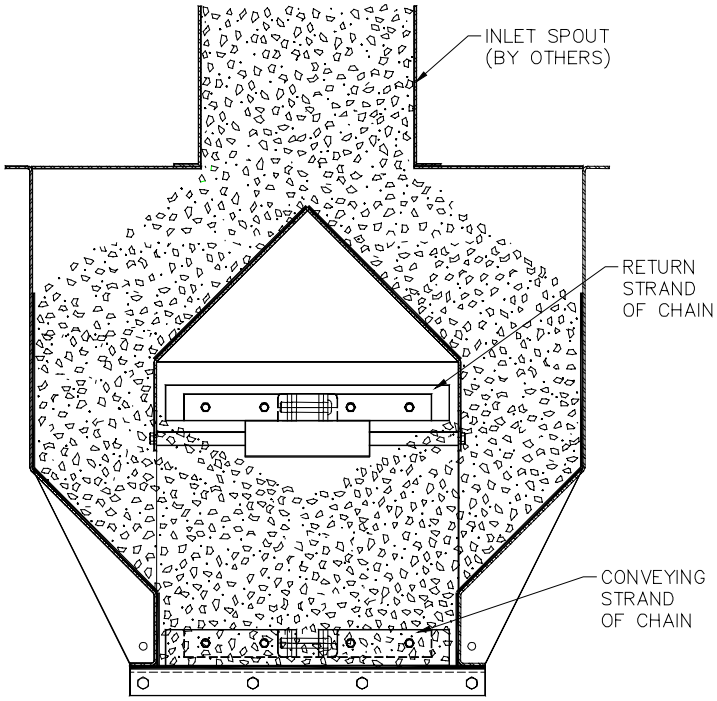

Figure 2-7C Divided Flow Inlet Cross Section

2.4.4 Typical Drive Installation (Shaft Mount Only)

Refer to the certified drawing and the equipment quotation for details of the drive components, if supplied. Drive components furnished can vary from simply providing an extended and keyseated head (drive) sprocket shaft to a complete drive. For purposes of explanation, the installation of a Dodge Shaft Mount Torque Arm reducer will be discussed. Installation of other reducer brands are very similar, differing only in minor details. Refer to **Figure 2-8A**. Save and refer to the manufacturer's data supplied with the reducer. 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.

A. Attach torque arm bracket to trough bottom directly behind head (See **Figure 2-8A**).

B. Attach the torque arm anchor bracket to the reducer housing.

C. Rotate the torque arm turnbuckle to nearly full extension for maximum adjustment range.

D. Refer to **Figure 2-8A**. Assemble the torque arm clevis bracket to the torque arm eye bolt.

E. Fasten the clevis bracket to the torque arm bracket. Use existing holes if possible or drill new holes to fasten the clevis bracket to the torque arm bracket.

F. Adjust the torque arm so that the reducer is vertical. Use the lock nut on the turnbuckle to prevent movement by vibration.

G. Attach the front and back motor mount supports to the reducer.

H. Fasten the motor to the motor mount. The fasteners used will depend on the size and origin of the motor. DO NOT tighten motor mounting screws yet.

I. Fasten the belt guard mounting brackets to the motor mount.

J. Loosely fasten the belt guard 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.

K. Assemble the drive and driven sheaves on the motor and reducer input shafts. Align the sheave faces and tighten the "taper-lock" bushing setscrews.

L. 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 reinstall the belt guard cover.

M. Tighten all fasteners.

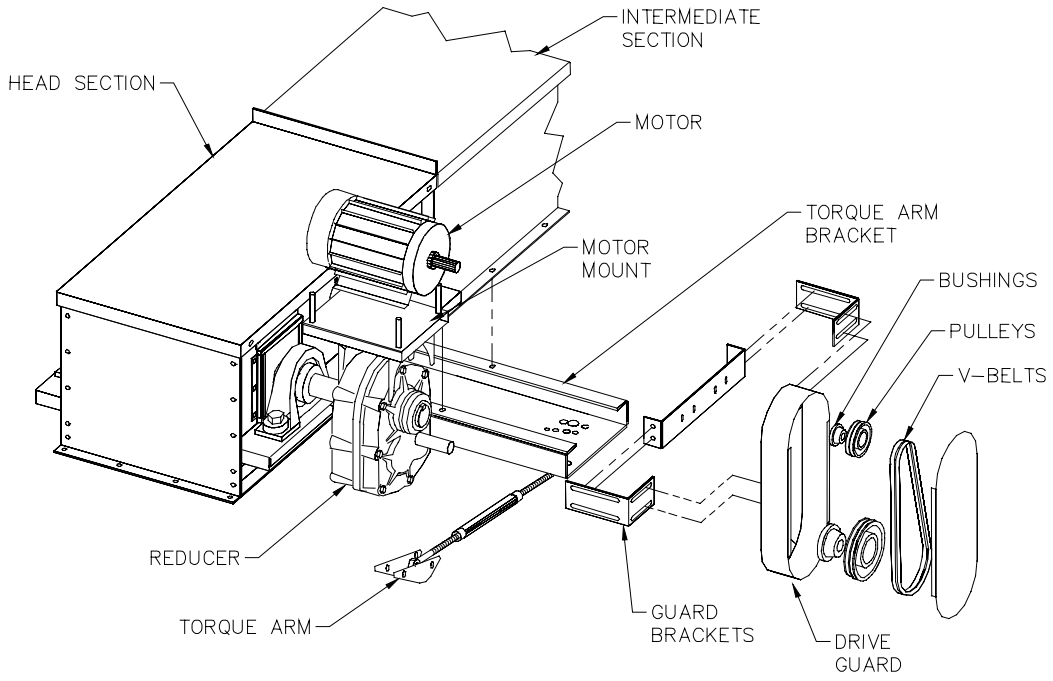

Figure 2-8A, Typical Shaft Mount Drive Installation

2.4.4.1 Chain Drive Installation

A chain drive can be provided at the customer's request. There is such variety, that specific details cannot be given in advance. Refer to the conveyor quotation and the certified drawing for further detail if a chain drive is supplied. See **Figure 2-8B** for a general reference on this type of drive assembly.

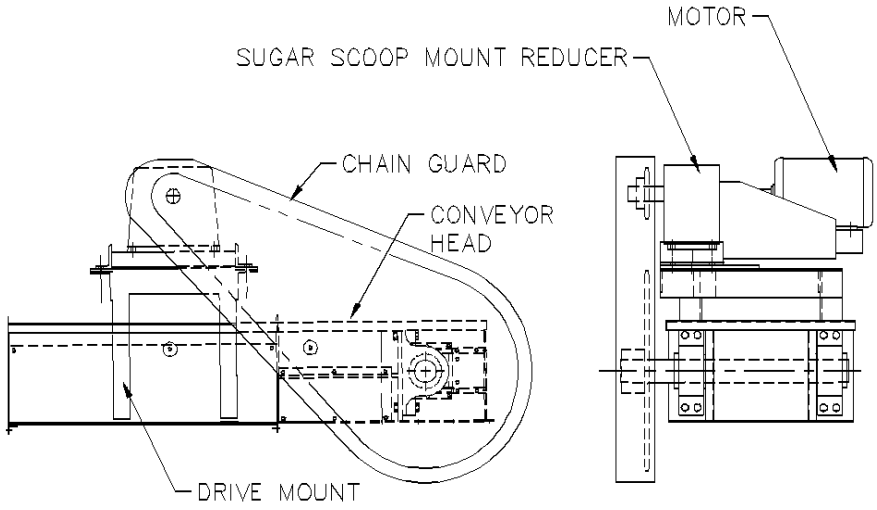

Figure 2-8B Typical Chain Drive Installation

2.4.5 Field Wiring

Regardless of the source of the conveyor's drive and controls, all power and control wiring must conform to the National Electrical Code and to all applicable federal, state, and local codes and regulations. See **Figure 2-9,** SUGGESTED WIRING DIAGRAM. 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.

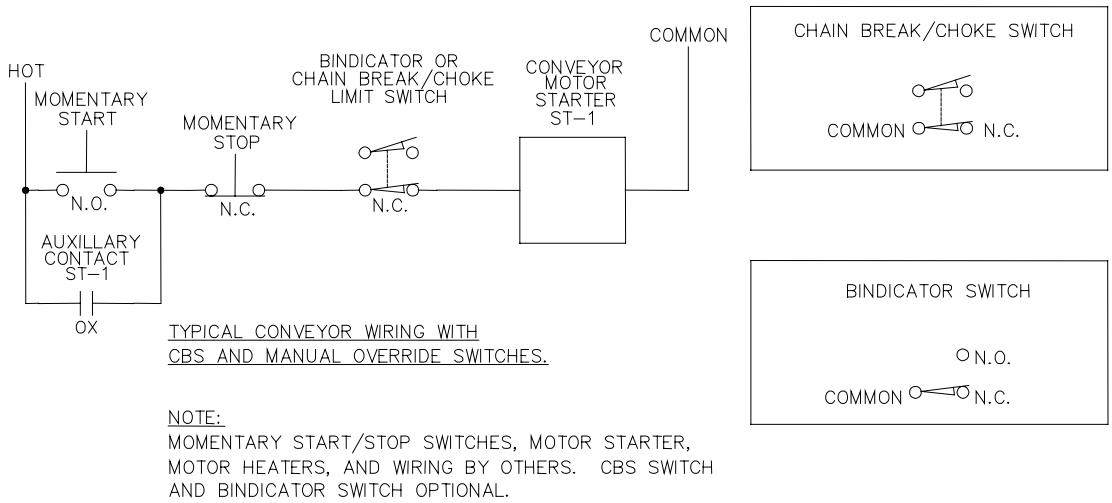

Figure 2-9, Suggested Wiring Diagram

2.4.5.1 Chain Break/Choke Switch Function

This switch has two 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 buildup of material lifts the cover. Refer to **Figure 3-3A, 3-3B, and 3-3C** for theory of operation..

2. If the conveyor chain breaks, the chain and flights will begin to wrap around the drive sprocket. This in turn results in the flights pressing down on the trip levers. The trip lever shaft pivots 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 pushbutton 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 shutdown.

2.4.5.2 Electrically Operated Discharge Gate.

Included with each gate is a premounted C-face reducer with motor. Also provided with each powered gate is 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 2-10** for suggested wiring of intermediate gate, motor, and switches.

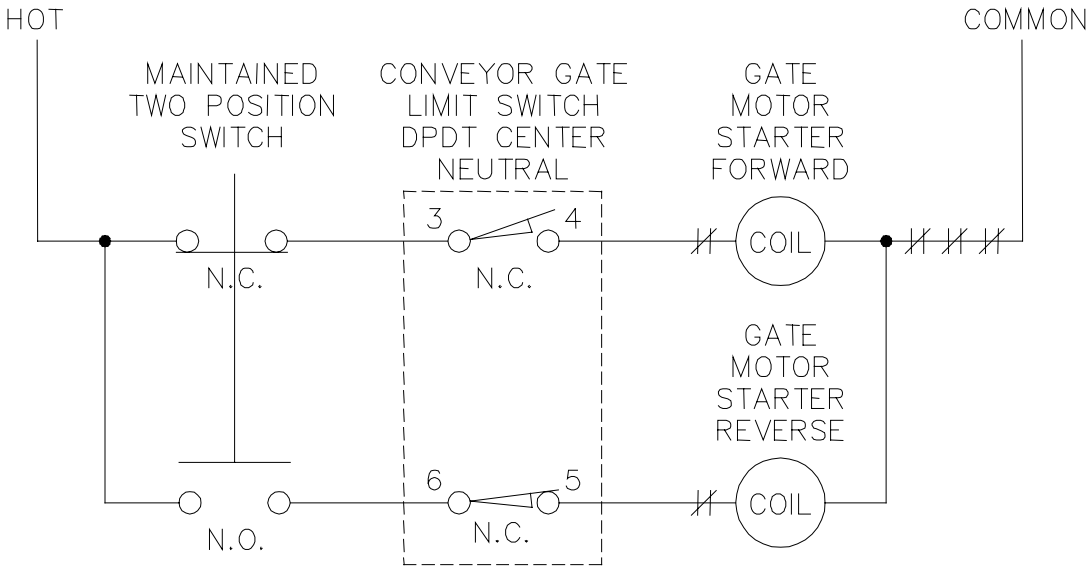

Figure 2-10 Suggested Wiring of Gate, Motor and Switches

2.5 Pre-Startup Procedure

DANGER

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!

2.5.1 Initial Lubrication

2.5.1.1 Filling The Reducer With Lubricant

The conveyor's drive reducer is shipped without lubricant (dry). Referring 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.

2.5.1.2 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.

2.5.1.3 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.

2.5.2 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.

2.5.3 Initial Tail Section (Takeup) Adjustment

A. Remove the first unobstructed cover from the intermediate section nearest the tail section.

B. Turn the inner nuts to apply tension evenly to both takeup 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.

C. Verify that the tail 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.

D. If the conveyor has a knee section, the chain must be sufficiently slack so that the upper or return strand of chain does not rub against the cover of the knee section.

E. Retighten the takeup screw locking nuts. Replace any trough covers removed.

F. After the conveyor has operated for approximately 100 hours, the chain may "stretch" or (wear), taking an initial set and requiring readjustment.

2.5.4 General Safety & Housekeeping

DO THIS BEFORE POWER IS APPLIED TO THE CONVEYOR.

A. Make sure all guards are in place and all warning labels are in place and legible. Section I, GENERAL SAFETY INFORMATION, explains the purpose and intended location of the warning signs. Section I also lists the part numbers of the signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY!

B. Make certain all electrical connection box covers are in place and securely fastened. Check for exposed wiring and damaged conduit

C. Inspect the inside of the conveyor for tools, or anything else that could cause damage on startup.

D. Verify that all trough covers are in place and firmly held in place by the appropriate extension spring clip assemblies and snap lid clips.

2.6 Startup

A. For the initial startup, the conveyor should be empty.

B. Depending on the conveyor length and configuration, station one or more persons to listen and watch for potentially dangerous or damaging conditions.

C. 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.

D. 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.

E. Shutdown the conveyor. Lock out all power.

F. 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.

G. Recheck chain tension as detailed in Paragraph 2.5.3, Initial Tail Section (Takeup) Adjustment. Apply a protective coating to the takeup screw threads to prevent rust and corrosion. Future takeup adjustments will be much easier if this is done.

H. 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 is not responsible for system integration or controls, a system test procedure is beyond the scope of this manual.

2.7 Conveyor Dry Run Time

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 wll 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 procrdures.

III. MAINTENANCE AND REPAIR

DANGER

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!

3.1 General Maintenance

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

3.2 Periodic Inspection

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

A. Loose or missing hardware, in particular:

1. Flight mounting fasteners
2. Return roller mounting screws and set collars.
3. Setscrews 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.
4. Check and tighten all sprocket set screws.

B. Noisy bearings, motor, or reducer

C. Overheated bearings, motor, or reducer

D. Structural damage

E. Rust or corrosion

F. Damaged wiring, including exposed conductors and connections

G. Periodically shut off and lockout all power to the conveyor. Check the CHOKE/CHAIN BREAK switch to see that it actuates and restores smoothly.

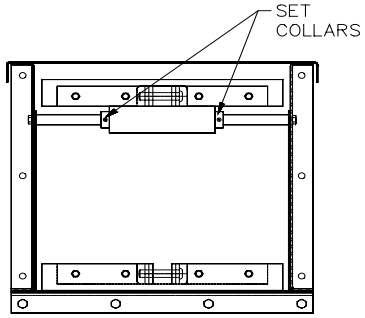

Figure 3-1, Typical Return Roller Cross Section

H. 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 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.

I. Make sure that all guards are in place and that all warning labels are in place and legible. Section I, GENERAL SAFETY INFORMATION, explains the purpose and intended location of the warning signs. Section I also lists the part numbers of the signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY!

3.3 Lubrication Information

3.3.1 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.

3.3.2 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.

3.3.3 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.

3.3.4 Roller Chain Drive

For conveyors which include InterSystems, Inc. supplied chain drives, the lubricant level in the chain case/cover should be maintained at a high enough level to immerse the lower sprocket teeth and roller chain. It obviously must not be so high as to leak from the joints in the chain case. **Figure 2-8B s**hows a typical chain drive.

Chain lubricant should be examined at appropriate intervals and changed whenever it is dirty or yearly, whichever occurs first. Use heavyweight 140 Wt. gearlube.

3.4 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.

3.5 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 3-1A** for 12" and 17" heads and **Figure 3-1B** for 26" heads

DANGER

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!

A. To remove the head or tail shaft assembly, it is necessary to separate two sections of chain at the affected shaft assembly. A splice has a chain pin locked in the chain by a cotterpin as shown in **Figure 2-2.**

B. Remove the chain splice pin so that the chain can be disengaged from the sprocket.

C. Follow the instructions below for removal of the head or tail shaft.

3.5.1 Head Shaft Assembly Removal

Remove the head shaft ONLY AFTER the chain has been separated at the head sprocket per Subsection 3.5.

A. Reconfirm that all power has been shut off and locked out

B. 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.

C. Remove the end panel on 26" conveyors or HD style heads, or filler plate on standard head. Save the fasteners.

D. Remove the fasteners attaching the top seal plate retaining clips to the head section side panels. Save the fasteners.

E. Remove and save the fasteners attaching the pillow blocks to their supports.

F. 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 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

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

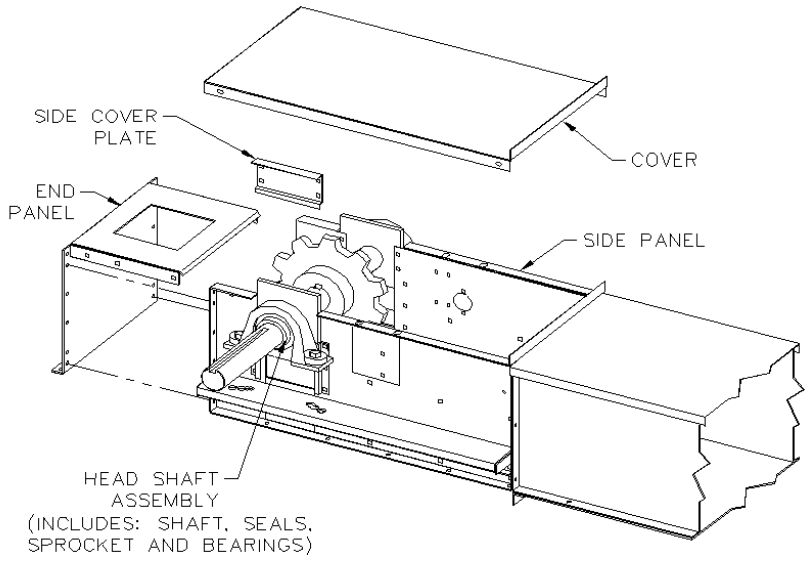

Figure 3-1A, 12" & 17" Head Shaft Removal and Reinstallation

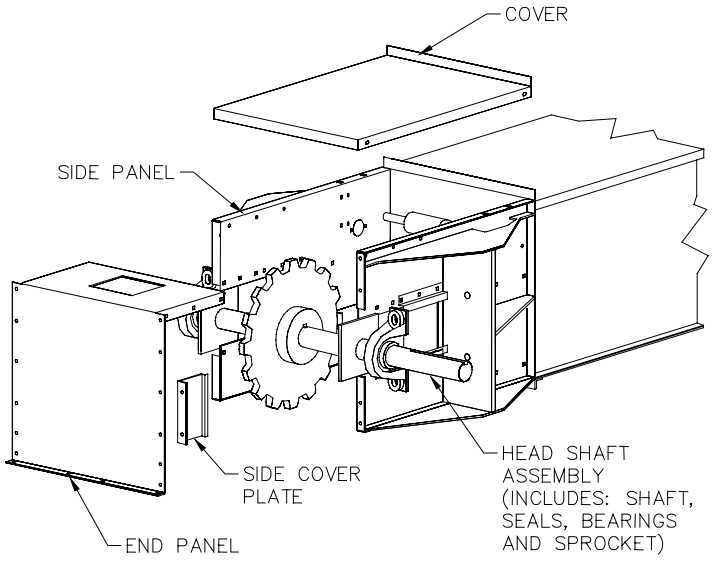

Figure 3-1B, 26" Head Shaft Removal and Reinstallation

3.5.2 Tail Shaft Assembly Removal

Refer to **Figure 3-1B.**

Remove the tail shaft ONLY AFTER the chain has been separated at the tail sprocket per Subsection 3.5.

A. Remove the fasteners attaching the tail section end panel to the side and bottom panel. Save the fasteners.

B. Separate the chain from the sprocket.

C. Pull the shaft assembly from the tail section.

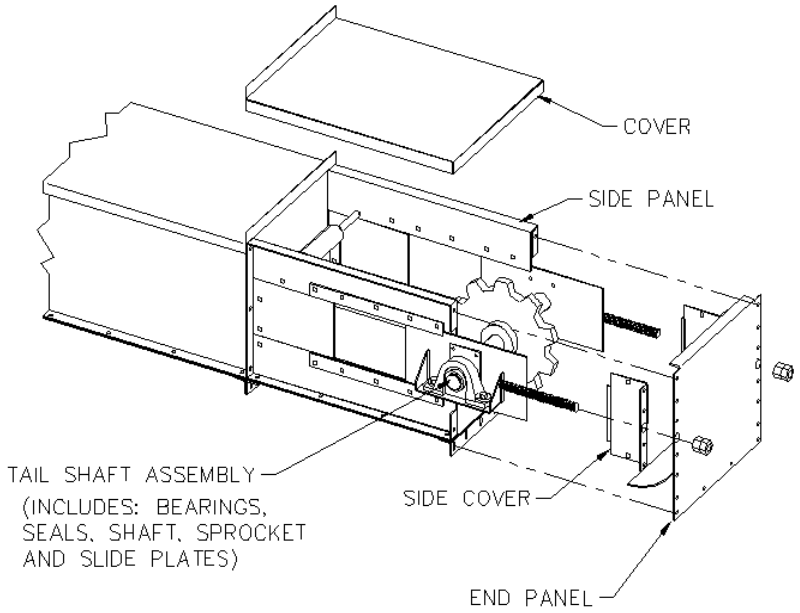

Figure 3-1C,Tail Shaft Removal and Reinstallation

3.5.3 Head And Tail Shaft Reinstallation

Reinstallation of either the head or the tail shaft is essentially 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 reinstalled.

3.6 Conveyor Trough Panel and Liner Replacement

Trough panels and liners can be replaced without disconnecting the chain and flights. The following procedures reference side panel liner replacement. Follow the same procedures for side or bottom panel replacement. Refer to **Figure 3-2**

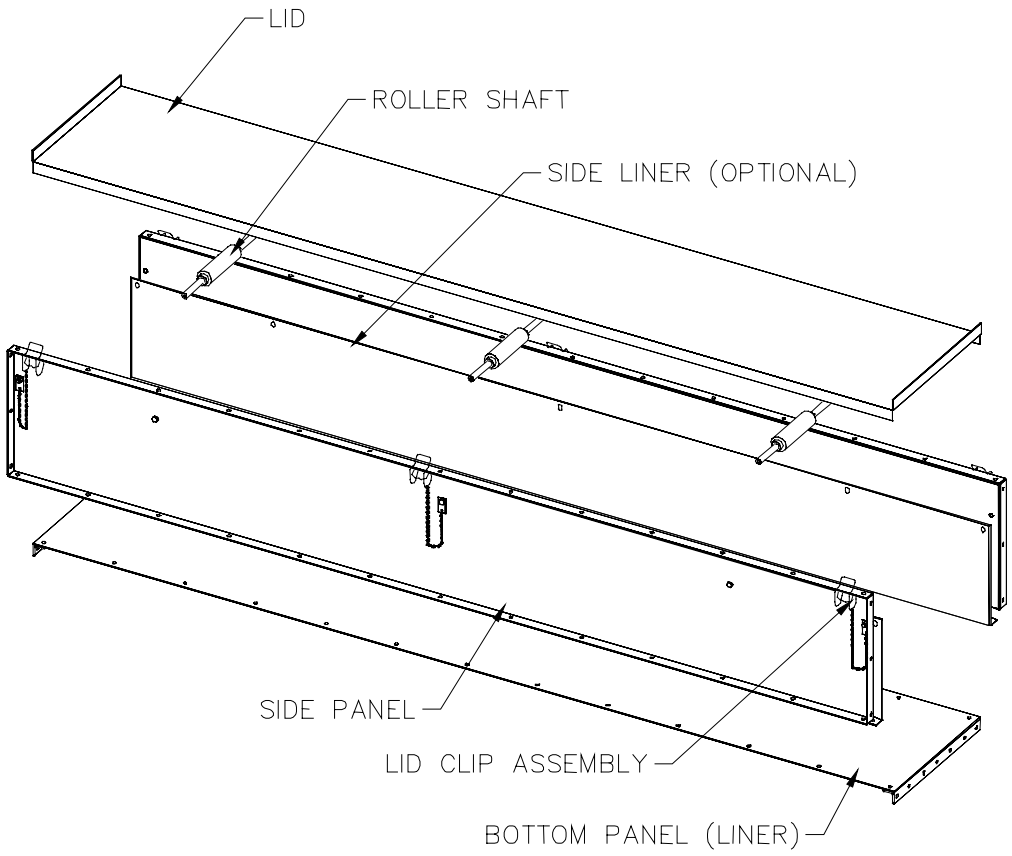

Figure 3-2, Trough Liner and Panel Replacement

DANGER

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

3.6.1 Side Liner Replacement

A. 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.

B. 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.

C. Position the side panel with new liner on the conveyor. Loosely reinstall all fasteners in all panel flanges. Also loosely install the return rollers and shafts.

D. Making sure that adjoining inner surfaces of the liner are flush, tighten the fasteners in the side panel flanges. Then tighten all other fasteners.

3.6.2 Bottom Panel Replacement

REMINDER

THE BOTTOM PANEL IS ALSO THE BOTTOM LINER. IF ABRASION-RESISTANT LINERS WERE ORDERED, THE BOTTOM PANEL WILL BE FABRICATED FROM ABRASION-RESISTANT MATERIAL.

A. Remove and save all fasteners attaching the trough bottom panel to the rest of the conveyor.

B. 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. Refasten the new bottom liner to the side panel flanges.

3.7 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 shutdown automatically to prevent or minimize damage to the equipment and to prevent injury to personnel in the vicinity of the conveyor.

See **Figure 3-3A,3-3B AND 3-3C** DISCHARGE CHOKE/CHAIN BREAK SWITCH AND MECHANISM and **Figure 2-9,** SUGGESTED WIRING DIAGRAM.

3.7.1 Choke Condition Operation

If the conveyor discharge becomes choked, causing conveyed material to build up in the head section, material buildup 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 reengage the extension spring clip assemblies.

Figure 3-3A shows Chain Break Switch in Operating Mode

Figure 3-3B shows a choked condition where material has lifted the cover and activated the switch

Figure 3-3C shows a broken chain condition where the trip lever has lifted the cover.

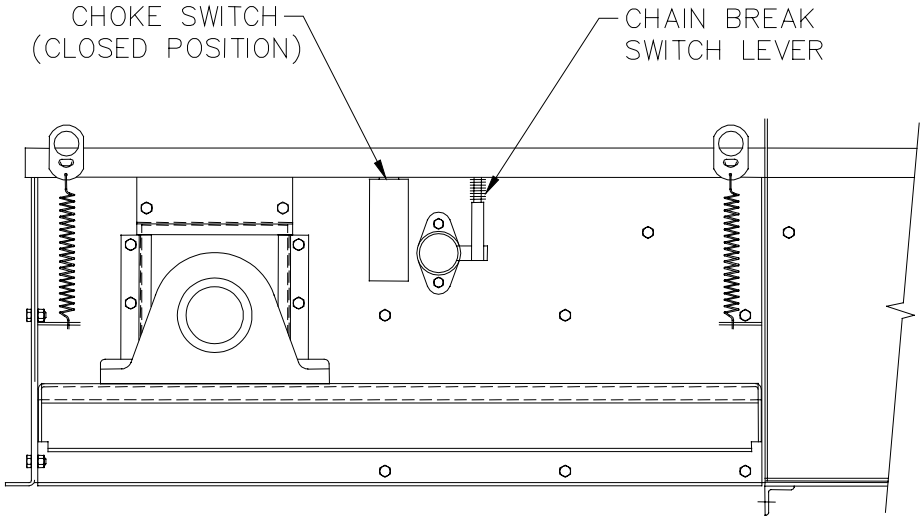

Figure 3-3A, Discharge Choke/Chain Break Switch Mechanism in Normal Operating Position

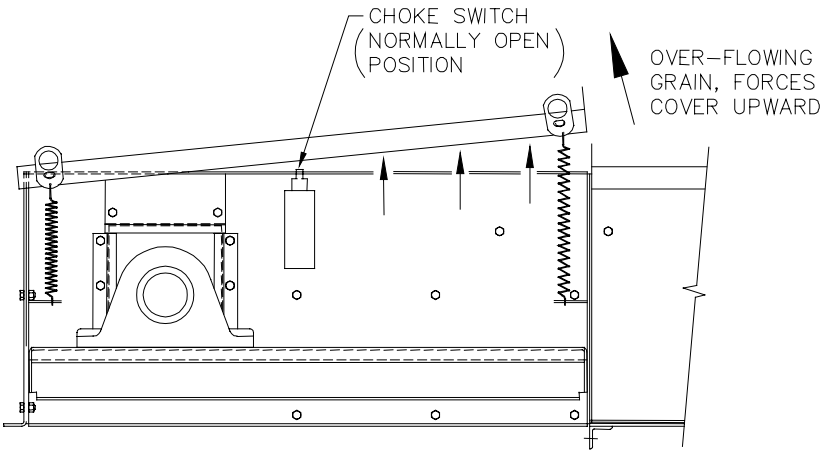

Figure 3-3B, Discharge Choke/Chain Break Switch Mechanism in Material Choke Condition

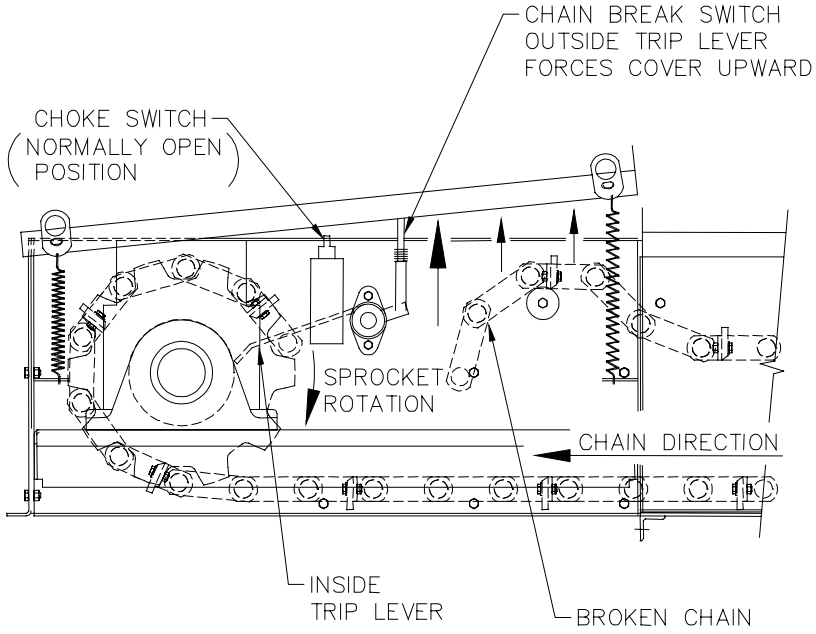

Figure 3-3C, Discharge Choke/Chain Break Switch Mechanism in Chain Break Condition

3.7.2 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.

3.7.3 Switch Mechanism Adjustments

3.7.3.1 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 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 .202 inches, 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 .030, approximately 1/32".

3.7.3.2 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 counter-clockwise 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!

3.7.4 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 (**Figure 2-9)**. See **Figure 3-4A or 3-4B** for theory of operation.

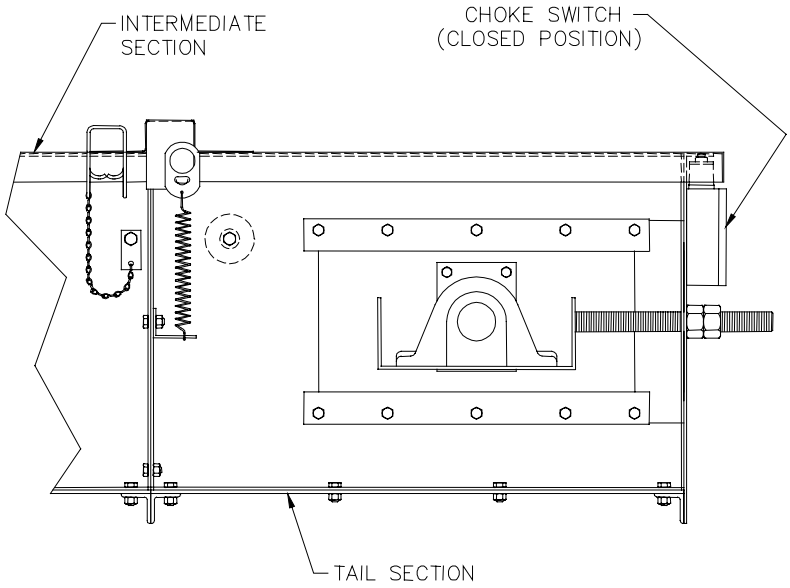

Figure 3-4A, Tail Choke Switch, Normal Condition

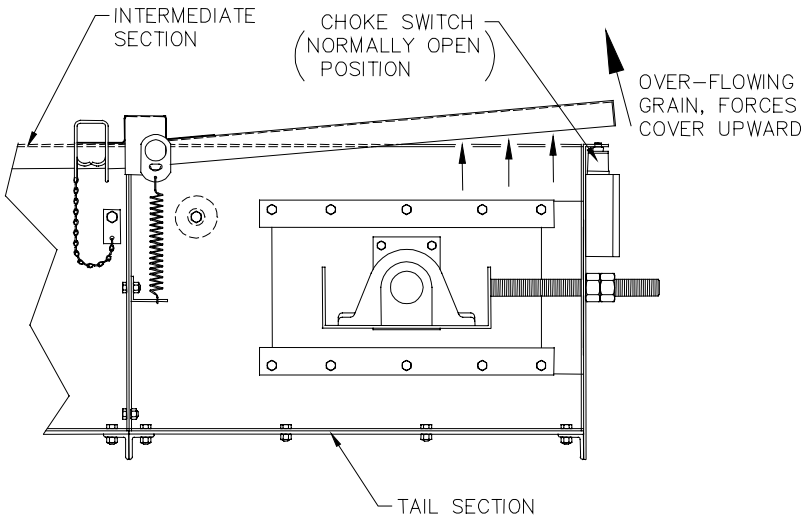

Figure 3-4B, Tail Choke Switch, Choked Condition

3.8 Troubleshooting

If a problem is experienced at startup, verify that the conveyor has been installed and is being operated within the parameters set forth when the conveyor was ordered and as stated in the quotation confirmation and shown on the certified drawing furnished with the conveyor, Among the factors to be considered are these:

A. Is the conveyor being used for inclined service if it was not quoted or designed for such use?

B. If the conveyor was designed for inclined service, does the degree of incline exceed the designed incline specified in the quotation?

C. If the drive was not furnished by Intersystems, is the drive of different capacity or output speed than specified in the quotation?

D. Is the conveyor's capacity, either in terms of volume or weight per cubic foot of material being exceeded?

E. Is the conveyor being 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.

3.8.1 Conveyor Operates At Less Than Design Capacity

A. 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.

B. Check for obstructions at the conveyor inlet(s) or in the bins, hoppers, or chutes feeding the conveyor.

C. Look for clumping of moist material on the flights and along the sides of the trough which are effectively reducing conveyor capacity.

D. 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 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.

E. Compare the depth of conveyed material to that specified on the certified drawings.

3.8.2 Unusual or Loud Noise When Conveyor Operates

A. Verify that drive and takeup (tail) sprockets are centered on their shafts and that the setscrews 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.

B. 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.

C. 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 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.

D. Check for loose or missing hardware, paying particular attention to:

1. Flight mounting fasteners
2. Return roller mounting screws and rail return mounting screws.
3. Setscrews that lock return roller location 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.

E. Monitor the motor, reducer, and bearings for noise levels. Any change in sound level or pitch indicates trouble.

F. Inspect the conveyor for damage such as dents or punctures and for bowed panels or lids.

G. 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.

IV. REPLACEMENT PARTS

4.1 Scope

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.

4.2 Ordering Parts

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

Intersystems
9575 N 109th Ave
Omaha, NE 68142
Phone 402.330.1500
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 sampler is INSTALLED.

4.3 Replacement Parts

The Intersystems sampler 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.

V. WARRANTY

Intersystems reserves the right to make changes in design or in construction of equipment and components without obligation to incorporate such changes in equipment and components previously ordered.

WARRANTY, LIMITATION OF LIABILITY, DISCLAIMER OF IMPLIED WARRANTIES: Intersystems manufactured equipment and components are guaranteed against defects in workmanship or materials for one year from date of shipment. The obligation of Intersystems with respect to any goods is limited to replacement or repair of defective parts and equipment provided those parts are returned, shipping costs prepaid, to Intersystems' factory and provided the product has not been subject to misuse, negligence, or accident, or repaired or altered outside of our factory, or other than by an Authorized Service Representative. This warranty does not cover the replacement of parts inoperative because of wear occasioned by use, the cost of replacing parts by a person other than an Intersystems employee or an Authorized Service Representative, or the adjustment of a product where the product was improperly adjusted by the purchaser. In addition, this warranty does not cover components manufactured by others such as motors, drives, clutches, cylinders, valves, blowers, and the like. On those components the standard Manufacturers' warranty applies. In any event, liability is limited to the purchase price paid, and Intersystems will, under no circumstances, be responsible for special or consequential damages, or for incidental damages.

INTERSYSTEMS NEITHER MAKES NOR AUTHORIZES ANY WARRANTY OTHER THAN AS HEREIN CONTAINED. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.