

## **Product Manual**

# **UniSort VII<sup>®</sup> Sortation Conveyor**

Product Summary, Application Guidelines,  
Specifications, Engineering Data, Layout  
Dimension, Accessories, Installation  
Procedures, Maintenance, and Parts  
Identification



To contact Intelligrated:  
For service: Customer Service and Support (CSS)  
Hotline 1-877-315-3400  
On the World Wide Web: [www.intelligrated.com](http://www.intelligrated.com)

By mail:

Intelligrated  
7901 Innovation Way  
Mason, OH 45040

(513) 701-7300

Read these documents thoroughly before attempting to perform maintenance or repairs to the applicable Intelligrated conveyor system components or devices. Exercise extreme caution when working around moving and rotating conveyor equipment. Wear the proper clothing and safety equipment. DO NOT attempt to perform any maintenance until the equipment is de-energized, locked out and tagged out in accordance with established company procedures.

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Direct questions and comments concerning the information contained in this manual to:

Documentation Department  
Intelligrated  
7901 Innovation Way  
Mason, OH 45040

Ph (513) 701-7300  
Fax (513)701-7349

[customerservice@intelligrated.com](mailto:customerservice@intelligrated.com)

Package Conveyor Safety Signs



# Package Conveyors

SAFETY

IS IN  
YOUR  
HANDS



 <p style="font-size: 0.8em;">Do Not Climb, Sit, Stand, Walk, Ride, or Touch the Conveyor at Any Time</p>	 <p style="font-size: 0.8em;">Do Not Perform Maintenance on Conveyor Until Electrical, Air, Hydraulic and Gravity Energy Sources Have Been Locked Out or Blocked</p>	 <p style="font-size: 0.8em;">Operate Equipment Only With All Approved Covers and Guards in Place</p>
 <p style="font-size: 0.8em;">Do Not Load a Stopped Conveyor or Overload a Running Conveyor</p>	 <p style="font-size: 0.8em;">Ensure That All Personnel Are Clear of Equipment Before Starting</p>	 <p style="font-size: 0.8em;">Allow Only Authorized Personnel To Operate or Maintain Material Handling Equipment</p>
 <p style="font-size: 0.8em;">Do Not Modify or Misuse Conveyor Controls</p>	 <p style="font-size: 0.8em;">Keep Clothing, Body Parts, and Hair Away from Conveyors</p>	 <p style="font-size: 0.8em;">Remove Trash, Paperwork, and Other Debris Only When Power is Locked Out and Tagged Out</p>
 <p style="font-size: 0.8em;">Ensure That ALL Controls and Pull Cords are Visible and Accessible</p>	 <p style="font-size: 0.8em;">Know the Location and Function of All Stop and Start Controls</p>	 <p style="font-size: 0.8em;">Report All Unsafe Conditions Jams should be cleared ONLY BY Authorized, Trained, Personnel</p>

POST IN PROMINENT AREA

## Manual Release and Revision Dates

1<sup>st</sup> Release Date: September 2005  
 Revision Date(s): November 2006  
 February 2007  
 November 2007  
 October 2008  
 October 2009

## Revision Summary

Revision Date	Manual Section	Revision Summary
October 2008	C	Updated Figure C-2.
	G	Updated the "Layout of the Divert Control Module" description.
	H	Updated "Divert Switch Actuator Replacement" procedure and Figures H-4 and H-5. Updated "Divert Switch Trigger Replacement" procedure and Figures H-6. Added "Divert Switch Troubleshooting Flowchart."
	I	Added Infeed Belt PTO - Dual-Sided Part Listing and Drawing. Added Infeed Belt PTO - Single-Sided - PTO on Divert Side Part Listing and Drawing. Added Infeed Belt PTO - Single-Sided - PTO on Switch Side Part Listing and Drawing. Added End Idler Part Listing and Drawing. Updated Divert Switch P/Ns on pages I-10, I-12, I-14, and I-16. Updated Part Listing page I-24 and Figure I-13. Updated Part Listing page I-26.
October 2009	G and H	Modify text on regarding the required oil for the reservoir
	I	Entire section has been modified with new part numbers and added topics.

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**SECTION A: PRODUCT SUMMARY**

**UniSort VII - Product Summary**

**Overview**

The UniSort VII consists of the following components:

- an in-feed section to accept cases from a transportation conveyor,
- an idler section (consisting of an idler and an intermediate section),
- intermediate sections (as required by the application) consisting of non-divert sections, or divert sections for diverting product at a 30° angle to the left, right, or both sides of the sorter, and
- a drive section.

Note: Refer to Section B - “Application Guidelines” for additional information.

**System Width/Between Frame Description**

The UniSort VII conveyor system widths (W) include the following: 22W, 28W, 34W, and 40W. The System widths (W) and Between Frame (BF) widths are outlined in Table A 1.

**Table A 1 System Widths/Between Frame Widths**

<b>System Width (W)</b>	<b>Sorter Between Frame (BF)</b>
<b>Single Sided Sorter (LH or RH)</b>	
22W	36.5”
28W	42.5”
34W	48.5”
40W	54.5”
<b>Dual Sided Sorter</b>	
22W	42.5”
28W	48.5”
34W	54.5”
40W	60.5”

Standard dual-sided sorters feature a bottom side shoe return. Standard single-sided sorters feature a top side shoe return. The top side shoe return feature typically allows the user to select a smaller BF sorter.

Note: Single-sided sorters are available having dual-sided BF dimensions. This allows a single-sided sorter to be converted to a dual-sided sorter in the event the sorter application requirements change in the future.

**Applications**

Product sorting system for transportation conveyor applications.

## General

### Product Handled

.5 to 100 lbs. weight (30lbs./ft. is normal load limit).

6" to 48" length - 1" to 36" width.

Consult factory for other sizes.

Cartons, bags, rolls, bound package, etc.

### Drive Medium

RC100 matched pair, single pin extension every other pitch, with cam follower.

### Speeds

120, 150, 200, 250, 300 and 350fpm.

### Sort Rate

24 to 200 cartons per minute.

Actual rate dependant on: product dimension, gap between product, and conveyor speed.

### Tube Centers

Tubes - 2.5" centers.

Divert shoe - 5.0" centers.

Material -1.74" diameter, 16 ga steel.

### Slat Centers

Slats - 5.0" centers.

Divert shoe - 5.0" centers.

Material - Aluminum.

### Divert Characteristic

Divert centers - based on width - consult factory.

Number of diverts - limited only by distance between sort lanes and/or conveyor pull requirements.

Divert angle 30°.

Divert switches - left, right (electrical), or crossover (mechanical).

## Delivery Rates

Table A 2 shows the delivery rates based on uniform case lengths and a 12” case gap. Actual rates will vary depending on case length, mix, induction system thru-put, and availability of product at induction system.

Table A 2 Delivery Rates - Case/Minute - FPM

<b>Speeds FPM</b>	<b>120</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>
<b>Uniform Case Length</b>	<b>Delivery Rate/Case Per Minute</b>					
9”	68	85	114	142	171	200
12”	60	75	100	125	150	175
16”	51	64	85	107	128	150
18”	48	60	80	100	120	140
24”	40	50	66	83	100	116
30”	34	43	57	71	85	100
36”	30	37	50	62	75	87
42”	26	33	44	55	66	77
48”	24	30	40	50	60	70

## Finish

Intelligrated Gray.

---

## In-Feed Section

### Widths “W” and “BF”

22”, 28”, 34”, and 40”.

### Belt Widths

20”, 26”, 32”, and 38”.

### Lengths

48” minimum, 240” maximum.

## Idler Section

The idler section includes the idler and the first intermediate section. This section is pre-assembled at the factory and shipped as a single unit.

### Between Frame Widths (BF) - Single Sided Sorter

22W = 36.5”.

28W = 42.5”.

34W = 48.5”.

40W = 54.5”.

### Between Frame Widths (BF) - Dual Sided Sorter

22W = 42.5”.

28W = 48.5”.

34W = 54.5”.

40W = 60.5”.

### Idler Length

All idler section lengths = 40.0”.

### Idler Section Assembly Length - (combined Idler and Intermediate)

#### Single Sided Sorter

22W - BF 36.5” = 101.5”.

28W - BF 42.5” = 112.0”.

34W - BF 48.5” = 122.5”.

40W - BF 54.5” = 133.0”.

#### Dual Sided Sorter

22W - BF 42.5” = 112.0”.

28W - BF 48.5” = 122.5”.

34W - BF 54.5” = 133.0”.

40W - BF 60.5” = 143.5”.



**Power Take-Off**

Left or right side.

**Drive Shoe Return**

Left or right side.

**Intermediate Sections****Between Frame Widths (BF) - Single Sided Sorter**

22W = 36.5".

28W = 42.5".

34W = 48.5".

40W = 54.5".

**Between Frame Widths (BF) - Dual Sided Sorter**

22W = 42.5".

28W = 48.5".

34W = 54.5".

40W = 60.5".

**Lengths****0° Divert Sections**

42.5" (BF), 48.5" (BF), 54.5" (BF) = 12.0" to 120.0", in 12.0" increments.

**0° Divert Sections - w/IJD (Internal Jam Detector)**

42.5" (BF), 48.5" (BF), 54.5" (BF) = 36.0" to 120.0", in 12.0" increments.

**Divert Sections**

36.5" (BF) = 61.5".

42.5" (BF) = 72.0".

48.5" (BF) = 82.5".

54.5" (BF) = 93.0".

60.5" (BF) = 103.5".

**Divert Angles/Direction**

0°.

30°/ left, right, or crossover.

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## **Drive Section**

### **Between Frame Widths (BF) - Single Sided Sorter**

22W = 36.5"

28W = 42.5".

34W = 48.5".

40W = 54.5".

### **Between Frame Widths (BF) - Dual Sided Sorter**

22W = 42.5".

28W = 48.5".

34W = 54.5".

40W = 60.5".

## **Lengths**

All drive section lengths = 84.0".

## **Divert Shoe Return**

Single Sided Sorter = top side return.

Dual Sided Sorter = bottom side return.

## **Drive Medium**

Sprocket - #100 Series - 32 tooth.

## **Drive Mounting**

Standard mounting = overhead, left or right.

Optional mounting = side mounted, left or right.

## **Motor/Reducer**

### **Motor - Baldor**

5, 7.5, 10, 15, 20, 25, 30, and 40hp.

3ph-60Hz.

### **Reducer - Browning**

Shaft mounted with variable speed controller.

## **Drive Medium**

Motor sheave - two or three "V" groove.

Reducer sheave - two or three "V" groove.

Belts - two or three "V" belts.

## **Operating Environment**

0°F to 120°F.

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## SECTION B: APPLICATION GUIDELINES

### Product Description

A UniSort VII sortation conveyor application contains of an infeed section used to marry the UniSort VII conveyor to a product induction conveyor, an idler section (consisting of an idler section and the first intermediate section), application dependant intermediate sections, and a drive section, see example in Figure B - 1.

The idler is the infeed end of the UniSort VII conveyor. The primary function of the idler is to return the carrying tubes/slats to the top of the conveyor. The first intermediate section is typically the first divert section and stages the divert shoes for downstream intermediate sections. The number of downstream intermediate sections is application dependant and can be of the type: non-divert, left- or right-handed divert, or dual-divert sections. The drive section contains the conveyor drive motor and a shaft mounted reducer.

The conveying surface of the UniSort VII can be either a carrying tube or carrying slat. The tubes (or slats) are attached to a matched pair of RC-100 Series roller chains which ride on a UHMW wear strip in the chain track. The carrying tube (or slat) utilizes a sliding shoe to divert the product. The conveyor requires a 12" average product gap and is capable of operating up to speeds of 350 fpm.

Divert shoes are dual-handed and are installed between each pair of carrying tubes (or on each slat) and are free to slide at a fixed 30° angle. Tubes (or slats) are installed perpendicular to the direction of travel and function to transport product for diverting.

Divert shoes travel along the opposite side to which product is to be diverted. The system controller signals the divert switch DCM (Divert Control Module) to direct the correct number of shoes to divert the product onto a take-away conveyor. Take-away conveyors are located at the fixed divert points along the side (or sides) of the UniSort VII.

As the conveying surface returns, all shoes remain on the sides of the tube (or slat). Returning shoes are maintained in this position until they reach the idler where their position is set for diverting.

Note: Refer to Section C - "Standard Specifications and Features" for details regarding the specifications for the different UniSort VII sections discussed in this chapter.

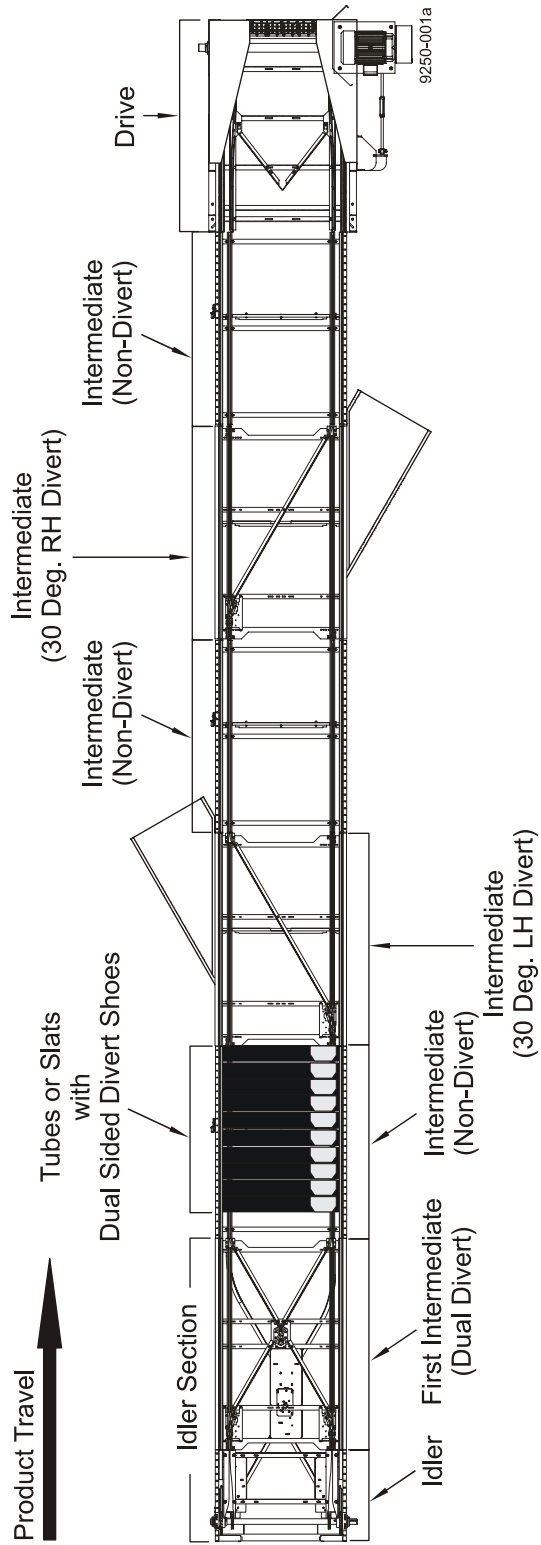


Figure B - 1 UniSort VII Conveyor Layout Example

## Infeed Section

The infeed section connects the UniSort VII sortation conveyor application to a product induction conveyor system.

When a dual-sided divert idler section is used, the infeed section and product induction conveyor share the same centerline, see Figure B - 2.

When a single-sided divert section is used, the infeed section and product induction conveyor centerline are offset from the idler centerline by 3.0" in the direction of the divert.

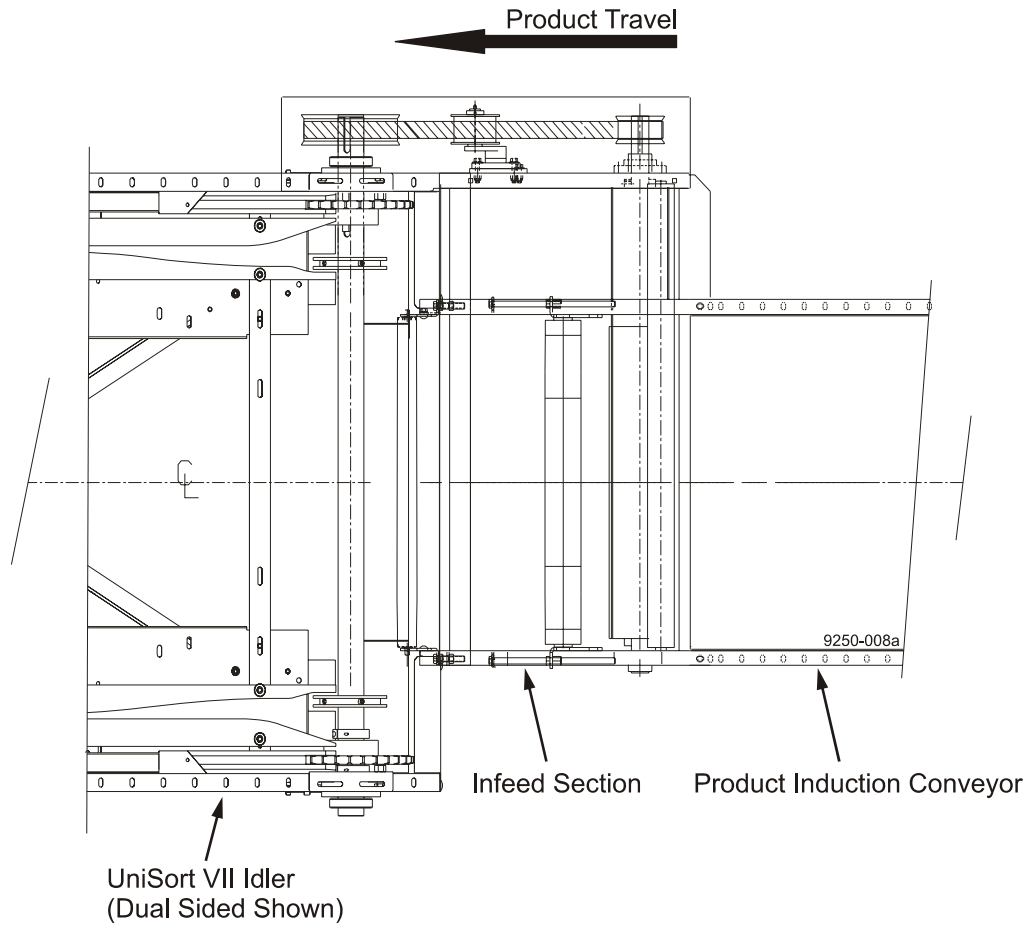
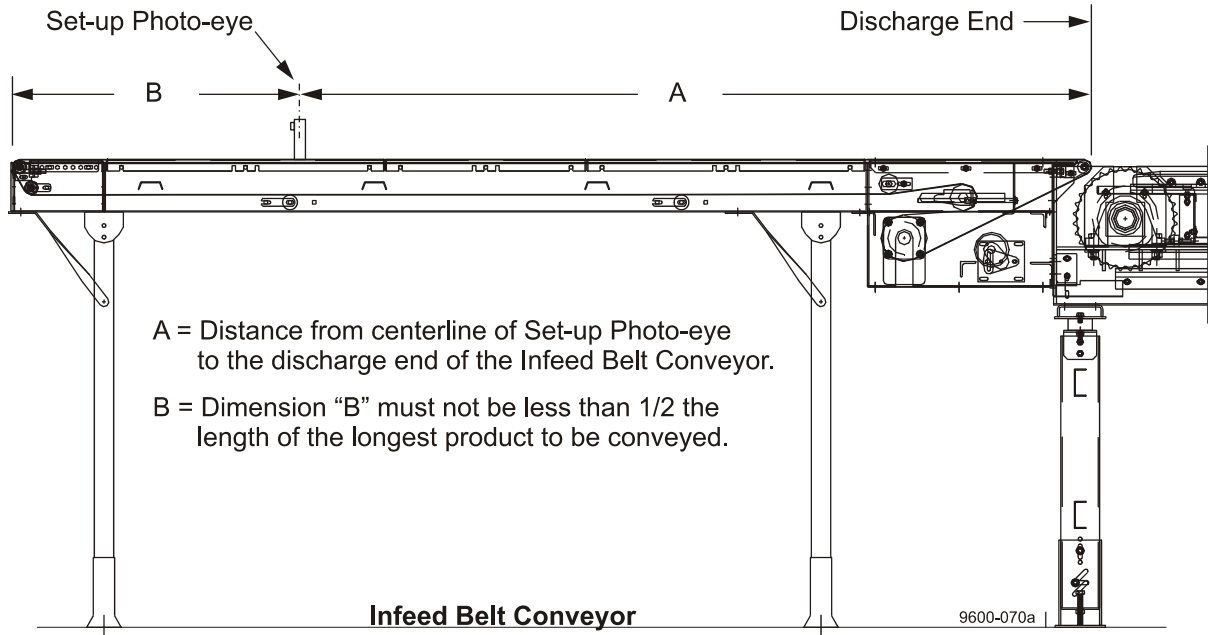


Figure B - 2 Infeed Section (Viewed from the Underside)

### Minimum Infeed Belt Conveyor Lengths - Dual-Sided Sorters (Only)

Figure B - 3 shows distance “A” which represents the minimum distance from the discharge end of the infeed belt conveyor to the centerline of the set-up photo-eye. Distance “A” is a variable depending on the infeed belt conveyor width and must be taken into consideration when selecting the infeed belt conveyor used with a UniSort VII dual-sided idler unit/ intermediate section.



W	“A” - 30° DS Sorter
22”	68”
28”	74”
34”	78”
40”	88”

Figure B - 3 Infeed Belt Conveyor Lengths - Dual-Sided Sorters

## Idler Section - Single and Dual Sided Diverting

The idler section consists of an idler and the first intermediate section and is located at the infeed end of the conveyor. Besides functioning as a terminal end, the intermediate section typically contains the first divert position. Figure B - 4 shows the major components of the infeed section.

The carrying chains travel up and around the idler driven by the two sprockets mounted on the idler shaft. The divert shoes are guided around the idler by split disc pin guides also mounted on the idler shaft.

Pin guide tracks are mounted on the intermediate section to maintain the correct divert shoe position as they travel between divert points.

On dual sided configurations, divert shoe staging is performed by the justifier switch mounted to the underside of the intermediate section. For dual-sided shoes using down-the-side configuration, the justifier switch performs the staging by returning the shoes to the right or left as they travel to the top of the idler section.

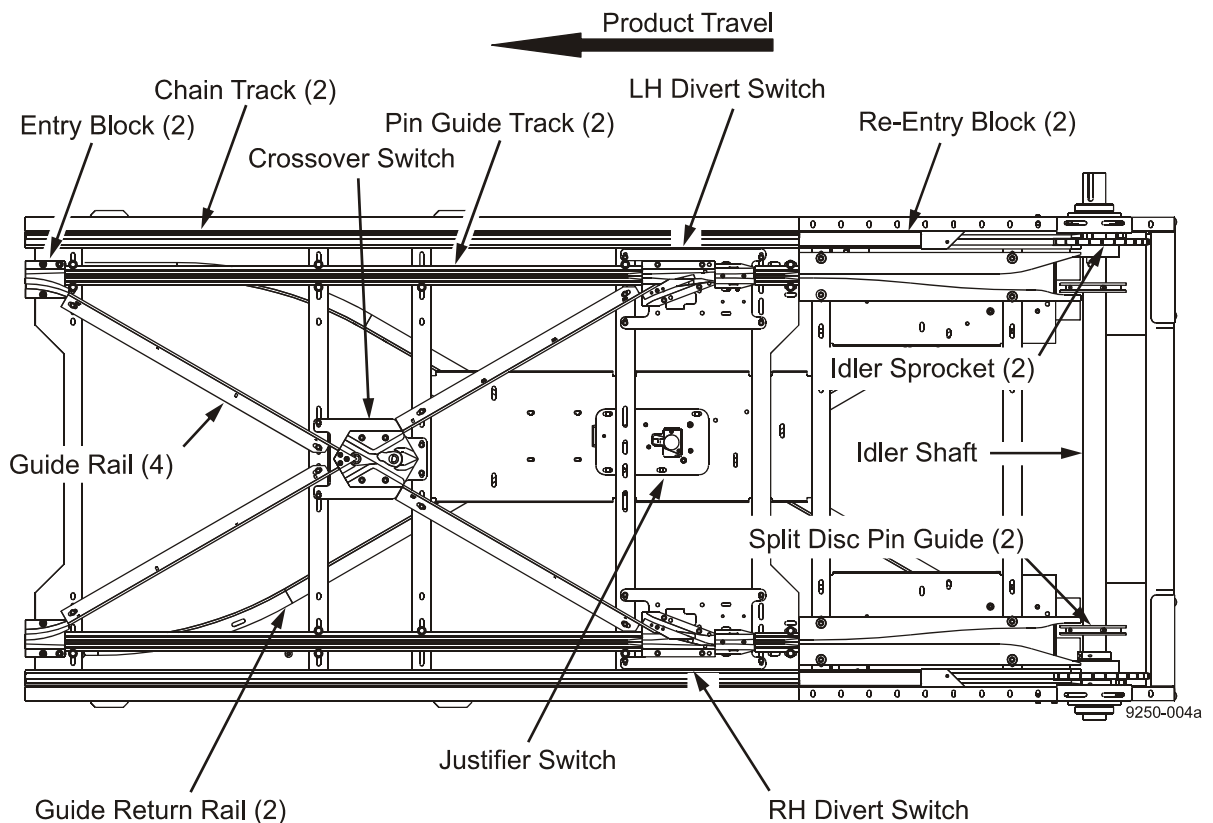


Figure B - 4 Idler Section (Dual Sided Shown)

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## Idler Section - Dual-Sided Intermediate Section Configurations

Different idler section configurations are available and are based primarily on how the justifier switch (on the underside of the sorter) biases the divert shoes and the side of the sorter that the divert shoes are biased (on the top side of the sorter).

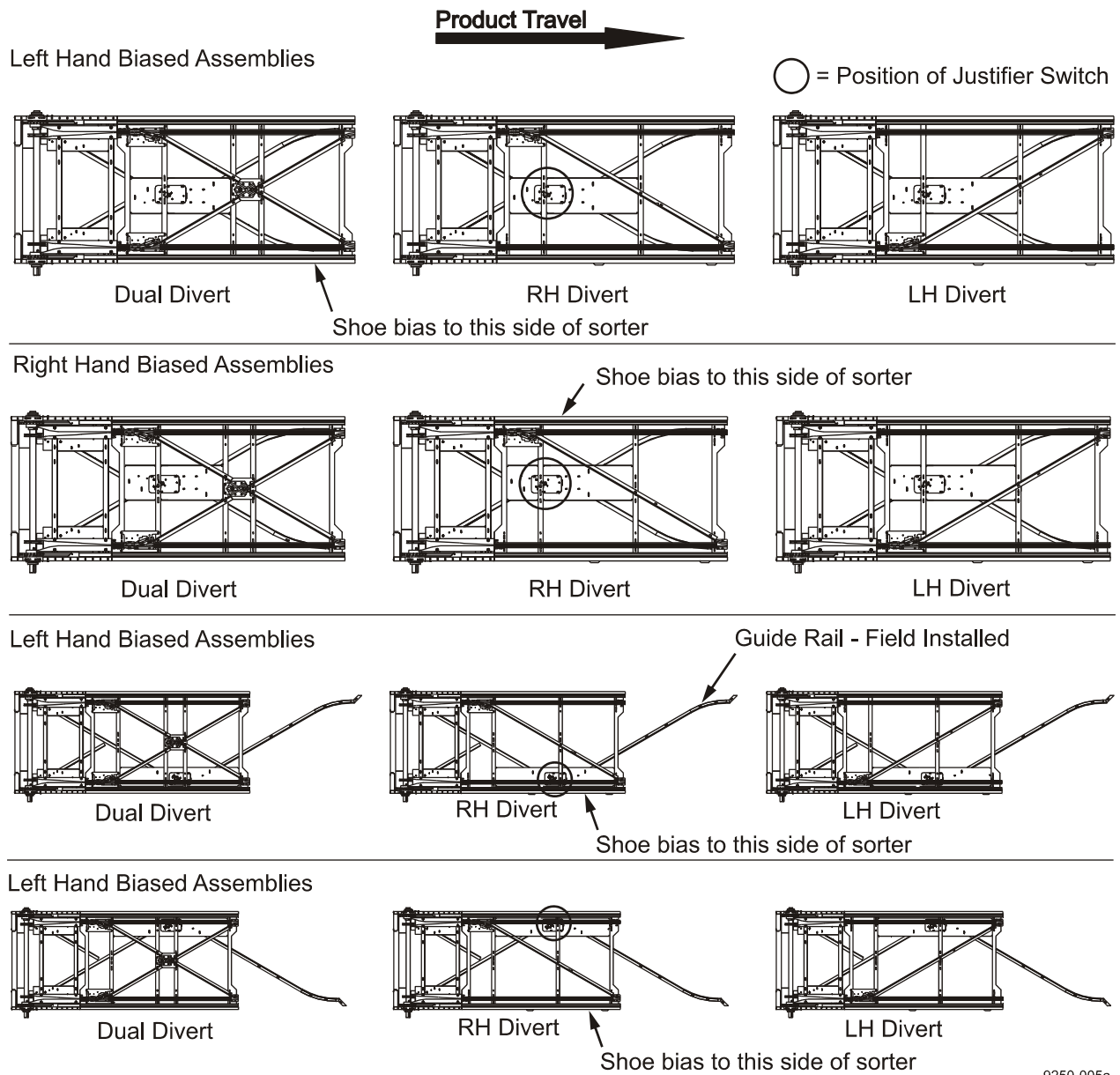
Additionally, the other factors that make up the different configurations include:

- System width (W) and Between Frame width (BF)
- Infeed section length
- Divert type - Dual, LH, or RH
- PTO shaft position - left or right

Figure B - 5 shows three examples of each type of configuration. Table B 1 lists the different configurations based on the above factors.

The terms left- and right-hand divert bias refers to the switch orientation in relation to the side of the sorter containing the most diverts. For example, a dual-sided sorter has most of the divert lanes located on the right-hand side of the sorter (right side when facing in the direction of product travel), the type of set-up hardware needed would be a right-handed biased switch. This keeps the set-up switch activity to a minimum. The same is the case for the left-hand biased switch.





9250-005a

Figure B - 5 Return Pusher/Divert Shoe Biased Examples

Table B 1 Infeed Section Configurations

P/N	Divert Type	Biased Side		Widths		Length	PTO Shaft Side
		Pusher	Shoe	(W)	(BF)		
Reference Engineering Drawing: Dsreturn Justifier Blocks - Sht. 1 of 4							
7004600	D	LH	RH	34.0"	54.5"	133.0"	RH
7004601	D	LH	RH	34.0"	54.5"	133.0"	LH
7004804	RH	LH	RH	34.0"	54.5"	133.0"	RH

Table B 1 Infeed Section Configurations (Continued)

P/N	Divert Type	Biased Side		Widths		Length	PTO Shaft Side
		Pusher	Shoe	(W)	(BF)		
7004804	RH	LH	RH	34.0"	54.5"	133.0"	LH
7004610	LH	LH	RH	34.0"	54.5"	133.0"	RH
7004611	LH	LH	RH	34.0"	54.5"	133.0"	LH
7004461	D	LH	RH	28.0"	48.5"	122.5"	RH
7004462	D	LH	RH	28.0"	48.5"	122.5"	LH
7004606	RH	LH	RH	28.0"	48.5"	122.5"	RH
7004607	RH	LH	RH	28.0"	48.5"	122.5"	LH
7004612	LH	LH	RH	28.0"	48.5"	122.5"	RH
7004613	LH	LH	RH	28.0"	48.5"	122.5"	LH
7004602	D	LH	RH	22.0"	42.5"	112.0"	RH
7004603	D	LH	RH	22.0"	42.5"	112.0"	LH
7004608	RH	LH	RH	22.0"	42.5"	112.0"	RH
7004609	RH	LH	RH	22.0"	42.5"	112.0"	LH
7004614	LH	LH	RH	22.0"	42.5"	112.0"	RH
7004615	LH	LH	RH	22.0"	42.5"	112.0"	LH
Reference Engineering Drawing: Dsreturn Justifier Blocks - Sht. 2 of 4							
7004616	D	RH	LH	34.0"	54.5"	133.0"	RH
7004617	D	RH	LH	34.0"	54.5"	133.0"	LH
7004620	RH	RH	LH	34.0"	54.5"	133.0"	RH
7004621	RH	RH	LH	34.0"	54.5"	133.0"	LH
7004626	LH	RH	LH	34.0"	54.5"	133.0"	RH
7004627	LH	RH	LH	34.0"	54.5"	133.0"	LH
7004463	D	RH	LH	28.0"	48.5"	122.5"	RH
7004464	D	RH	LH	28.0"	48.5"	122.5"	LH
7004622	RH	RH	LH	28.0"	48.5"	122.5"	RH
7004623	RH	RH	LH	28.0"	48.5"	122.5"	LH
7004628	LH	LH	RH	28.0"	48.5"	122.5"	RH
7004629	LH	LH	RH	28.0"	48.5"	122.5"	LH
7004618	D	LH	RH	22.0"	42.5"	112.0"	RH
7004619	D	LH	RH	22.0"	42.5"	112.0"	LH
7004624	RH	LH	RH	22.0"	42.5"	112.0"	RH

**Table B 1 Infeed Section Configurations (Continued)**

P/N	Divert Type	Biased Side		Widths		Length	PTO Shaft Side
		Pusher	Shoe	(W)	(BF)		
7004625	RH	LH	RH	22.0"	42.5"	112.0"	LH
7004630	LH	LH	RH	22.0"	42.5"	112.0"	RH
7004631	LH	LH	RH	22.0"	42.5"	112.0"	LH
Reference Engineering Drawing: Dsreturn Justifier Blocks - Sht. 3 of 4							
7004632	D	LH	RH	34.0"	54.5"	133.0"	RH
7004633	D	LH	RH	34.0"	54.5"	133.0"	LH
7004638	RH	LH	RH	34.0"	54.5"	133.0"	RH
7004639	RH	LH	RH	34.0"	54.5"	133.0"	LH
7004644	LH	LH	RH	34.0"	54.5"	133.0"	RH
7004645	LH	LH	RH	34.0"	54.5"	133.0"	LH
7004634	D	LH	RH	28.0"	48.5"	122.5"	RH
7004635	D	LH	RH	28.0"	48.5"	122.5"	LH
7004640	RH	LH	RH	28.0"	48.5"	122.5"	RH
7004641	RH	LH	RH	28.0"	48.5"	122.5"	LH
7004646	LH	LH	RH	28.0"	48.5"	122.5"	RH
7004647	LH	LH	RH	28.0"	48.5"	122.5"	LH
7004636	D	LH	RH	22.0"	42.5"	112.0"	RH
7004637	D	LH	RH	22.0"	42.5"	112.0"	LH
7004642	RH	LH	RH	22.0"	42.5"	112.0"	RH
7004643	RH	LH	RH	22.0"	42.5"	112.0"	LH
7004648	LH	LH	RH	22.0"	42.5"	112.0"	RH
7004649	LH	LH	RH	22.0"	42.5"	112.0"	LH
Reference Engineering Drawing: Dsreturn Justifier Blocks - Sht. 4 of 4							
7004650	D	LH	RH	34.0"	54.5"	133.0"	RH
7004651	D	LH	RH	34.0"	54.5"	133.0"	LH
7004656	RH	LH	RH	34.0"	54.5"	133.0"	RH
7004657	RH	LH	RH	34.0"	54.5"	133.0"	LH
7004662	LH	LH	RH	34.0"	54.5"	133.0"	RH
7004663	LH	LH	RH	34.0"	54.5"	133.0"	LH
7004652	D	LH	RH	28.0"	48.5"	122.5"	RH
7004653	D	LH	RH	28.0"	48.5"	122.5"	LH

Table B 1 Infeed Section Configurations (Continued)

P/N	Divert Type	Biased Side		Widths		Length	PTO Shaft Side
		Pusher	Shoe	(W)	(BF)		
7004658	RH	LH	RH	28.0"	48.5"	122.5"	RH
7004659	RH	LH	RH	28.0"	48.5"	122.5"	LH
7004664	LH	LH	RH	28.0"	48.5"	122.5"	RH
7004665	LH	LH	RH	28.0"	48.5"	122.5"	LH
7004654	D	LH	RH	22.0"	42.5"	112.0"	RH
7004655	D	LH	RH	22.0"	42.5"	112.0"	LH
7004660	RH	LH	RH	22.0"	42.5"	112.0"	RH
7004661	RH	LH	RH	22.0"	42.5"	112.0"	LH
7004666	LH	LH	RH	22.0"	42.5"	112.0"	RH
7004667	LH	LH	RH	22.0"	42.5"	112.0"	LH

Note: The hand designations LH and RH correspond to the product Direction of Travel.

## Intermediate Sections

Intermediate sections immediately follow the idler section in the UniSort VII sortation conveyor application. Intermediate section types include: non-, single- (left- and right-hand), and dual-sided divert. [Figure B - 6](#) shows a dual-sided divert intermediate and the major components of intermediate sections.

Each intermediate section contains a continuation of the pin guide and carrying chain tracks. Depending on the application, the intermediate section may also contain the appropriate divert switch assembly(s) and divert shoe pin guide rails to meet the divert requirements of the application.

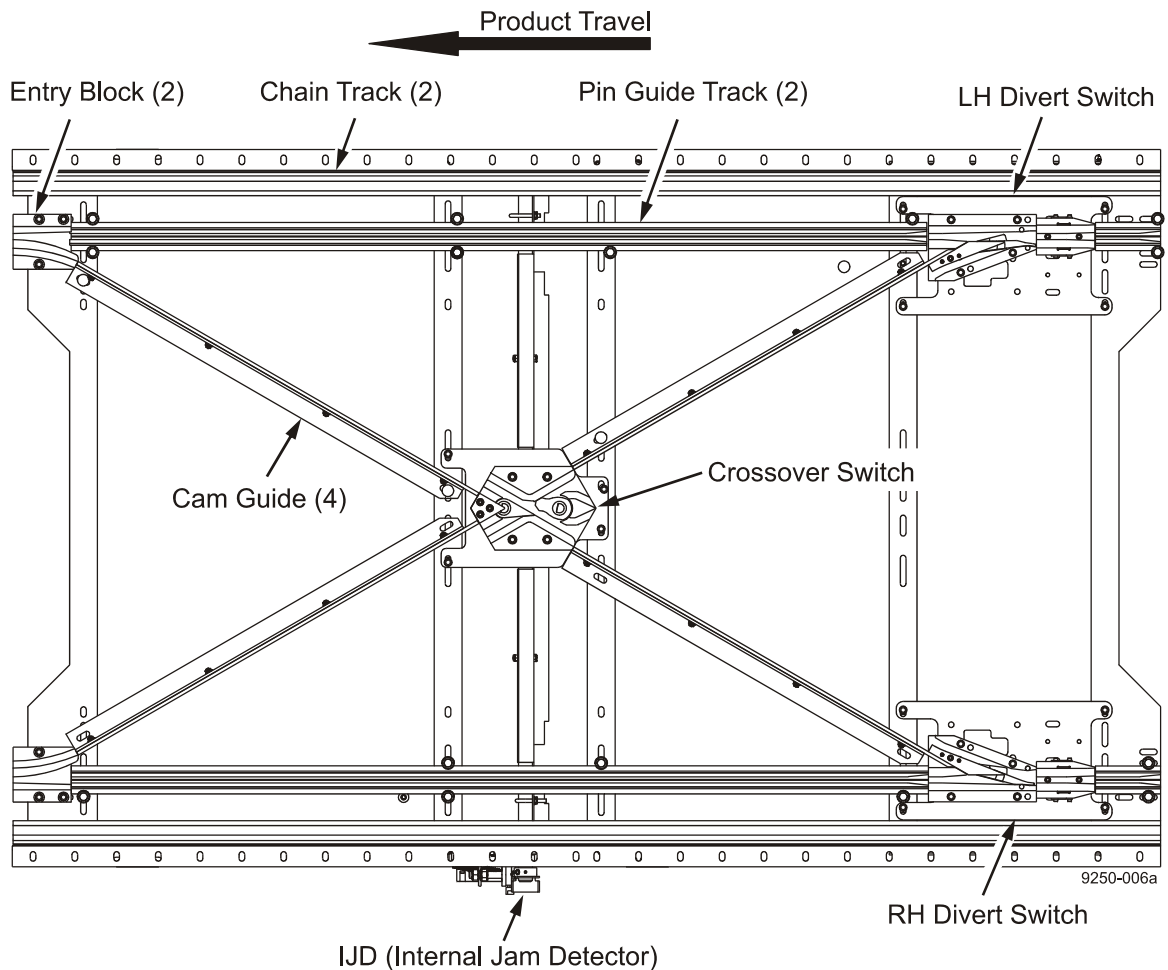


Figure B - 6 Intermediate Section (Dual-Sided Divert Shown)

### Non-Divert Intermediate Section

The non-divert intermediate sections do not contain divert switches. This type of intermediate simply has continuations of the pin guide and chain tracks to allow the divert shoes to remain in their current position while travelling downstream to the next sorter section.

## Single-Side (LH and RH) Divert Intermediate Section Switch Operation

Single-sided divert switch assemblies are located on the side opposite the divert point. Non-diverted shoes travel down this side to the next downstream sorter section. The guide pin of each divert shoe moves within the pin guide track.

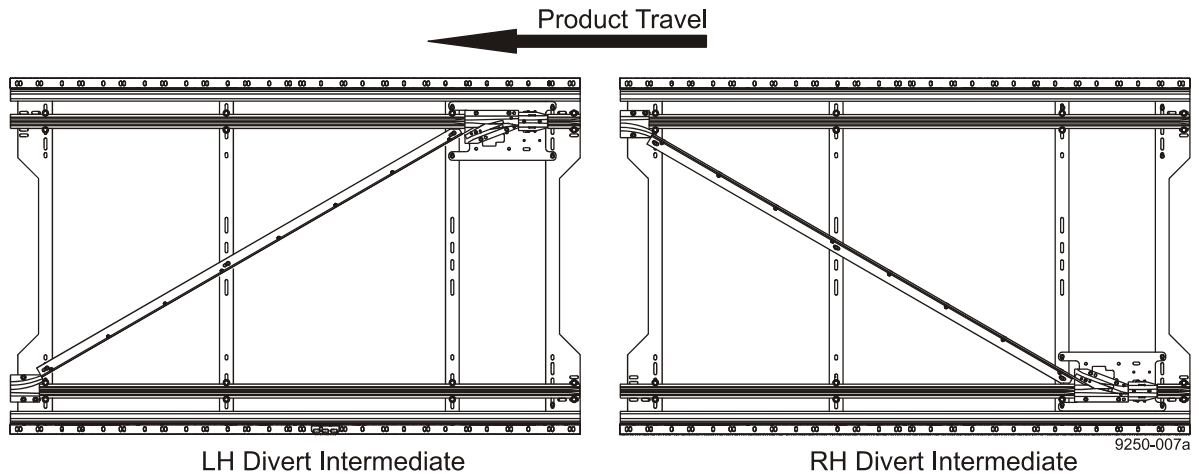


Figure B - 7 Single-Sided Divert Intermediate Sections

The divert switch assembly also contains a continuation of the pin guide track. A brushless rotary actuator controlled divert finger is located following this pin guide track. In the non-divert position, the switch allows the divert shoe to pass straight through the divert switch and continue down the non-divert side.

When diverting is to take place:

- The system controller signals the DCM (Divert Control Module) to switch the divert finger to the divert position.
- This allows the divert shoe pin to start down the divert path and the divert shoe cam guide follower to contact the cam guide and travel to the divert point.
- The diverted shoes then travel down the divert side until another divert switch is encountered or the idler section is reached.

One divert shoe is assigned for each 5" of product length with the leading edge of the divert shoe calibrated to the leading edge of the product to be diverted. This calibration process takes place during product induction using photo-eyes to sense the leading and trailing edges of the product.

The divert switch contains a thru beam photo-eye to actuate the divert finger. The photo-eye beam is broken by the divert shoe pin. If the divert shoe is to be diverted, the divert finger is switched to the divert position. If the divert shoe is not to be diverted, the divert finger is switched to the non-divert position. The signals received from the product sensing photo-eye and the divert switch photo-eye are used by the DCM to synchronize the switching action.

---

## Dual-Sided Divert Intermediate Section Switch Operation

The dual-sided intermediate section, with the divert shoes located down the side, uses two divert switches (a left- and a right-hand divert switch) and a crossover switch located in the approximate center of the intermediate to effect dual-sided product sorting, see Figure B - 6.

The left- and right-handed divert switches used in dual-sided intermediate are the same switches as used in a single-sided intermediate. Operation of these divert switches is also the same as described for the single-sided divert intermediate, described above.

The crossover switch has mechanically operated divert fingers located at the crossover point of the two diagonal cam guide rails. The divert fingers are actuated by the divert shoe pin. This allows shoes on the right side to divert product to the left and shoes located on the left side to divert product to the right. The crossover switch requires no electrical, or pneumatic control.

## Drive Section and Motor/Reducer

The drive section with motor/reducer provides the required carrying chain pull and speed, see [Figure B - 8](#) for the Top View and [Figure B - 9](#) for the End View. Drive sections include:

### Between Frame Widths (BF) - Single Sided (LH or RH) Sorter

22W = 36.5".

28W = 42.5".

34W = 48.5".

40W = 54.5".

### Between Frame Widths (BF) - Dual Sided Sorter

22W = 42.5".

28W = 48.5".

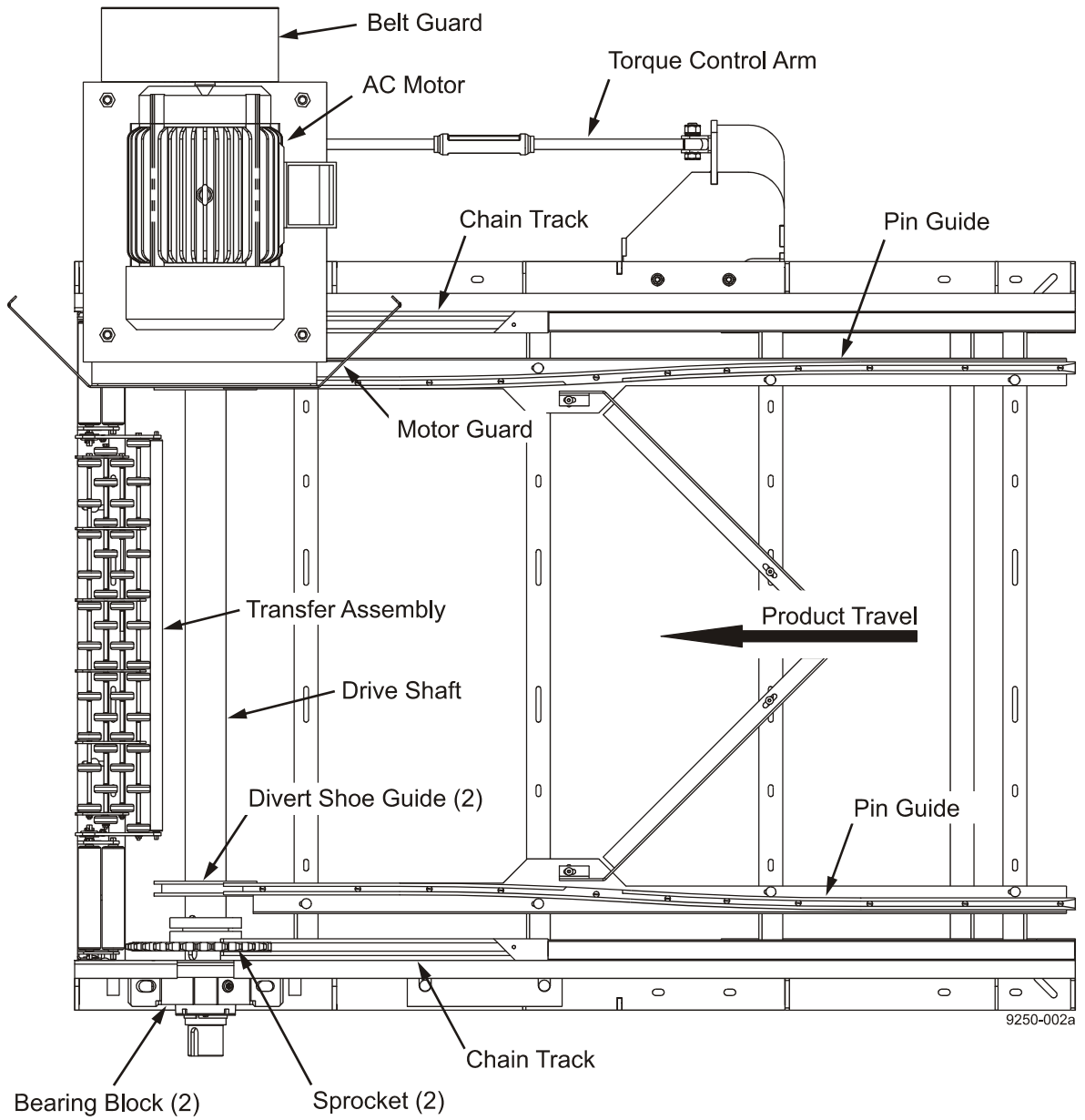
34W = 54.5".

40W = 60.5".

Single sided sorter drive sections provide top side shoe return and dual sided sorter drive sections provide bottom side shoe return.

The constant speed (TEFC) overhead AC motor drives the reducer by "V" belts. The shaft mounted reducer powers the drive shaft which contains two chain sprockets for driving the carrying chains. The motor can be side mounted as an option, consult the factory for details. The drive shaft also contains two divert shoe guides, see [Figure B - 9](#).

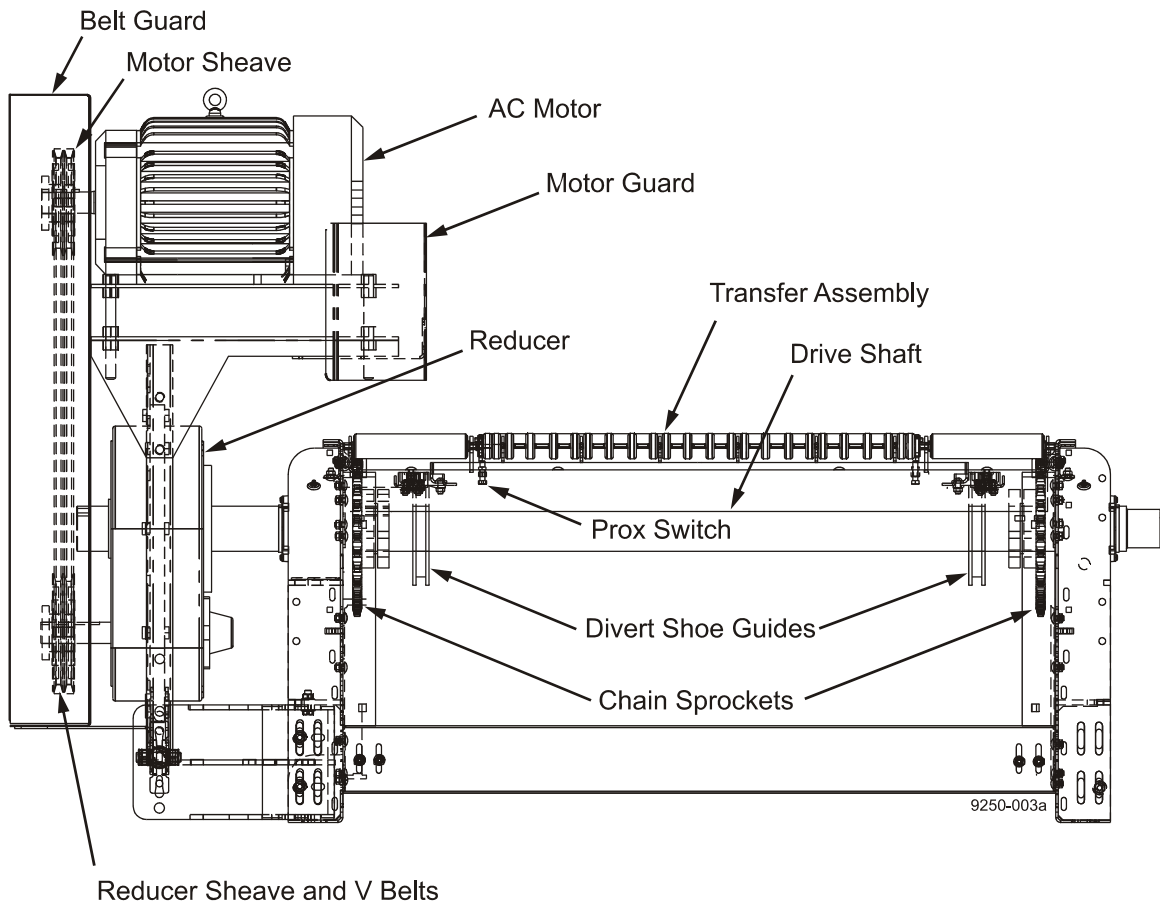
Carrying chains ride on UHMW wear strips in extruded aluminum chain tracks mounted on both sides of each conveyor section.



Note: Some guards or covers have been removed for clarity.

Figure B - 8 Drive Section and Power Unit - Top View





Note: Some guards or covers have been removed for clarity.

Figure B - 9 Drive Section and Power Unit - End View

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**SECTION C: STANDARD SPECIFICATIONS AND FEATURES**

**Mechanical and Electrical**

**Between Frame (BF) Widths**

The UniSort VII conveyor system widths (W) include the following: 22W, 28W, 38W, and 40W. The System widths (W) and Between Frame (BF) widths are outlined in Table C 1.

**Table C 1 System Widths/Between Frame Widths**

System Width (W)	Sorter Between Frame (BF)
<b>Single Sided Sorter (LH or RH)</b>	
22W	36.5"
28W	42.5"
34W	48.5"
40W	54.5"
<b>Dual Sided Sorter</b>	
22W	42.5"
28W	48.5"
34W	54.5"
40W	60.5"

**Capacity/Size Of Product**

0.5 to 100lbs. weight (30lbs./ft. is normal load limit).

6" to 48" length - 1" to 36" width.

Consult factory for other sizes.

Cartons, bags, rolls, bound package, etc.

**Carrying Chain**

RC100 matched pair, single pin extension every other pitch, with cam follower.

**Carrying Tubes/Slats**

Tubes - 2.50" centers, 1.75" diameter, 16 gauge steel.

Slats - 5.0" centers, aluminum extrusion.

**Center Crossover Switch**

Mechanical.

**Chain Oiler**

Electrically controlled.

**Chain Track**

Aluminum extrusion with UHMW wear strips.

---

## Control Systems

Microprocessor based programmable control features allow complete sortation and induction control. Interfaces with main frames or PLC based systems.

## Divert Centers

Based on width - consult factory.

## Divert Shoes

Located on 5.0" centers. Delrin low friction slide guide. Top of shoe uses high impact ABS with snap-on high friction, non-marking pads. Hardened steel guide pin with precision ball bearing guide follower.

## Divert Shoe Out Of Position

Limit switch activated when shoe jumps across return guide rail.

## Divert Shoe Pin

0.375" diameter hardened steel.

## Divert Switch

Non-jamming design, activated by double acting brushless rotary actuator. Photo-eye senses divert shoe pin and communicates with the DCM (Divert Control Module) for accurate divert timing.

## Divert Switch Body

Nycast 6.

## Divert Switch Finger

Glass filled nylon.

## Drive

5, 7.5, 10, 15, 20, 25, 30, and 40hp, 3ph-60Hz. - shaft mounted reducer with torque arm and V-belt drive.

NEMA design "B" drive motor; 1765rpm; continuous duty; totally enclosed; fan cooled.

## Drive Components

Shaft mounted reducer with variable speed controller.

## Drive Reducer

Shaft mounted; helical gear with torque arm.

## Drive Sprocket

RC100, 32 tooth, taper lock, "B" style hub, hardened.

## End Pop-Up Safety Roller

Out of position detected by 24Vdc proximity switch.

## Frame

10 gauge channel, 14" x 1.5".

**Idler Sprocket**

RC100, 28 tooth, taper lock, "B" style hub, hardened.

**Lengths**

Idler/Intermediate, intermediate sections are based on sorter width. All drive sections 84.0" long. Non-divert Intermediate sections are available in various lengths to accommodate layout requirements. Total sorter length determined by maximum effective pull limit per drive.

**Minimum Elevation**

30".

**Number Of Diverts**

Limited only by distance between sort lanes and/or conveyor pull requirements.

**Overload Current Sensor**

Adjustable instantaneous trip type or time delayed.

**Paint**

Intelligrated Gray.

**Photo-eyes**

Required for determining product (case) length; case gap; product jams; sort lane full conditions; recirculation/error lane full, etc.

**Proximity Switch**

18mm (.7") not shielded; 8mm (.3") sensing range; 3 wire; current sourcing (PNP) mode; 9.6 to 55Vdc supply; 200ma maximum load current.

**Slat Centers**

Divert shoes on 5" centers.

**Speeds**

120, 150, 200, 250, 300, and 350fpm.

**Sort Rate**

24 to 200 cartons per minute.

Actual rate dependant on: product dimension, gap between product, and conveyor speed.

**Tail Components**

Fixed idler with PTO for upstream infeed section.

## Take-Away Conveyors

The rates shown in Table C 2 are based on constant 12" gap between cases and all cases being the same length. Actual rates will depend on case length, mix, induction system throughput, and availability of product at induction conveyor.

Table C 2 Delivery Rates - Case/Minute - FPM

Speeds FPM	120	150	200	250	300	350
Uniform Case Length	Delivery Rate/Case Per Minute					
9"	68	85	114	142	171	200
12"	60	75	100	125	150	175
16"	51	64	85	107	128	150
18"	48	60	80	100	120	140
24"	40	50	66	83	100	116
30"	34	43	57	71	85	100
36"	30	37	50	62	75	87
42"	26	33	44	55	66	77
48"	24	30	40	50	60	70

## Tube Centers

2.5" center, divert shoes on 5" centers.

## Variable Frequency Drive (VFD)

Sized per drive motor horsepower; 0-60 second acceleration time adjustment; 0-150% start torque adjustment with current overload protection.

## Widths

"W" = 22", 28", 34", and 40".

## **Control Hardware Devices**

### **Current Sense Relay**

Used to detect excessive drive motor current resulting from an electrical/mechanical drive fault/jam condition. It is wired between the motor disconnect switch and the motor starter.

When tripped, drive power is dropped. Relay contact status is output to the system controller.

### **DCM (Divert Control Module)**

The system controller signals the divert switch DCM (Divert Control Module) to direct the correct number of shoes to divert the product onto a take-away conveyor.

### **Divert Shoe Photo-eye**

Divert shoe photo-eyes, located at each divert point of the sorter, are interfaced to the system controller for sortation tracking and synchronizing the divert switching mechanism. The photo-eyes detect the presence of a divert shoe by sensing the trailing edge of the divert shoe's cam guide follower bearing.

A photo-eye may also be used for verifying the UniSort VII's operating speed.

The divert photo-eyes can be interfaced to the control system.

### **Divert Shoe Pin Out Of Track Limit Switch**

Used to detect a divert shoe out of position; located at the end of the UniSort VII. Drive power is dropped or inhibited if "pin out of track" is actuated. Switch status is output to the system controller.

### **Emergency Stop**

Emergency Stop buttons and pull cords are used by the operator to effect an "Emergency Stop" drive power off condition. Contact status is output to the system controller.

### **End Pop-Up Roller Detection**

A proximity switch located on the drive end of the UniSort VII to detect the dislodging of the safety roller. Drive power is dropped or inhibited when the pop-up roller becomes dislodged. Switch status is output to the system controller.

### **Motor Disconnect**

A motor disconnect switch is used to apply power to the VFD and is located near the drive end of the UniSort VII. The contact status of this switch is supplied to the system controller.

### **Motor Starter**

Used to switch power to the drive motor via the motor disconnect switch and VFD. Contact status is supplied to the system controller.

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## Photo-eyes

Photo-eye usage depends on the particular UniSort VII sortation system configuration and system controller architecture. Application for photo-eyes include:

- Determining case (product) length; induction and sortation tracking.
- Detecting product jam conditions at the sorter's infeed, discharge ends; jams at sort lane(s); detecting sort lane full conditions; sensing recirculation and error lane full conditions.

Drive power to the sorter is dropped for any product jam conditions.

## Variable Frequency Drive (VFD)

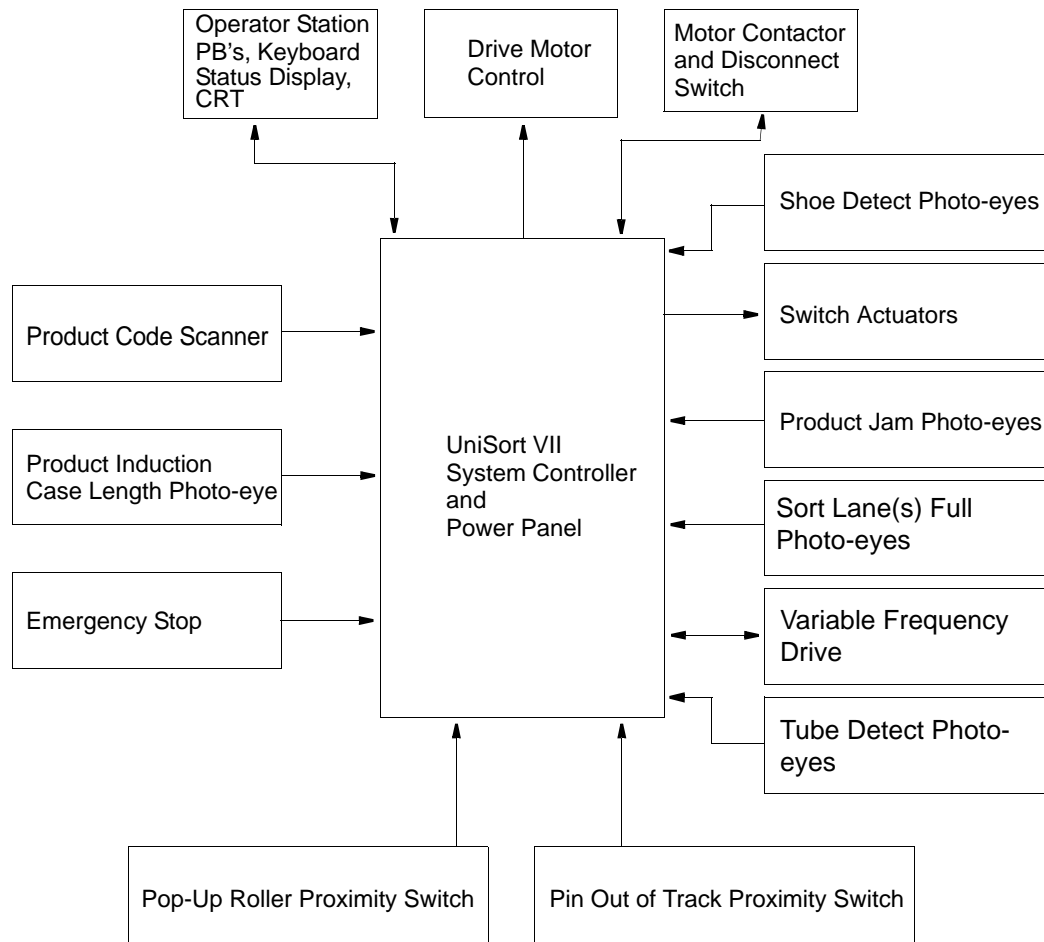
Used to effect a smooth start-up acceleration of the UniSort VII drive system. VFD is sized based on the drive motor's maximum current draw. One VFD is used for all drive motor horsepower sizes.

The VFD is located near the drive motor and wired between the drive motor and motor disconnect switch.

For first time start-up, the VFD time, torque, and current limit controls are set at mid-range before applying power. These controls are then fine-tuned per the VFD manufacturer's instructions to achieve a smooth acceleration of the UniSort VII. Improper adjustment may result in the sorter drive chain jumping a sprocket tooth when power is applied.



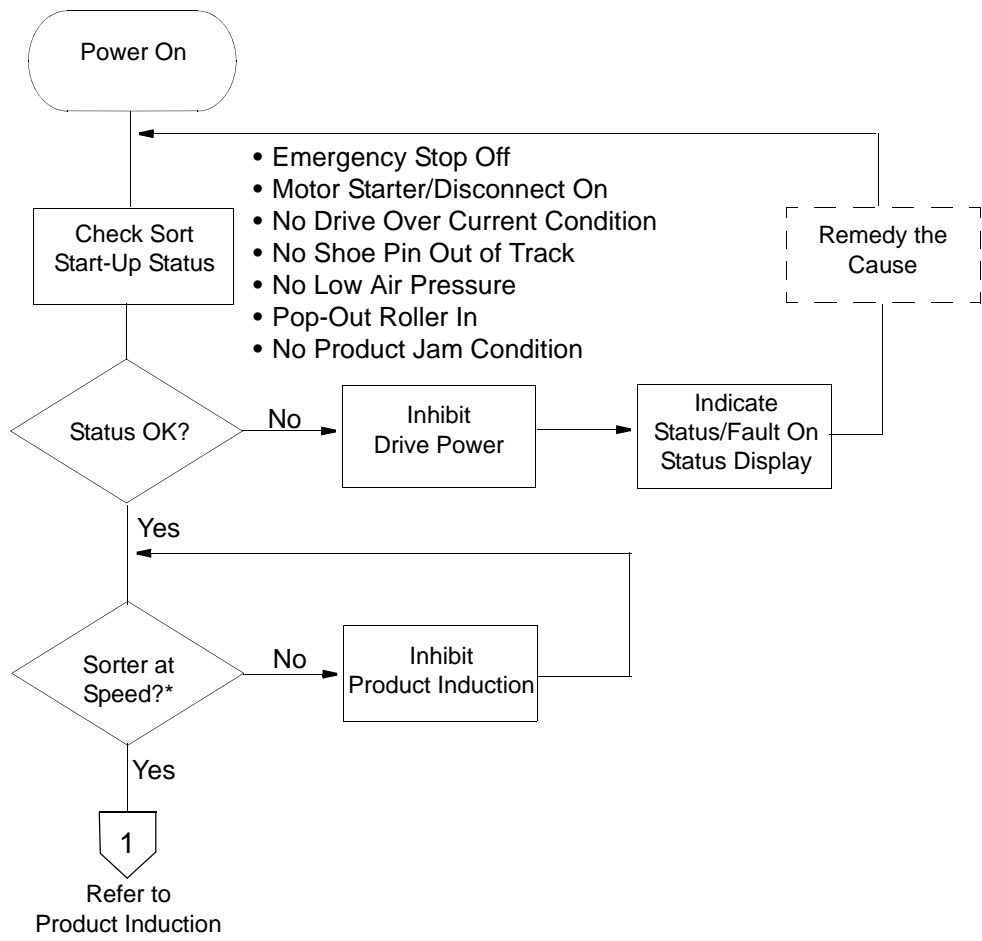
## UniSort VII - System Control and Operation Flow Charts



Line printer and UniSort VII host computer interfaces may also be included.

Notes: Arrows directed to the system controller indicate inputs to the system controller. Arrow directed out of the system controller indicate outputs to an external device. Double sided arrows indicate bi-directional communication between the system controller and external device.

Figure C - 1 UniSort VII Basic System Control Diagram



\*Can be accomplished by reading pulse repetition rate from first photo-eye (at infeed end).

Figure C - 2 Sequence of Operation - Sorter Power-on Status

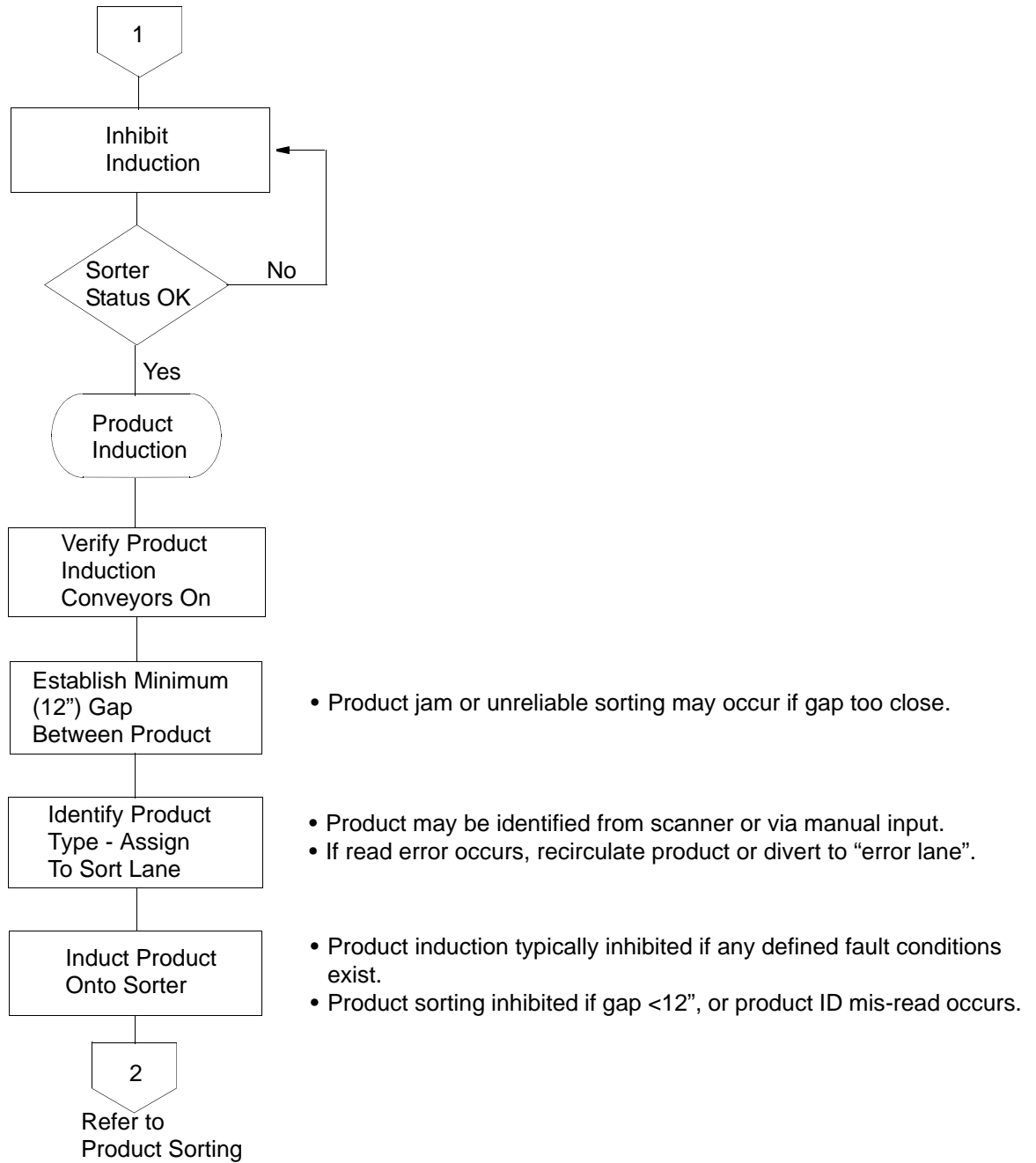


Figure C - 3 Sequence of Operation - Product Induction (Typical)

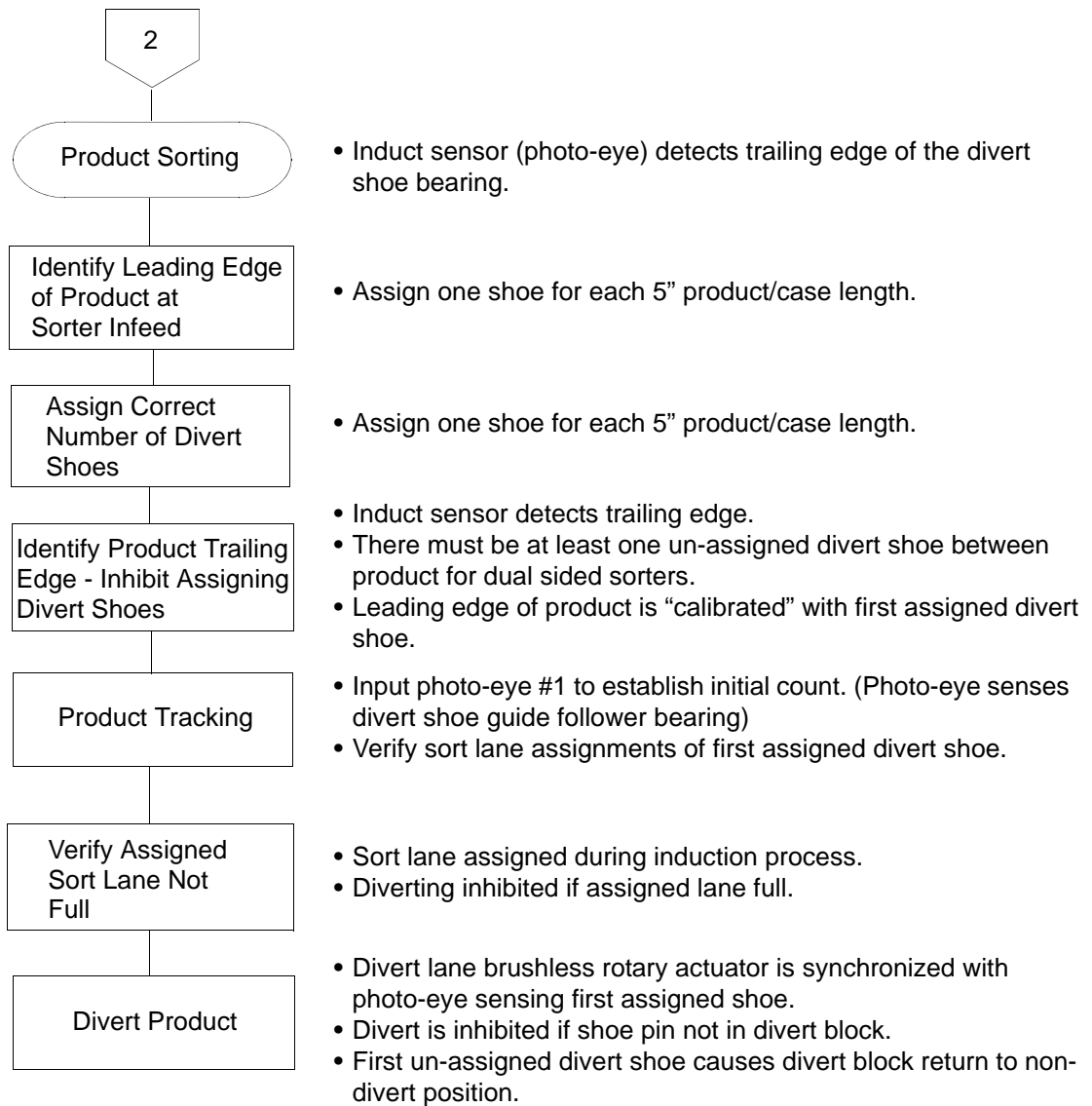


Figure C - 4 Sequence of Operation - Product Sorting

---

## **SECTION D: ENGINEERING DATA**

### **Preparing the Site Layout Drawing**

Prepare a layout drawing for all applications. The drawing will identify the required equipment elements and will show clearance requirements for building structures, aisles, tie-ins with adjoining conveyors, equipment, etc. The drawing should be drawn to scale and must be accurate.

The UniSort VII site layout should be constructed using the UniSort VII CAD Blocks. Please consult factory for additional information.

### **Chain Pull and Required Horsepower**

Consult manufacturer's Engineering Department.

### **Establishing Speed and Gap**

To properly determine the speed of the system and the gap between cases, the following items must be redefined.

1. New equipment or interfacing with existing.
2. Is an interface required with peripheral equipment.
3. Product to be handled.
  - Type, length, width, height, and weight of the product.
  - Description and same if available.
  - Maximum number of cases and minimum number of product.
  - Condition of top and bottom of product.
  - Vertical or tapered product sides.
4. Rate of handling.
  - Maximum number of units per minute.
  - Minimum number of units per minute.
  - Average number of units per minute.
  - Peak number of units per minute.
  - Breakdown of handling by area: Replenishment, picking, sortation, shipping.
  - Type of loading required: Palletized, direct load, load on carts, etc.
  - Rate of machines required to sort: Palletizers, case sealers, packaging equipment etc.
5. Description of operation - if available; if no, understand the operation and formulate your understanding of the operation in writing.
6. Type of operation - intermittent, constant.
7. Duty cycle - hours per day.
8. Operating environment.
9. Operating temperatures.

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## *SECTION E: LAYOUT DIMENSIONS*

### **Layout/Installation Drawings**

The UniSort VII layout/installation drawings contain information that identify and show the placement of the:

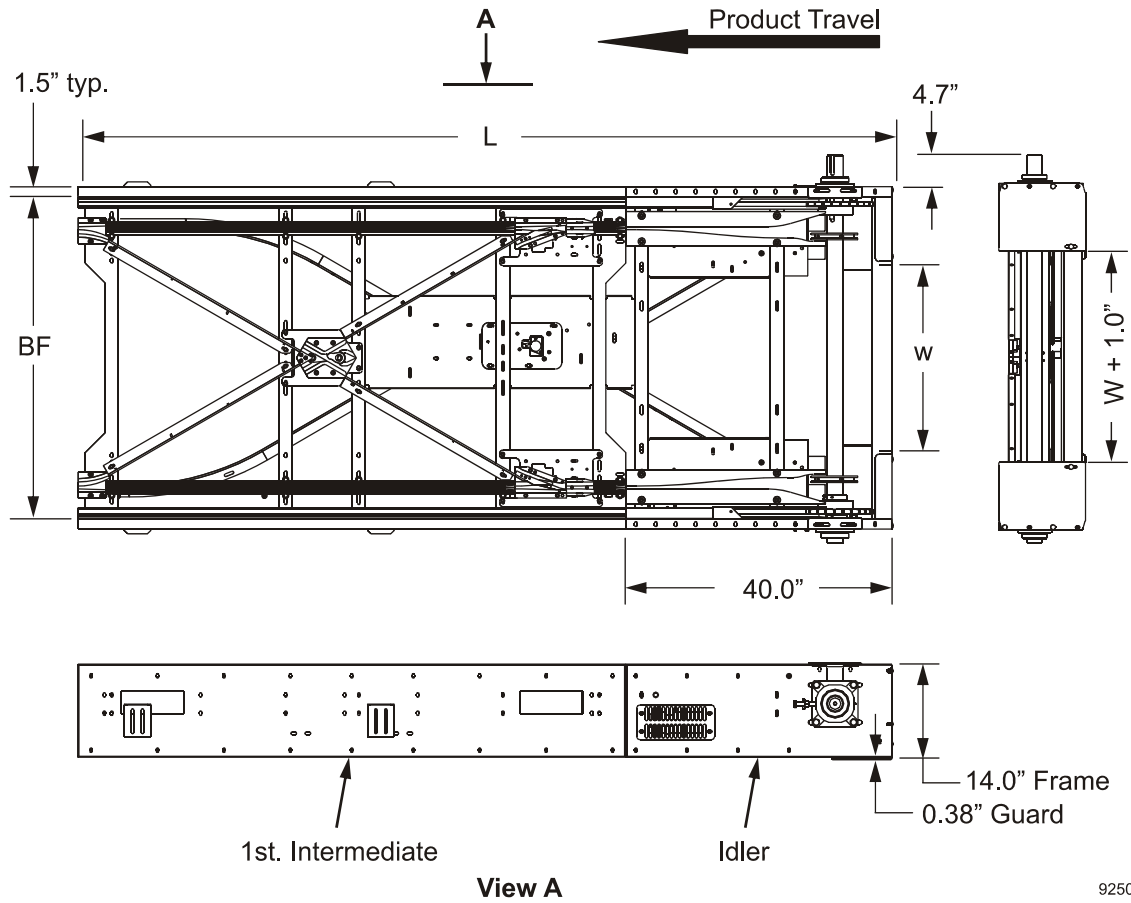
- Idler Section,
- Intermediate Section(s), and
- Drive Section.

Each conveyor section is identified by a label affixed to the unit at the factory. The information printed on these labels is useful for identifying the different sections as shown by the layout/installation drawings.

The following illustrations show the various sections and assemblies that can be included in a UniSort VII application.

# Idler Sections

## Idler/Intermediate Section



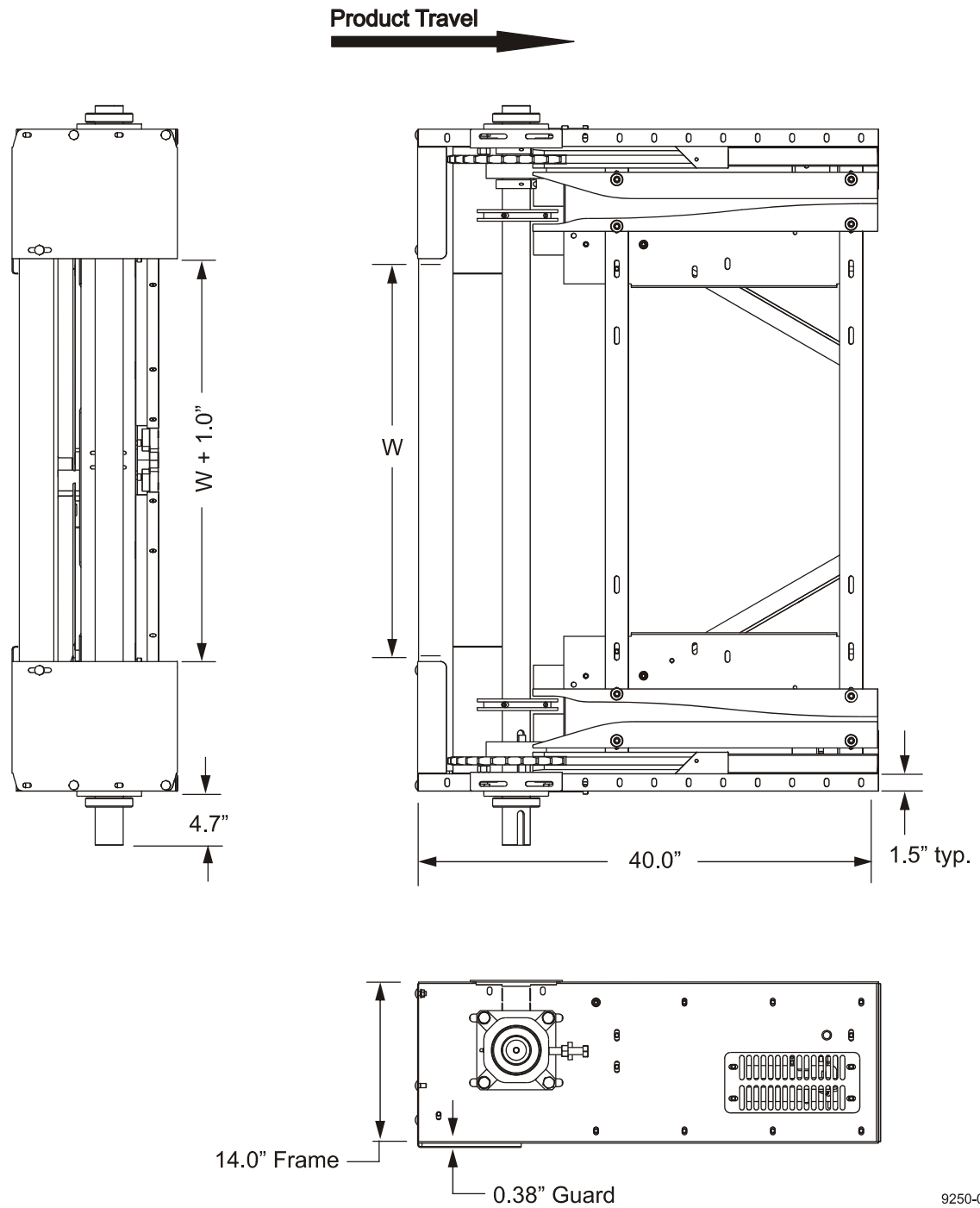
9250-009a

W	BF	L
22.0"	42.5"	112.0"
28.0"	48.5"	122.5"
34.0"	54.5"	133.0
40.0"	60.5"	143.5"

Figure E - 1 Idler/Intermediate Section - Dual-Sided Divert, Dual-Sided Return (shown)



**Idler Section (only) - Dual-Sided Divert**



9250-010a

Figure E - 2 Idler Section (only) - Dual-Sided Divert (shown)

**Idler Sections (only) - LH and RH Single-Sided Divert**

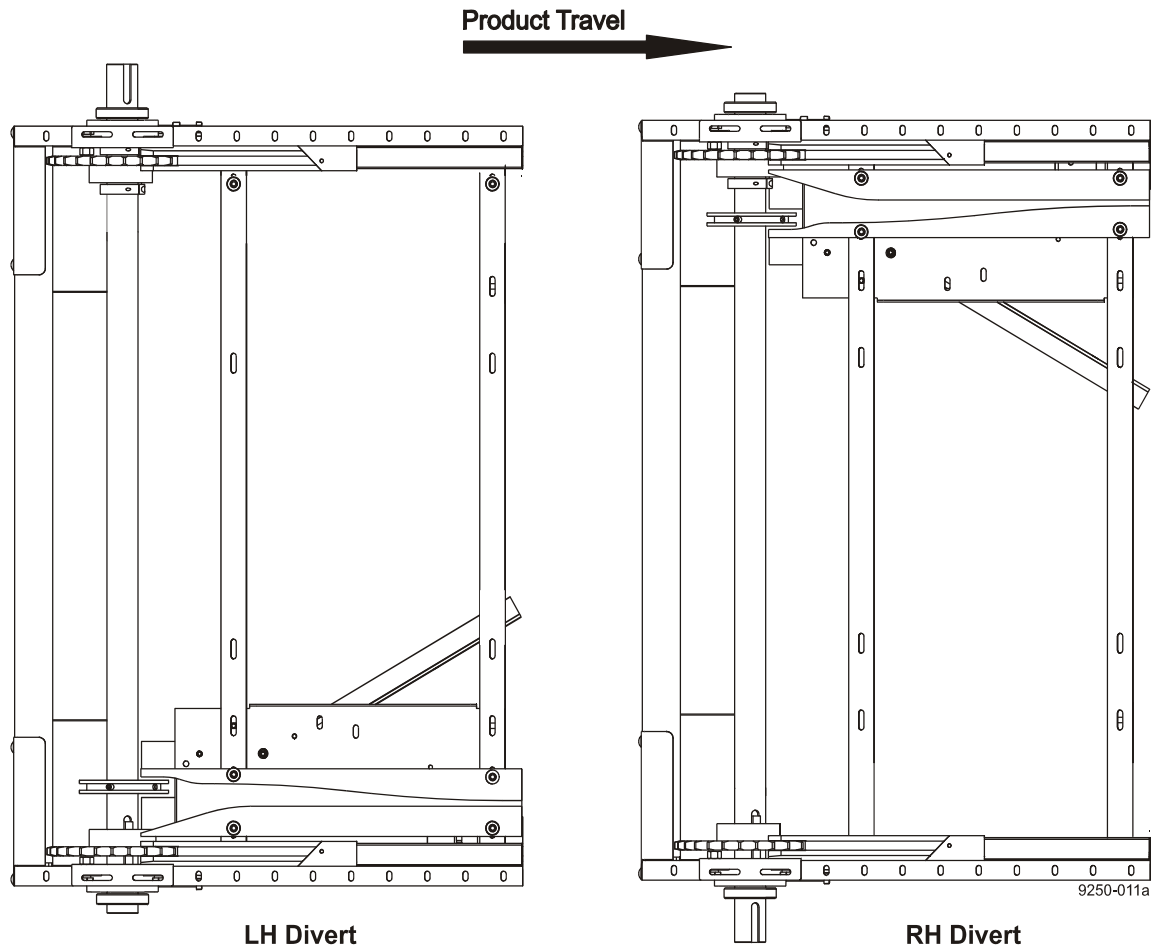
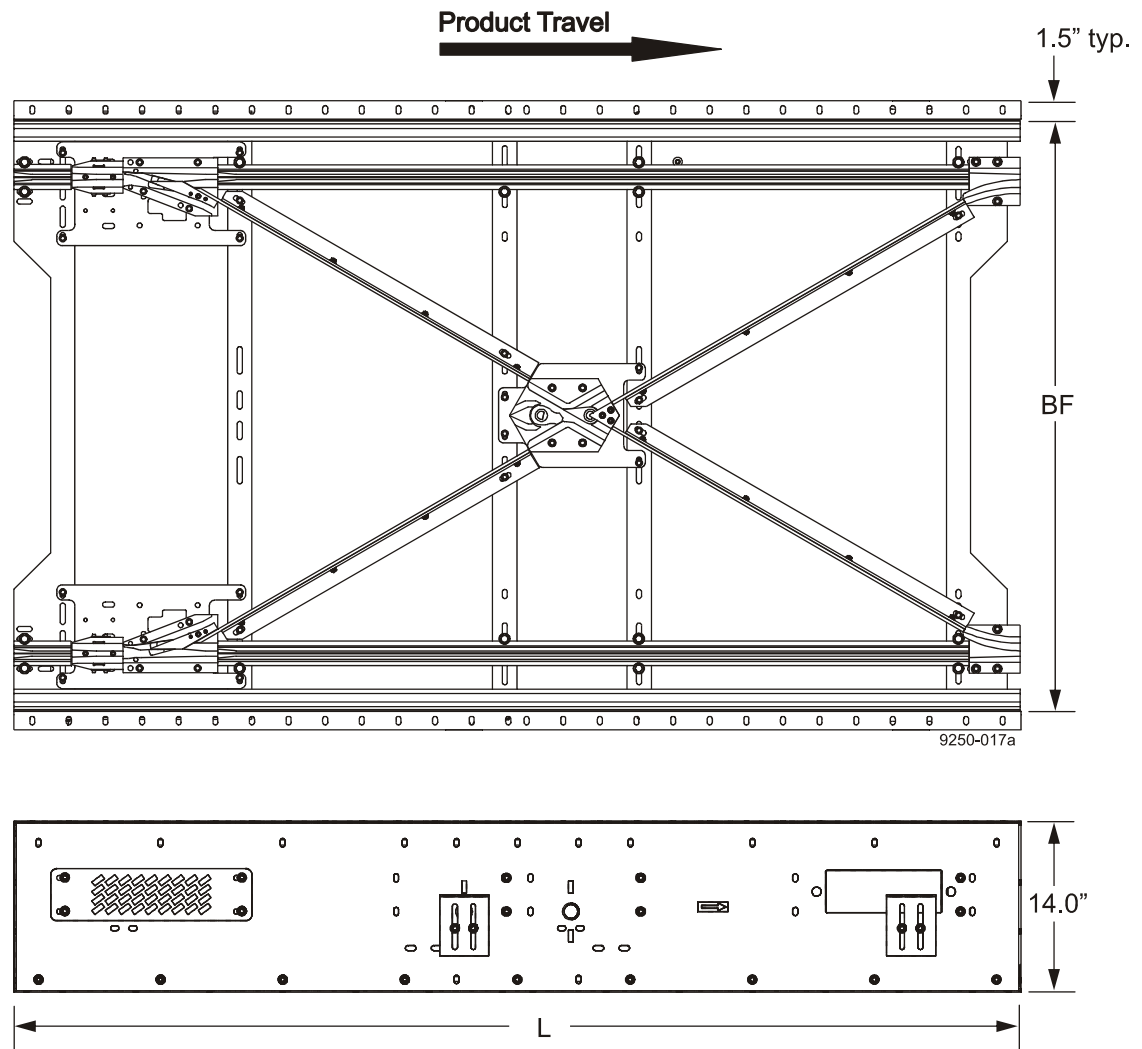


Figure E - 3 Idler Sections - LH and RH Single-Sided Divert

**Intermediate Sections**  
**Dual-Sided Divert**



W	BF	L
22.0"	42.5"	72.0"
28.0"	48.5"	82.5"
34.0"	54.5"	93.0"
40.0"	60.5"	103.5"

Figure E - 4 Intermediate Section - Dual-Side Divert (shown)

## LH and RH Single-Sided Diverts

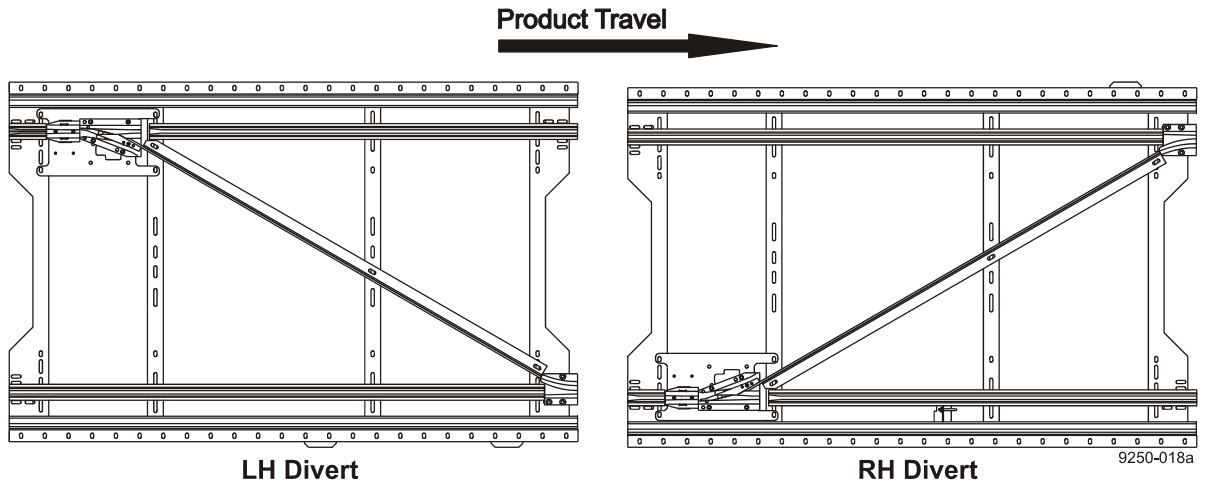
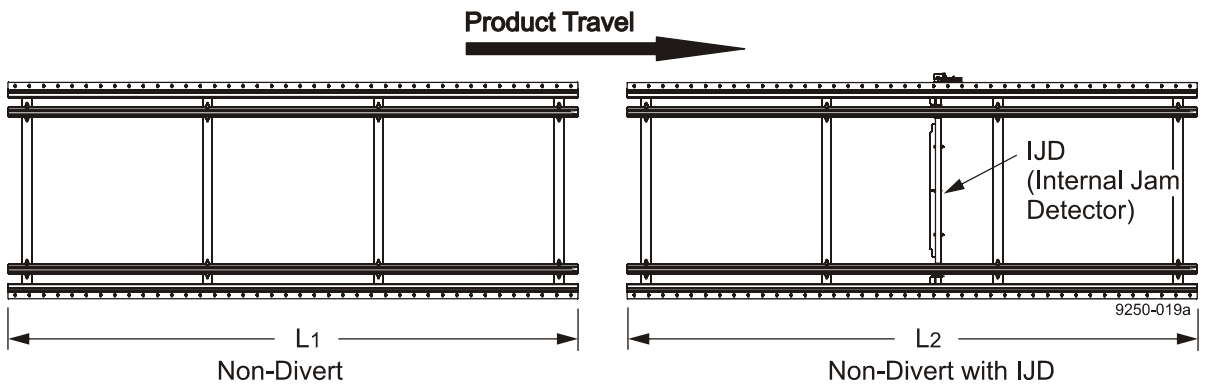


Figure E - 5 Intermediate Section - LH and RH Single-Side Diverts

## Non Diverts



L <sub>1</sub>	12.0" to 120.0" in 1.0" increments
L <sub>2</sub>	36.0" to 120.0" in 1.0" increments

Figure E - 6 Intermediate Section - Non Diverts

## Takeaway Conveyor Location Layout

Takeaway conveyors are located by LH and RH takeaway alignment jigs. The jigs are temporary clamped to the sorter section cam guide rail to locate the inside of the short junction rail. Figure E - 7 shows a UniSort XV intermediate but is applicable to a UniSort VII intermediate section.

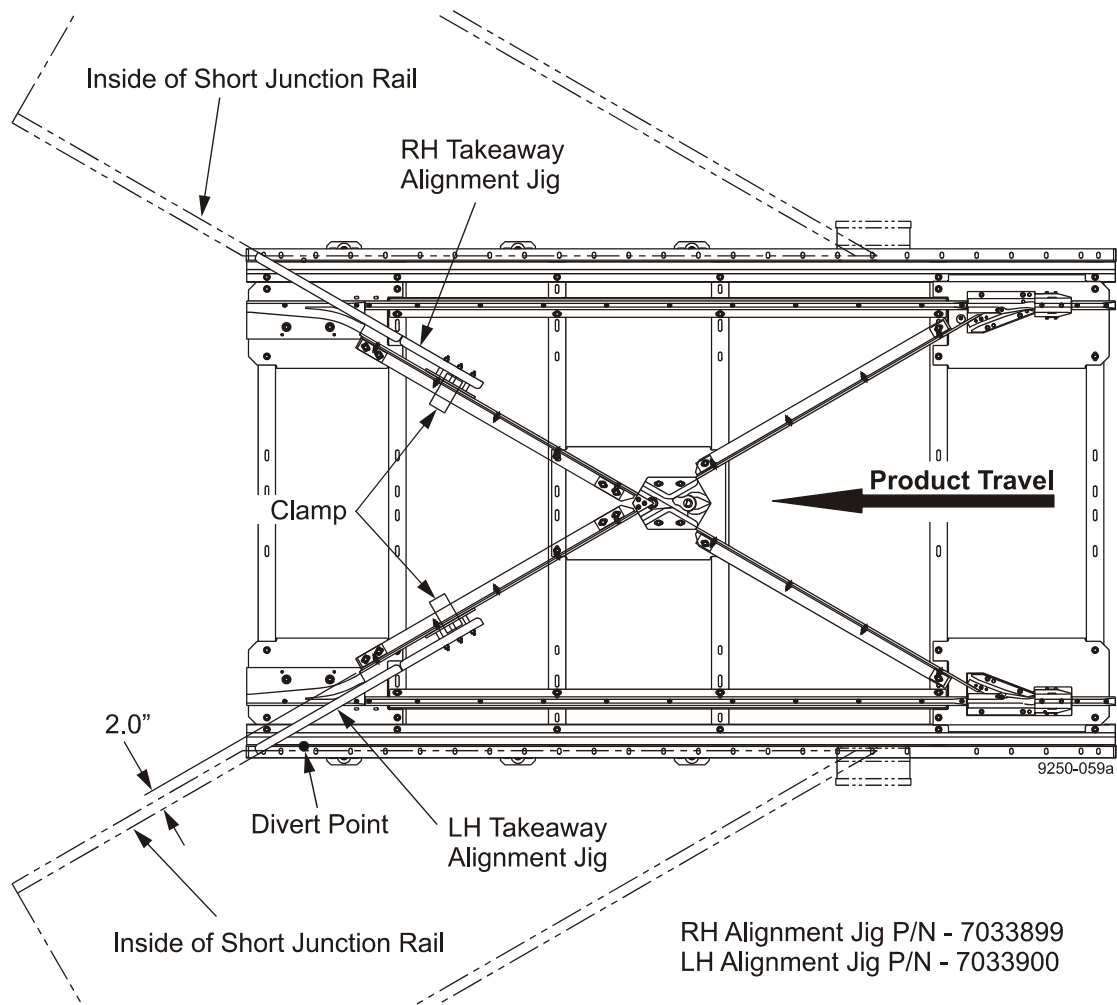


Figure E - 7 Divert Takeaway Layout

### Divert Line and Divert Point Location

Figure E - 8 shows the location of the divert line and the divert point relative to the end of the sorter intermediate section.

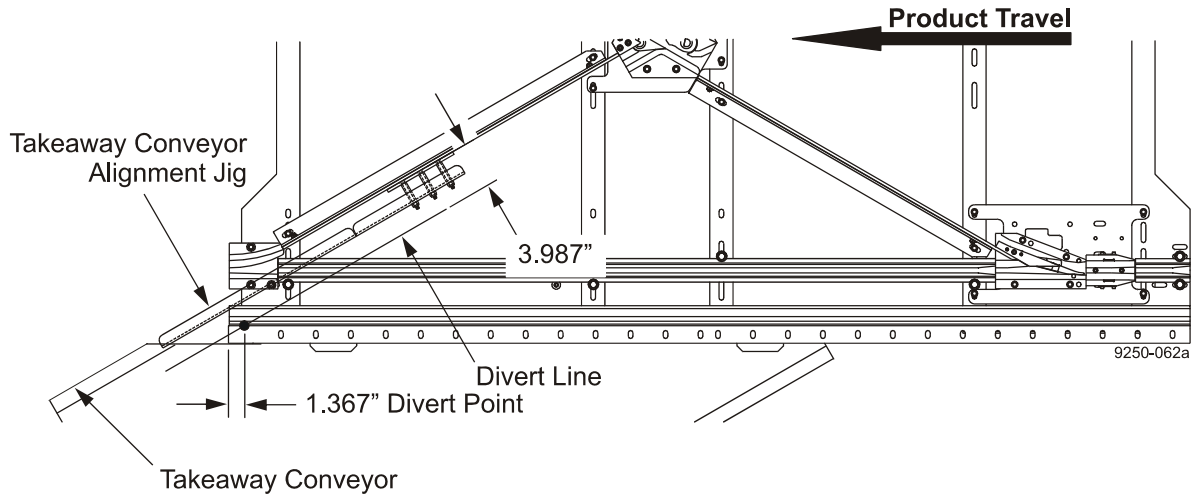


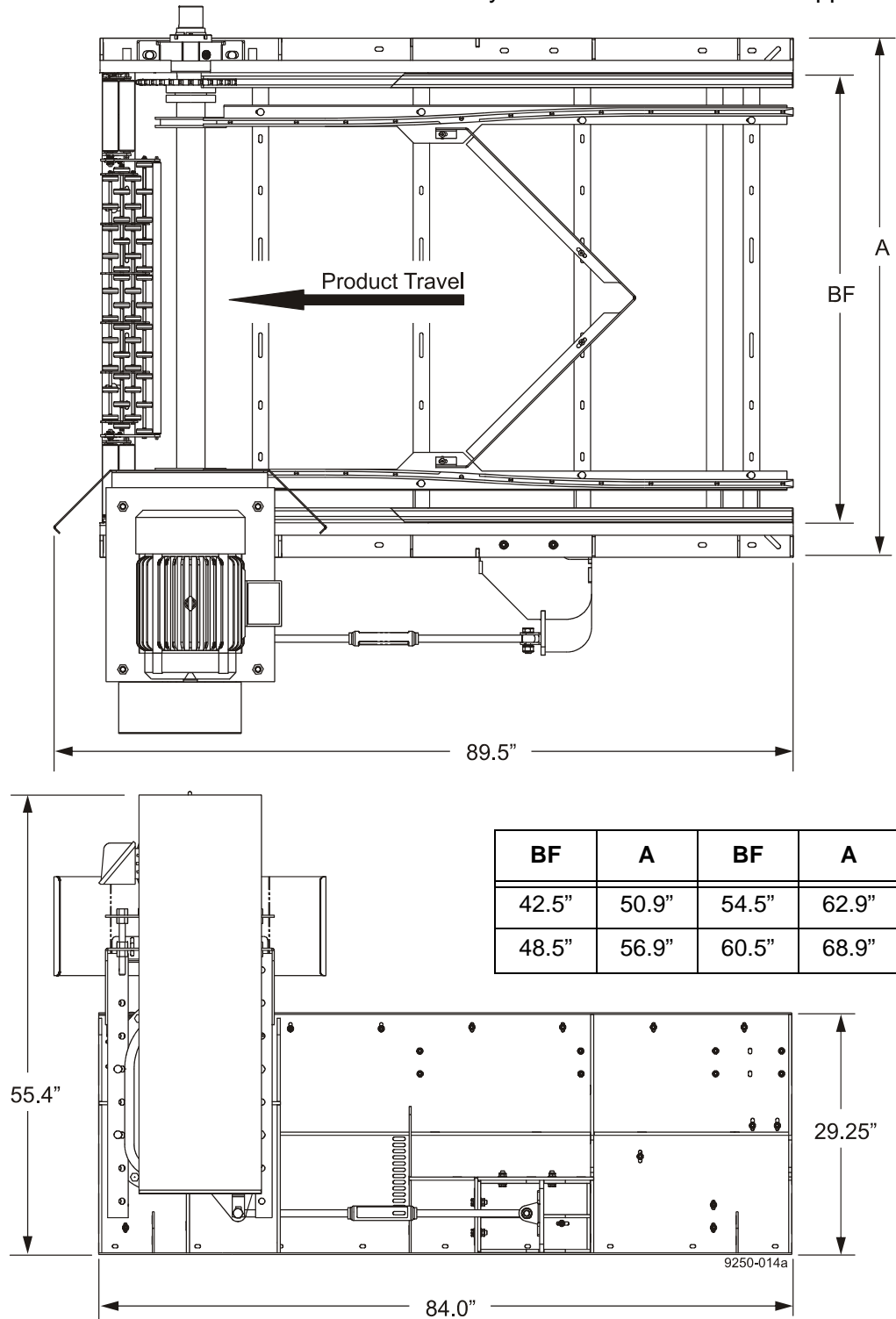
Figure E - 8 Divert Line and Divert Point Location (UniSort VII Intermediate shown)

Note: Dimensions for single-sided and dual-sided intermediate sections are identical.

**Drive Section- Layouts**

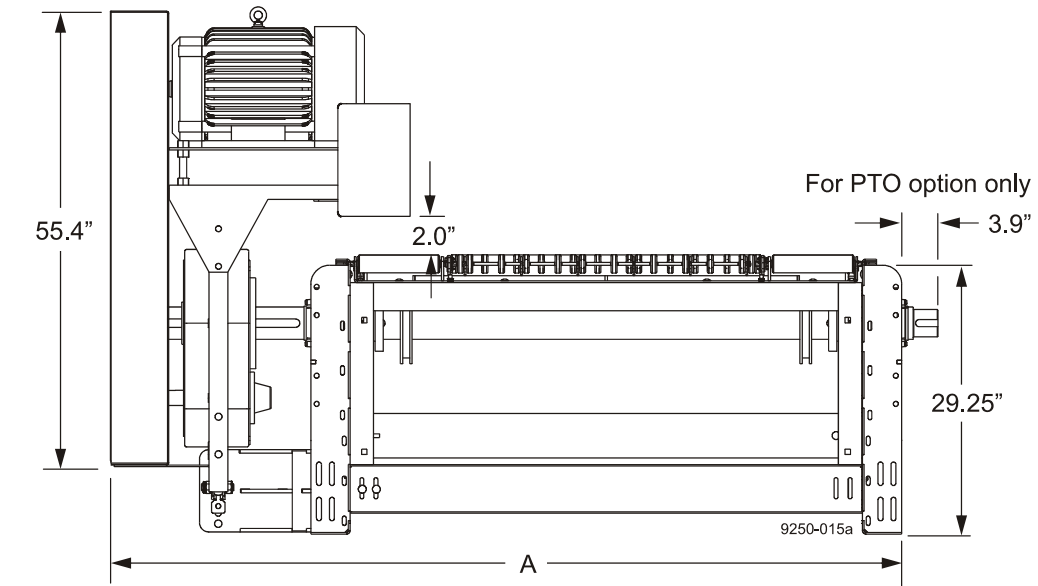
**Dual-Side Return Drive Section**

Figures E - 9 and E - 10 show the drive section layouts for a dual-side return application.



Note: Some guards or covers have been removed for clarity.

Figure E - 9 Drive Section - Dual Sided Return, Top and Side Views (shown)

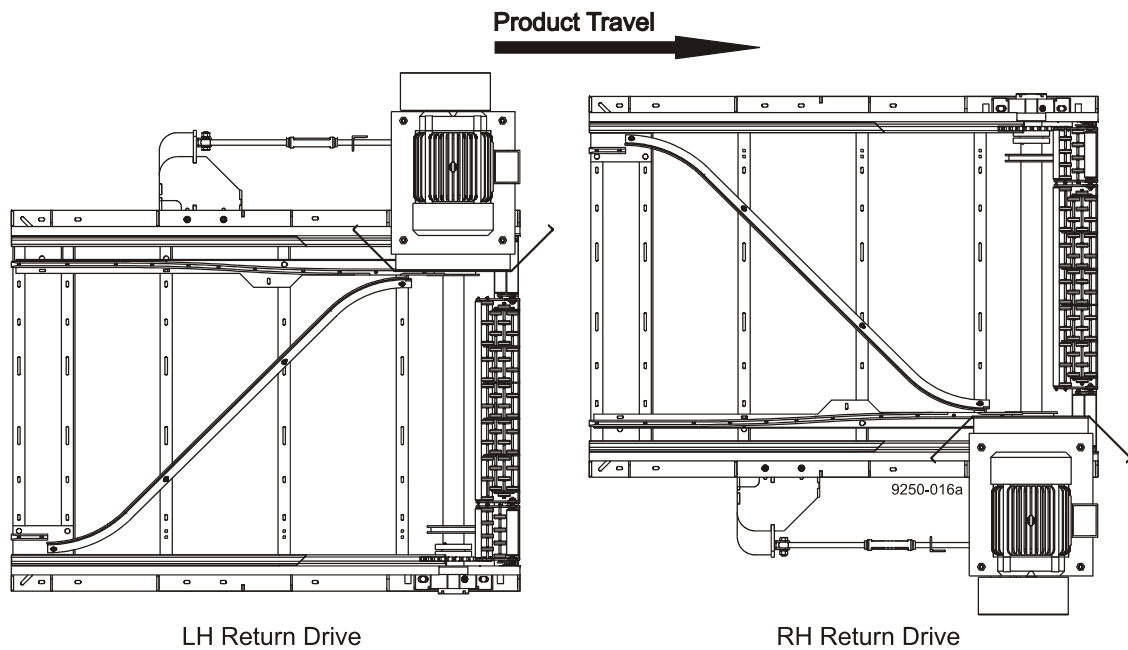


BF	A	BF	A
42.5"	50.9"	54.5"	62.9"
48.5"	56.9"	60.5"	68.9"

Note: Some guards or covers have been removed for clarity.

Figure E - 10 Drive Section - Dual Sided Return, End View (shown)

### LH and RH Return Drive Sections



LH Return Drive

RH Return Drive

Note: Some guards or covers have been removed for clarity.

Figure E - 11 Drive Section - LH and RH Return, Top Views (shown)



### Drive Section - Side View - Catenary Layout

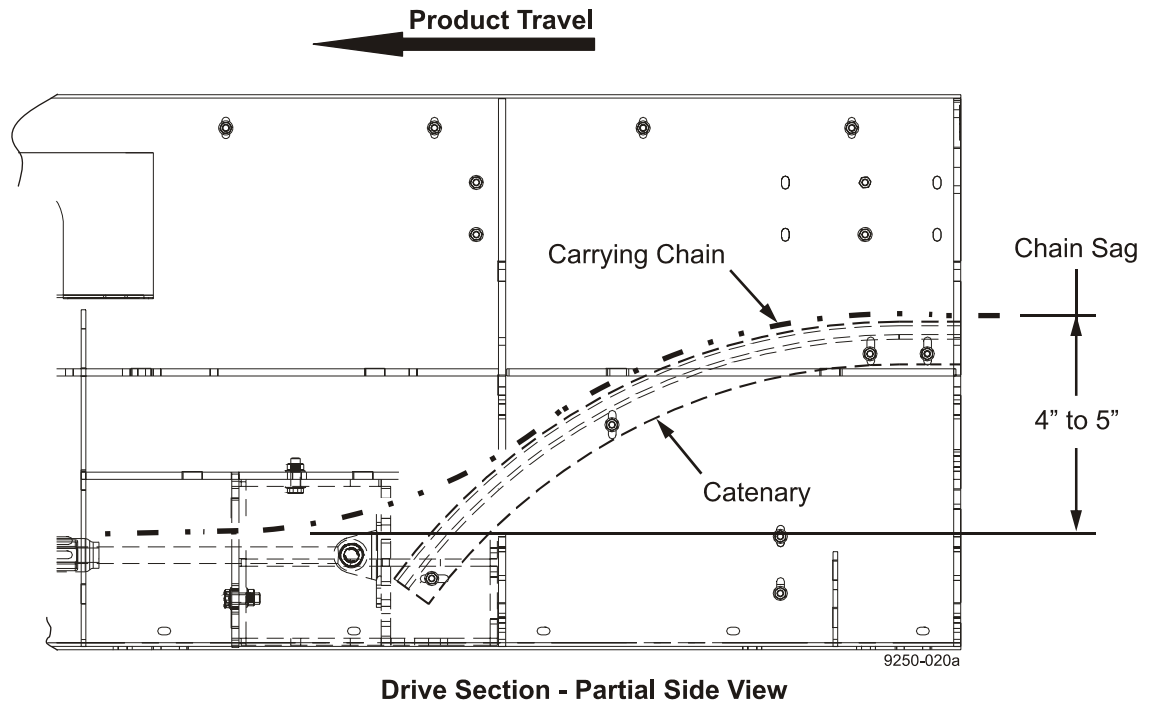


Figure E - 12 Drive Section - Side View - Chain Sag 4" to 5"

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**SECTION F: ACCESSORIES**

**UniSort VII Accessories**

UniSort VII accessories include S Type Floor Supports.

**S Type Floor Support**

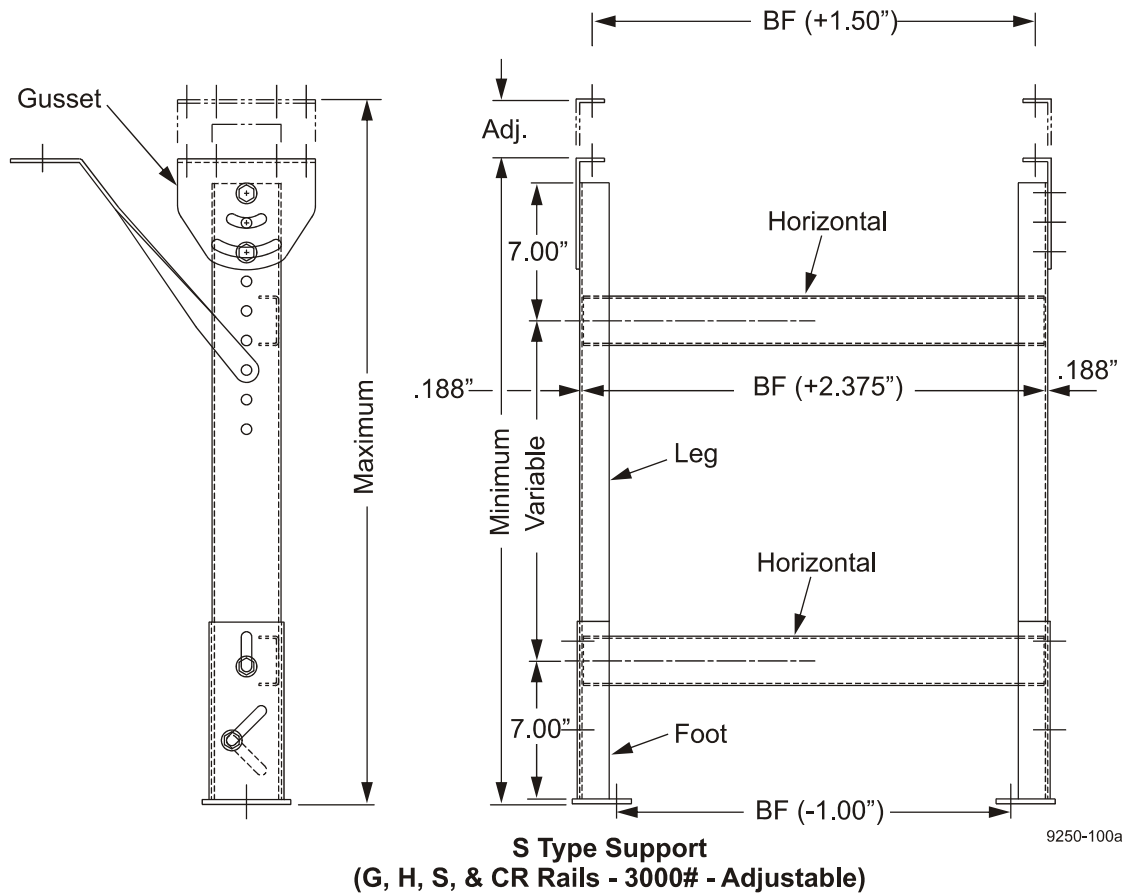


Figure F - 1 UniSort VII - S Type Floor Supports

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## **SECTION G: INSTALLATION PROCEDURES**

### **Accepting Shipment**

Immediately upon delivery, check that all equipment received agrees with the bill of lading or carrier's freight bill. Any shipping discrepancy or equipment damage should be clearly noted on the freight bill before signing.

### **Shortages or Errors**

Report any shortages or errors to the Manufacturer's Customer Service in writing within ten days after receipt of shipment.

### **Lost or Damaged Shipment**

Report lost shipments to the Manufacturer's Shipping Department.

If shipping damage is evident upon receipt of the equipment, note the extent of the damage on the freight bill and immediately contact the transportation carrier to request an inspection. Do not destroy the equipment crating and packing materials until the carrier's agent has examined them. Unless otherwise agreed by the manufacturer, the Purchaser (User) shall be responsible for filing claims with the transportation carrier. A copy of the inspection report along with a copy of the freight bill should be sent to the Manufacturer's traffic department.

### **Claims and Returns**

All equipment furnished in accordance with the Manufacturer's Agreement is not returnable for any reason except where authorized in writing by the Manufacturer. Notification of return must be made to the Manufacturer's Customer Service Department, and if approved, a "Return Authorization Tag" will be sent to the Purchaser (Users). The return tag sealed in the "Return Authorization Envelope" should be securely affixed to the exterior surface on any side of the shipping carton (not top or bottom), or affixed to any smooth flat surface on the equipment, if not boxed.

Send authorized return shipment(s) transportation charges prepaid to the address indicated on the Return Authorization Tag. If initial shipment is refused, the Purchaser (User) shall be liable for all freight charges, extra cost of handling, and other incidental expenses.

### **Codes and Standards**

The equipment is designed and manufactured to comply with the American National Standard Institute's "Safety Standards for Conveyors and Related Equipment" (ANSI/ASME B20.1) and with the National Electrical Code (ANSI/NFPA70).

The Purchaser/Operator shall be familiar with, and responsible for, compliance with all codes and regulations having jurisdiction regarding the installation, use, and maintenance of this equipment. Appropriate lockout/tagout policy and procedures shall comply with the minimum safety requirements outlined in the American National Standard Institute's current publication (ANSI Z244.1).

### **Warning Signs**

Warning signs and labels posted on or near the equipment shall not be removed, painted over, or altered at any time. All safety devices, warning lights, and alarms associated with the system should be regularly tested for proper operation and serviced as needed. If the original safety item(s) become defective or damaged, refer to the parts list(s) of bill(s)-of-materials for replacement part numbers.

---

## Safety Precautions

- DO turn off power source(s) and affix appropriate lockout/tagout device(s) to operating controls before servicing the equipment. ONLY trained and qualified personnel who are aware of the safety hazards should perform equipment adjustments or required maintenance while the equipment is in operation.
- DO observe all warning signs, lights, and alarms associated with the equipment operation and maintenance, and be alert at all times to automatic operation(s) of adjacent equipment.
- DO use extreme caution near moving parts to avoid the hazard of hands, hair, and clothing being caught.
- DO NOT sit on, stand on, walk, ride, or cross (over or under) the equipment at any time except where suitable catwalks, gates, or bridges are provided for personnel travel.
- DO NOT attempt to repair any equipment while it is running, replace any component without the appropriate replacement part, or modify the equipment without prior approval by the manufacturer.
- DO NOT operate the conveyor until all safety guards are securely in place, all tools and non-product materials are removed from or near the conveying surfaces, and all personnel are in safe positions.
- DO NOT remove or modify any safety devices provided on or with the equipment.
- DO NOT clear jams or reach into any unit before first turning off the all power source(s) and affixing appropriate lockout/tagout device(s).
- Per NFPA 70E
  - Only clothes of natural fiber are allowed at any voltage.  
The following safety equipment must be used:  
For 120V live panel (the DCM box)
    - Hard hat, leather work gloves, safety glasses  
For 480V
    - Safety glasses, 11 Cal. arc suit, insulated mat or platform, 2nd man 10 feet away

## Parts Replacement

To minimize production downtime, selected spare parts should be stocked for replacement of defective components when required. Refer to the equipment bill-of-material where quantity requirements or code numbers are not indicated on the parts list. For added convenience, a list of selected spare parts for standard products is included in this manual (see Section I).

## Factory Assistance

Contact Field Service for installation, operation, or maintenance assistance, or Customer One Protection (COP) for replacement parts.

---

## Installation Overview

This section provides the recommended order for installation, final assembly, and alignment verification of the UniSort VII sortation conveyor. Detailed information is provided in later sections.

The layout/installation drawings that should be referenced include:

- UniSort VII layout drawings showing: type, location, and elevation of the UniSort VII sections and associated conveyors.
- Electrical layout drawings.

## Installation and Assembly Steps

1. Verify receipt of the correct types and quantities of UniSort VII sections, installation hardware, loose parts, take-away conveyors, etc. as shown on the installation/layout drawings.

---

**NOTE:** The parts that are typically shipped loose include: carrying chains, carrying tubes (or slats), divert shoes, variable speed controller, divert control modules (DCM) supports, guardrail, and PTO components (if applicable).

---

- A Field Kit for checking and performing alignments is also shipped loose. The Field Kit contains two short strands of RC-100 carrying chain and a 3/8" x 18" long Switch Alignment Tool for checking divert switch alignment.
2. Mark the location and centerlines of all sections at the installation site.  
Identify the location of each section by marking its part number shown on the layout drawing. The part number is the same as the item number printed on the identification label affixed to each section.
  3. Pre-install Floor Supports.

---

**NOTE:** If the conveyor is to be located on an elevated structural steel platform, the platform should be in place and level along its entire length and width before installing any section.

---

4. Install the sections starting at the infeed end (idler section with the PTO driven infeed belt, if supplied) and working in direction of product travel.  
See "Installing the Infeed and Idler Sections", on page G - 8, "Installing Intermediate Sections", on page G - 11, and "Installing the Drive Section", on page G - 12, for details.
5. Check all sections for proper alignment.
6. Check center crossover switch.
7. Install divert control modules and check operation and alignment of all divert switches.  
Use the Switch Alignment Tool to verify switch alignment.
8. Check over basic installation before installing chain, chain oiler, slats and shoes.
9. Install chain and perform carrying chain take-up adjustment. See "Carrying Chain Sag Adjustment - Drive Section Catenary", on page G - 36, for details.

10. Install chain oiler, fill with lubricant, and setup and test operation.  
Verify lubrication settings and check oiler brush locations. See “Sorter Lubrication Run Time Settings”, on page G - 31, for details.  
Review chain facts, including temperature and stretch facts.
11. Install take-away conveyors/chutes. See “Installing Discharge End Conveyor”, on page G - 37, for details.
12. Install carrying tubes (or slats) and shoes. See “Installing the Carrying Tubes and Divert Shoes”, on page G - 34, for details.
13. Install chain cover.
14. Install discharge end conveyor. See “Installing Discharge End Conveyor”, on page G - 37, for details.
15. Install drive motor variable frequency drive. See “Installing the Variable Frequency Drive”, on page G - 41, for details.
16. Install control panel(s) including motor starters, fuses, relays, terminal strips, sortation-induction control unit, etc.
17. Install photo-eyes which are mounted on the UniSort VII, induction, take-away, and discharge conveyors. See project electrical layout drawings, not included in standard product manual.
18. Install all electrical power and control device wiring, see Electrical layout drawings.
19. Perform initial power-off variable frequency drive (VFD) adjustments, see VFD manufacturer’s manual.
20. Check for proper oil type and quantity in the reducer. For additional information, see “Initial Start-Up and Run-In Period”, on page H - 4, in Section H.
21. Apply momentary power to the drive motor and verify motor phase.
22. Perform final VFD adjustments, see VFD manufacturer’s manual.
23. Ensure that the drive over-current electrical relay/sensor is properly adjusted, see manufacturer’s instruction sheet.
24. Check the operation and adjustment of the internal jam detectors. See “IJD (Internal Jam Detector)”, on page G - 42, for details.
25. Be sure the transfer assembly operates correctly. See “Transfer Assembly”, on page G - 44, for details.
26. Install product containment guarding (if applicable), personnel safety guards, labels, or signs.
27. Perform final power-off and power-on checks.
28. Test run the installed UniSort VII with product being diverted. Make any necessary adjustments.



## Installing the Conveyor

### Order of Conveyor Section Installation

Set the sections in place in the order of product flow starting with the infeed section followed by the idler section, intermediate sections, and drive section. See Figure G - 1.

---

**NOTE:** Before beginning the installation, ALWAYS refer to the layout drawings to verify proper identification of the sections. Since layouts are site specific, it is important that the sections be installed as specified by the layout drawings.

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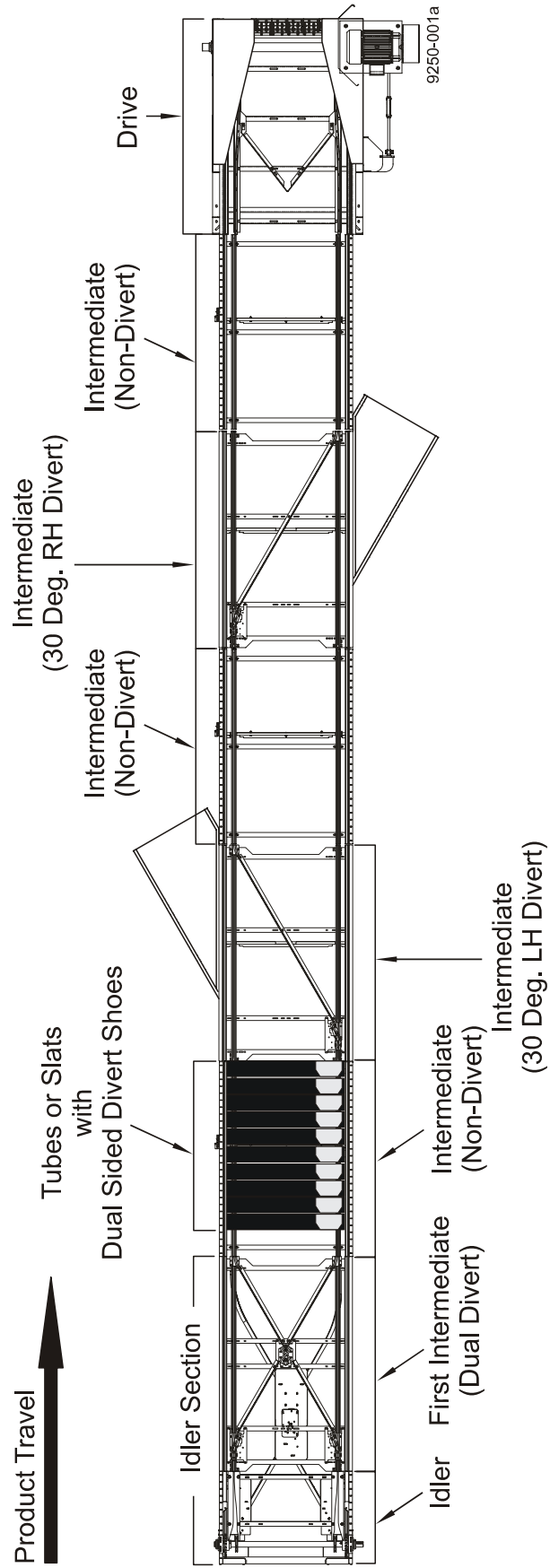


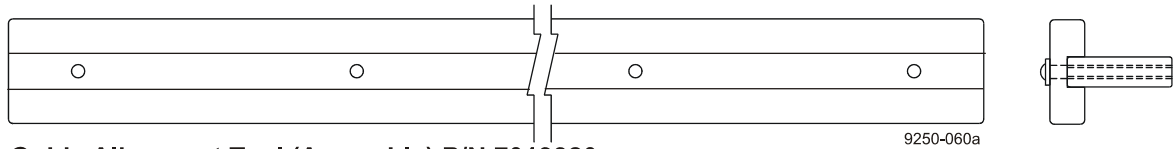
Figure G - 1 Conveyor Sections Layout

## Conveyor Installation Alignment Tools

Several alignment tools are available to assist in installation and ensure proper alignments. These tools are listed in this section along with the part number of the tool.

### Guide Alignment Tool

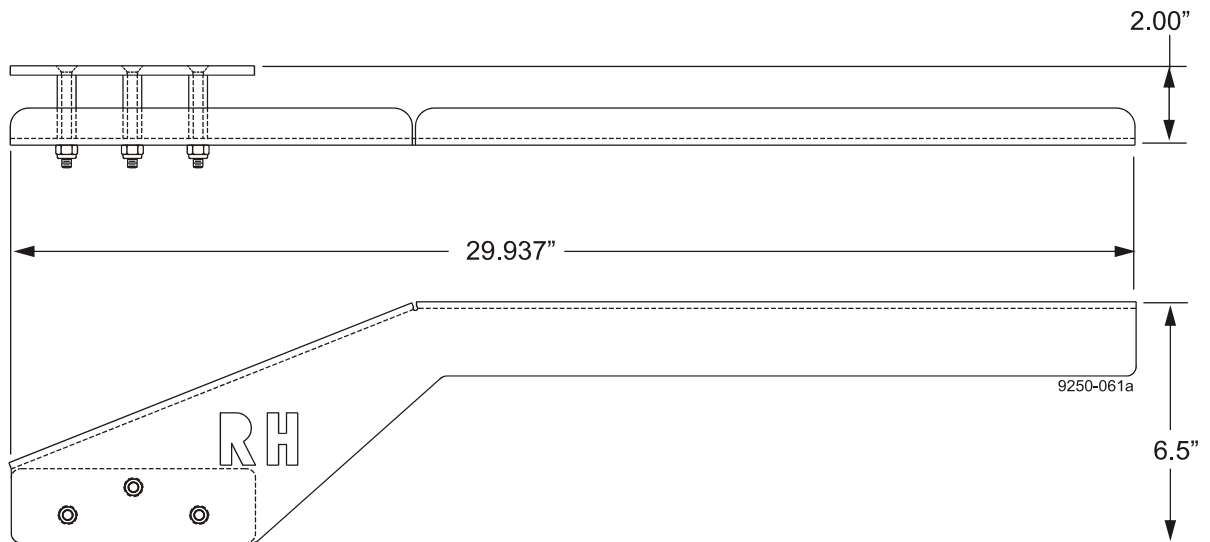
This alignment tool is used to align the pin guide tracks and divert switches.



**Guide Alignment Tool (Assembly) P/N 7013320**

### Takeaway Conveyor Alignment Jigs

These alignment jigs are used to properly locate the takeaways conveyors to intermediate sections.



**Takeaway Alignment Jig RH Jig P/N - 7033899**  
**LH Jig P/N - 7033900**

---

## Installing the Infeed and Idler Sections

The infeed section is used to marry the UniSort VII sortation conveyor to a product induction conveyor. During installation, the idler section must be installed first, see Figure G - 3, then the infeed section installed between the product induction conveyor and the idler.

To install the idler section, see Figure G - 3:

1. Refer to the layout drawing and verify the accuracy of the installation site layout.
2. Move the idler near its final installation location.
3. Install the floor supports.
4. Set the idler into its final position:
  - For a dual-sided return idler, the idler and infeed sections share the same centerline as the product induction conveyor, see Figure G - 2.
  - For a single-sided return idler, the idler and infeed sections share the same centerline but are offset 3.0" from the product induction conveyor centerline, see Figure G - 2.
  - Adjust the idler height requirement.
  - Check that the idler section is level and square front-to-back and side-to-side.

---

**CAUTION:** As the idler section will be the "alignment reference section" for aligning the remaining sections, it is most important that the idler section be carefully aligned and leveled. Re-check all alignments if the idler section is accidentally bumped during installation of the remaining sections.

---

5. Install the infeed section between the idler and product induction conveyor:
  - Verify all alignments.
6. Secure the floor supports by lagging to the floor.
7. Install the PTO drive belt between the infeed and idler section.
  - The belt guard must be installed before putting the conveyor system into production.

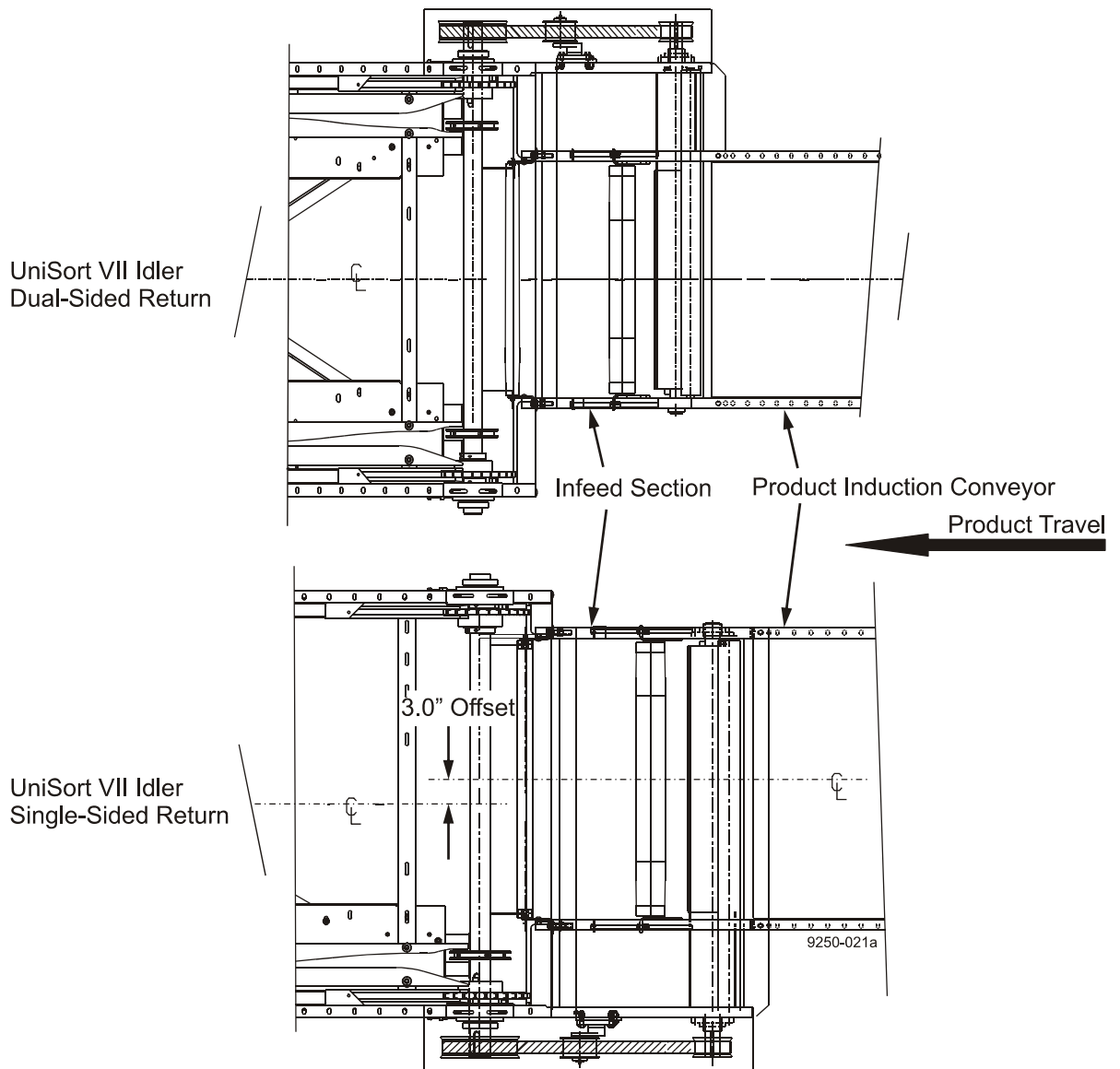


Figure G - 2 Infeed Section - Dual- and Single-Sided (shown)

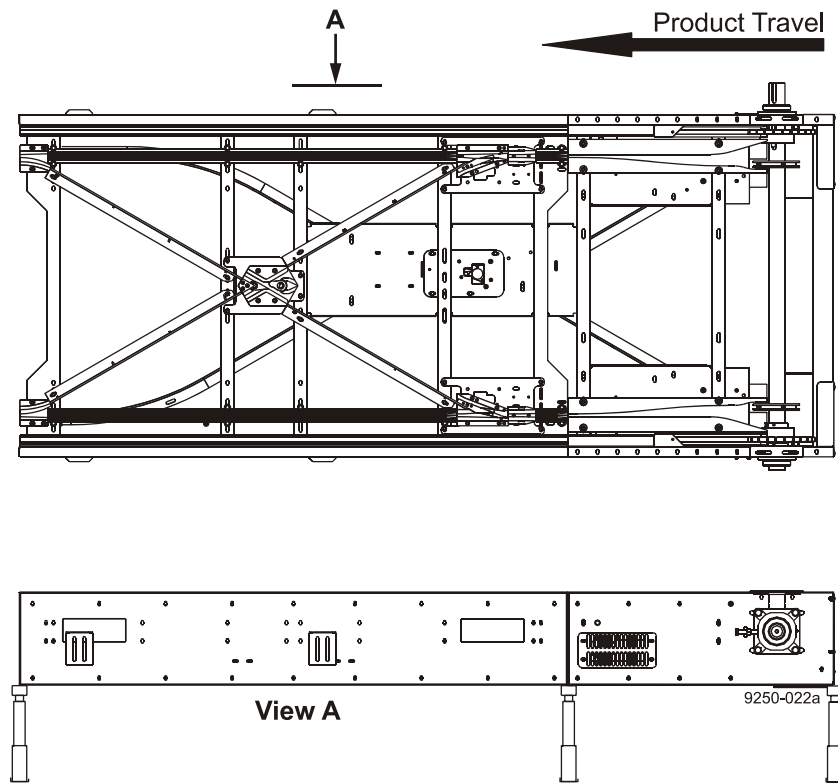


Figure G - 3 Idler Section (Idler and 1st Intermediate)

## Installing Intermediate Sections

To install the intermediate sections, see Figure G - 4:

1. Refer to the layout drawing and verify the accuracy of the installation site layout.
2. Move the intermediate section near its final installation location.
3. Install the floor the supports.
4. Set the intermediate section into its final position.
  - Align the intermediate section to the idler.
  - Adjust the intermediate section height requirement.
  - Check that the intermediate section is level and square front-to-back and side-to-side.
5. Bolt the intermediate section to the idler section.
6. Secure the floor supports by lagging to the floor.
7. Repeat this process for all remaining intermediate sections.

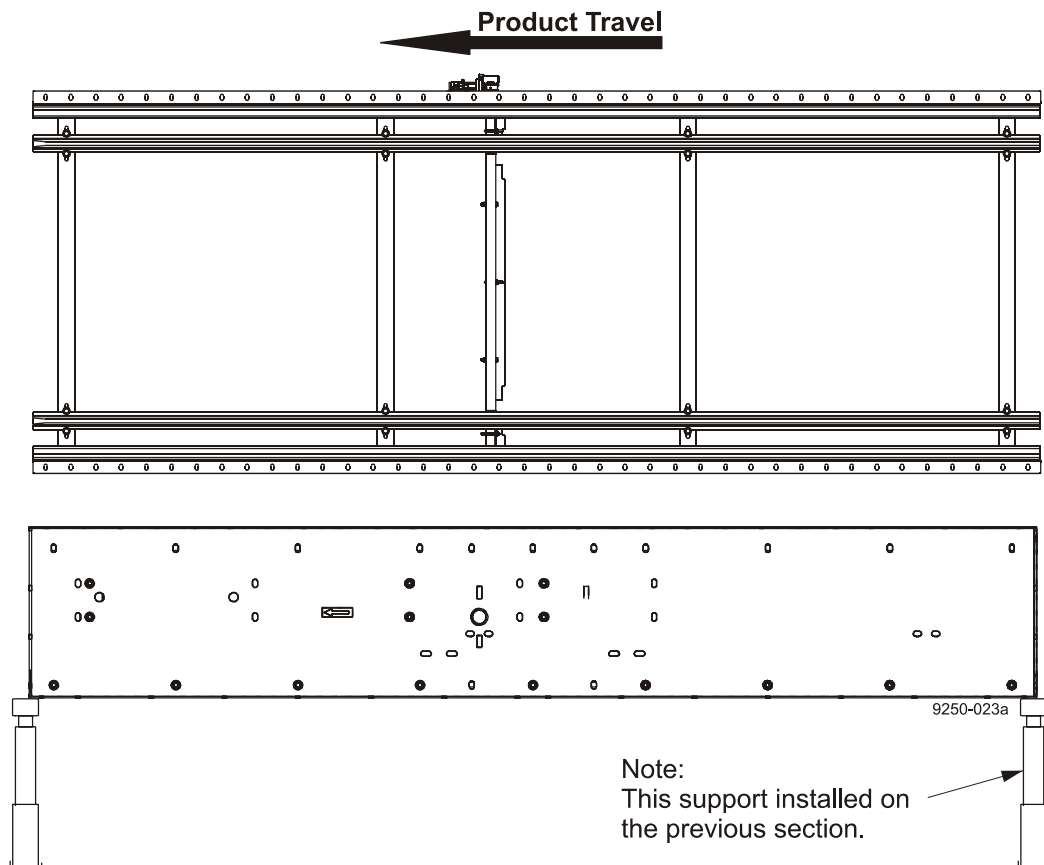


Figure G - 4 Intermediate Section - Non-Divert (shown)

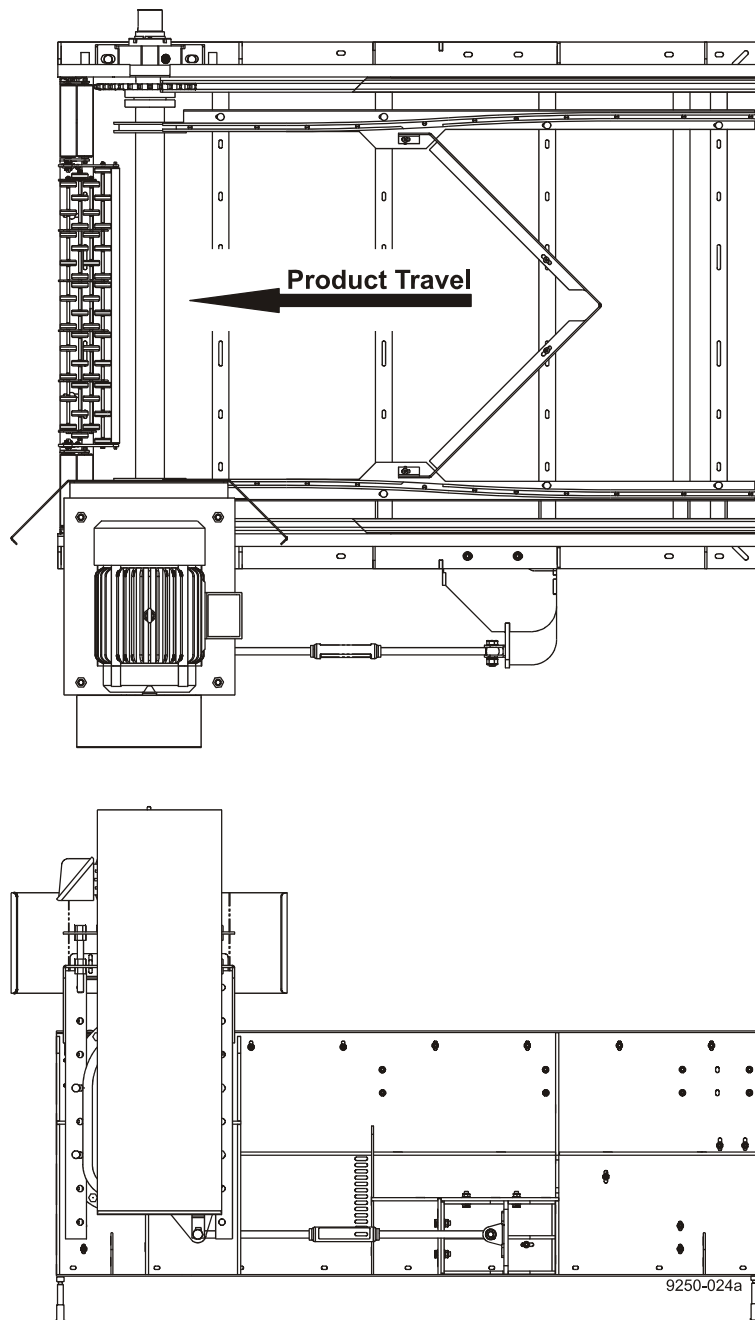
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## Installing the Drive Section

To install the drive section, see Figure G - 5:

1. Refer to the layout drawing and verify the accuracy of the installation site layout.
2. Move the drive section near its final installation location.
3. Install the floor supports.
4. Set the drive section into its final position.
  - Align the drive section to the previous section.
  - Adjust the drive section height requirement.
  - Check that the drive section is level and square front-to-back and side-to-side.
5. Bolt the drive section to the previous section.
6. Secure the floor supports by lagging to the floor.





Note: Some guards or covers removed for clarity.

Figure G - 5 Drive Section - Dual-Sided Return (shown)

## Aligning Sections

To check the alignment of two sections over their entire length:

1. Assemble a divert shoe onto two carrying tubes (or one slat) with the two short lengths of roller chain furnished in the Field Kit.
2. Cut two short pieces of UHMW wear strips and place them in the chain tracks where alignment is to be checked.
3. Place the chain and carrying tube (slat) assembly onto the UHMW wear strips. Position the shoe pin in the pin guide track, see Figure G - 6.
4. Slowly move the assembly in the direction of product travel checking for free shoe movement without interference along the entire length of the conveyor.

---

**NOTE:** Ensure the top and bottom divert shoe pin guide tracks are flush where conveyor sections join.

---

5. If adjustment is required, loosen the bolts joining the two sections requiring adjustment and adjust as necessary.

---

**NOTE:** Mis-alignment of any section may result in accelerated wear and increased operating noise.

---

6. After aligning the sections, tighten all bolts located in the section joint flanges. Also, check the tightness of all floor support bolts.

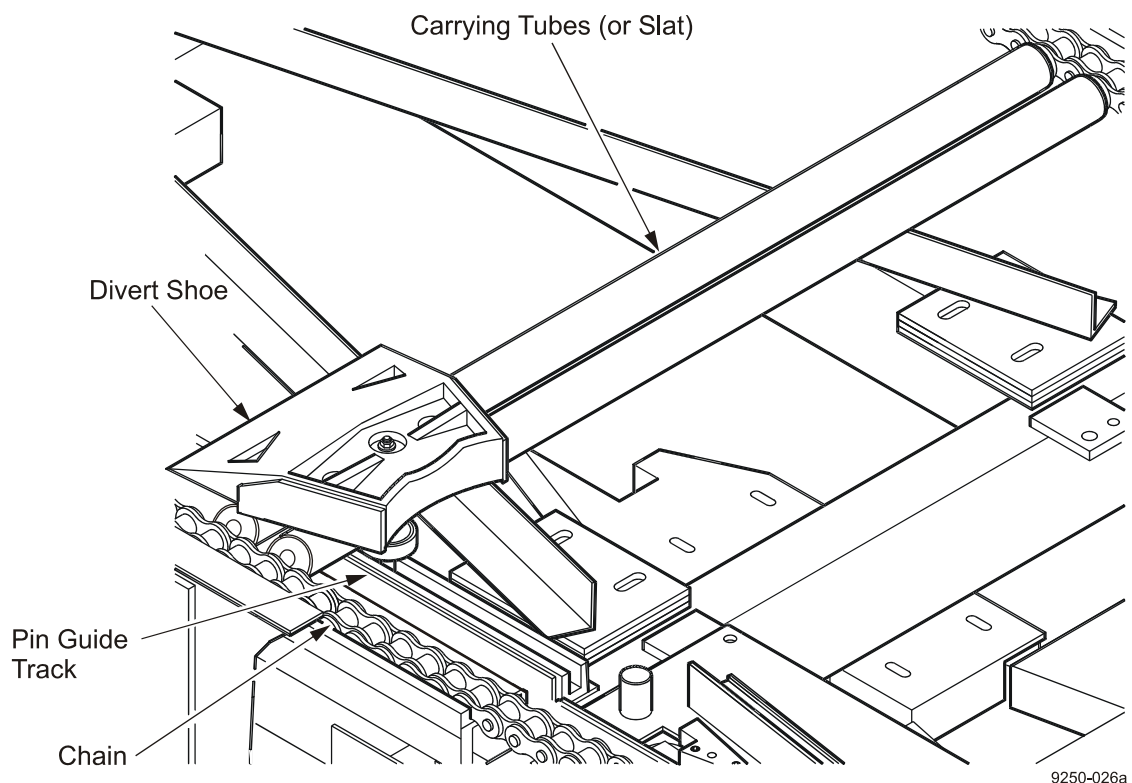


Figure G - 6 Checking Conveyor Section Alignment

## Installing the UHMW Wear Strips

The chain track is designed to minimize wear and noise and consists of the following components:

- Extruded aluminum chain track,
- UHMW wear strip, and
- Chain cover (optional).

All sections are shipped with the chain track pre-assembled to the frame and should not require field adjustment.

The UHMW wear strips, and chain cover are shipped loose for field installation. Figure G - 7 shows the mounting locations of these components.

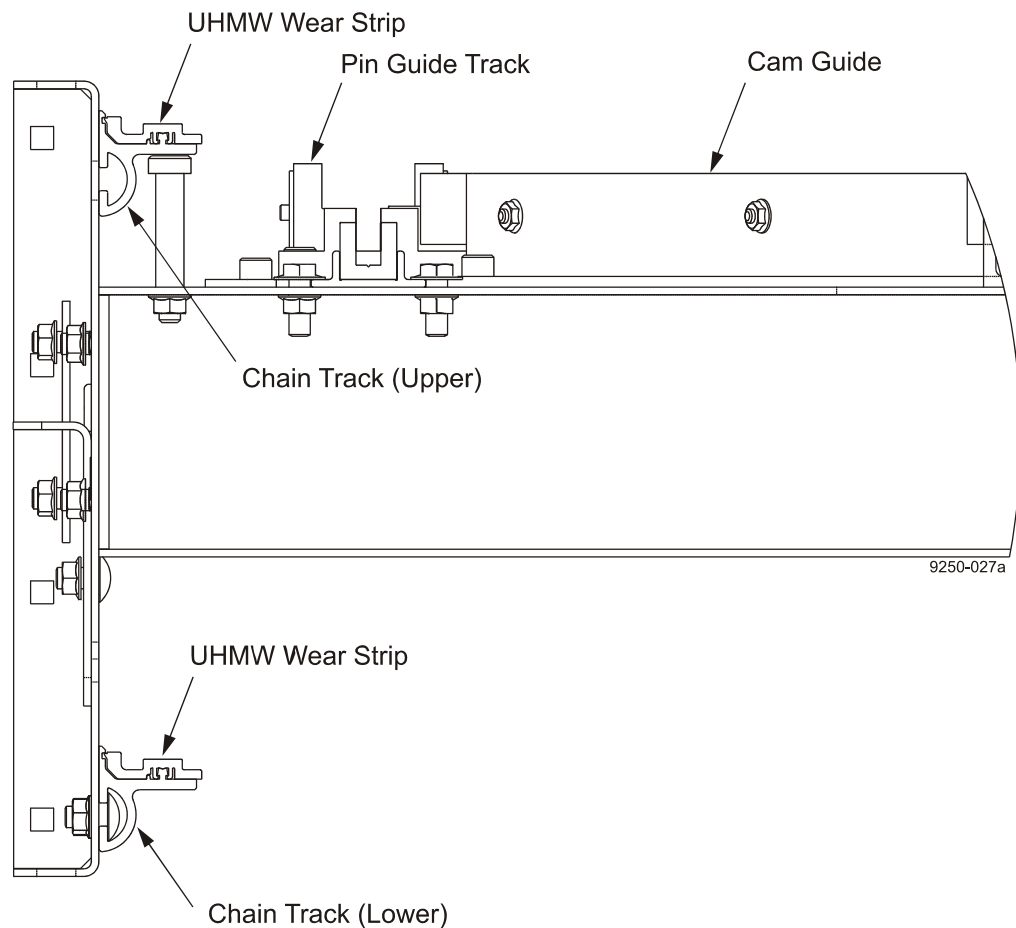


Figure G - 7 Chain Track, UHMW Wear Strip, and Pin Guide Track

## UHMW Wear Strip Installation

Use the following procedure to install UHMW wear strips, see Figure G - 10:

- Verify that enough 10' pieces of wear strips were supplied for installation on the four chain track sections of each conveyor section.
- Wear strips are cut on a 45° at the intersection of adjacent pieces and are snapped into the chain track.
- Only the leading edge of a wear strip is anchored to the chain track.

### General Installation Procedure

1. Starting on the top side of the infeed section, cut the trailing end of the wear strip on a 45° then snap it into the chain track.
  - Verify that the trailing edge overlaps the chain track of the next conveyor section. The end of a wear strip must not coincide with the end of a conveyor section.

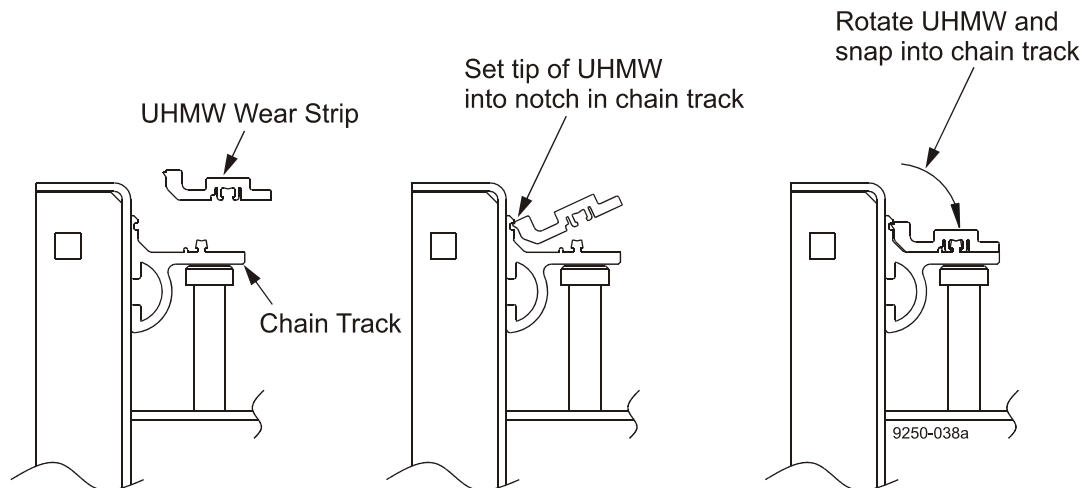


Figure G - 8 Snapping UHMW Wear Strips into the Chain Track

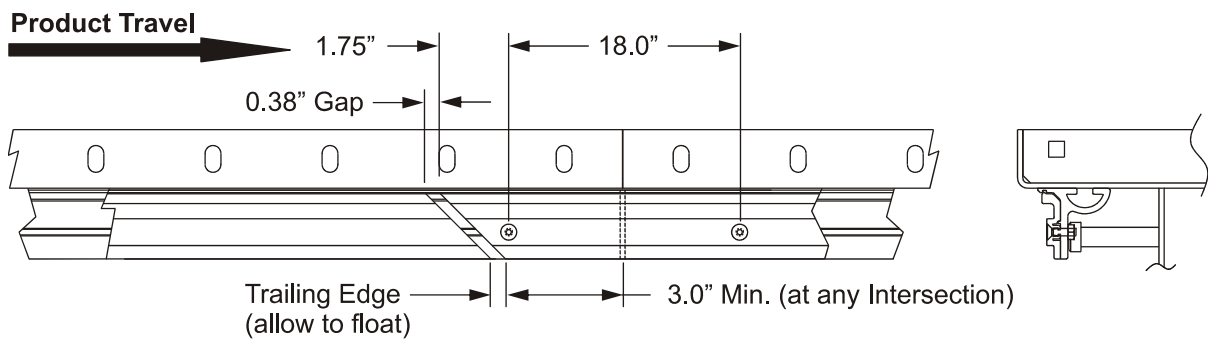
2. Anchor the wear strip to the chain track:
  - a. Drill two holes to accept No. 8 screws. Drill the first hole approximately 1.75" from the leading edge and the second 18.0" from the first hole.
  - b. Drill a hole through the wear strip and chain track.
  - c. Countersink the holes in the wear strip to allow the screw head to seat below the wear strip.
  - d. Install the #8-32 screws and nuts.
3. Install the next wear strip leaving a 0.38" gap between the end of the previous wear strip.
  - Cut leading edge (and trailing edge, if necessary) on a 45° and snap it into the chain track.
  - Anchor the UHMW as described in Step 2 above.
4. Repeat the wear strip installation and anchoring process for the top side chain tracks of all conveyor sections.

- Ensure a 0.38" gap is maintained between each wear strip and that the end of a wear strip does not coincide with the end of a conveyor section. A wear strip may be cut in order to ensure proper overlapping between adjoining conveyor sections.

**CAUTION:** Leaving a gap between the UHMW wear strips is critical, since they will expand as the conveyor chain warms up to its operating temperature. Failure to leave a gap between wear strips will result in the wear strip buckling and coming out of the aluminum track, possibly causing chain binding.

5. Repeat this process for the return chain track on the underside of the conveyor.

**Detailed Instructions Per Section**



**Intermediate Sections**

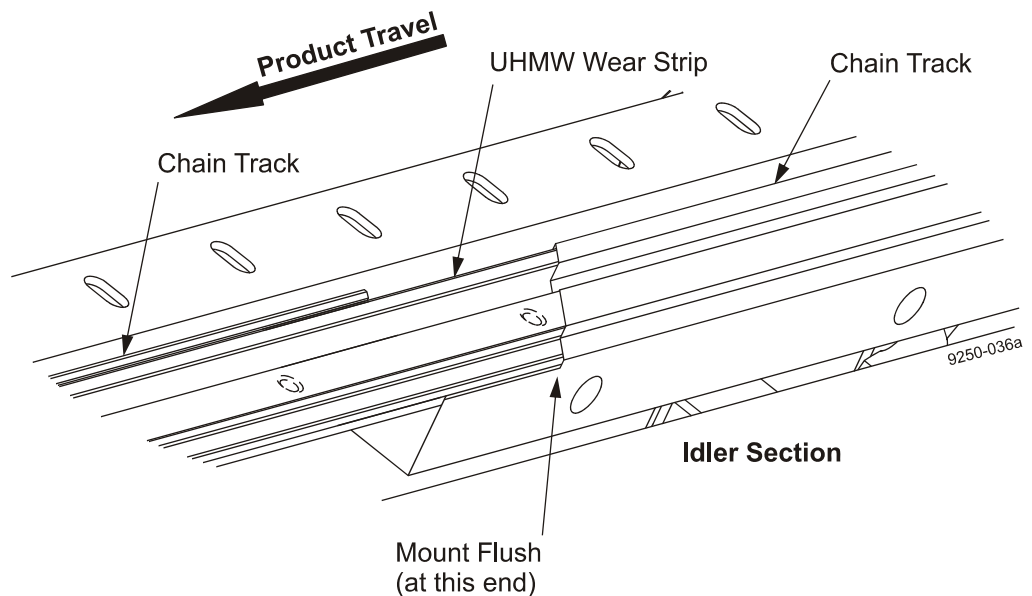


Figure G - 9 Intermediate and Idler Sections - UHMW Wear Strip Mounting Details

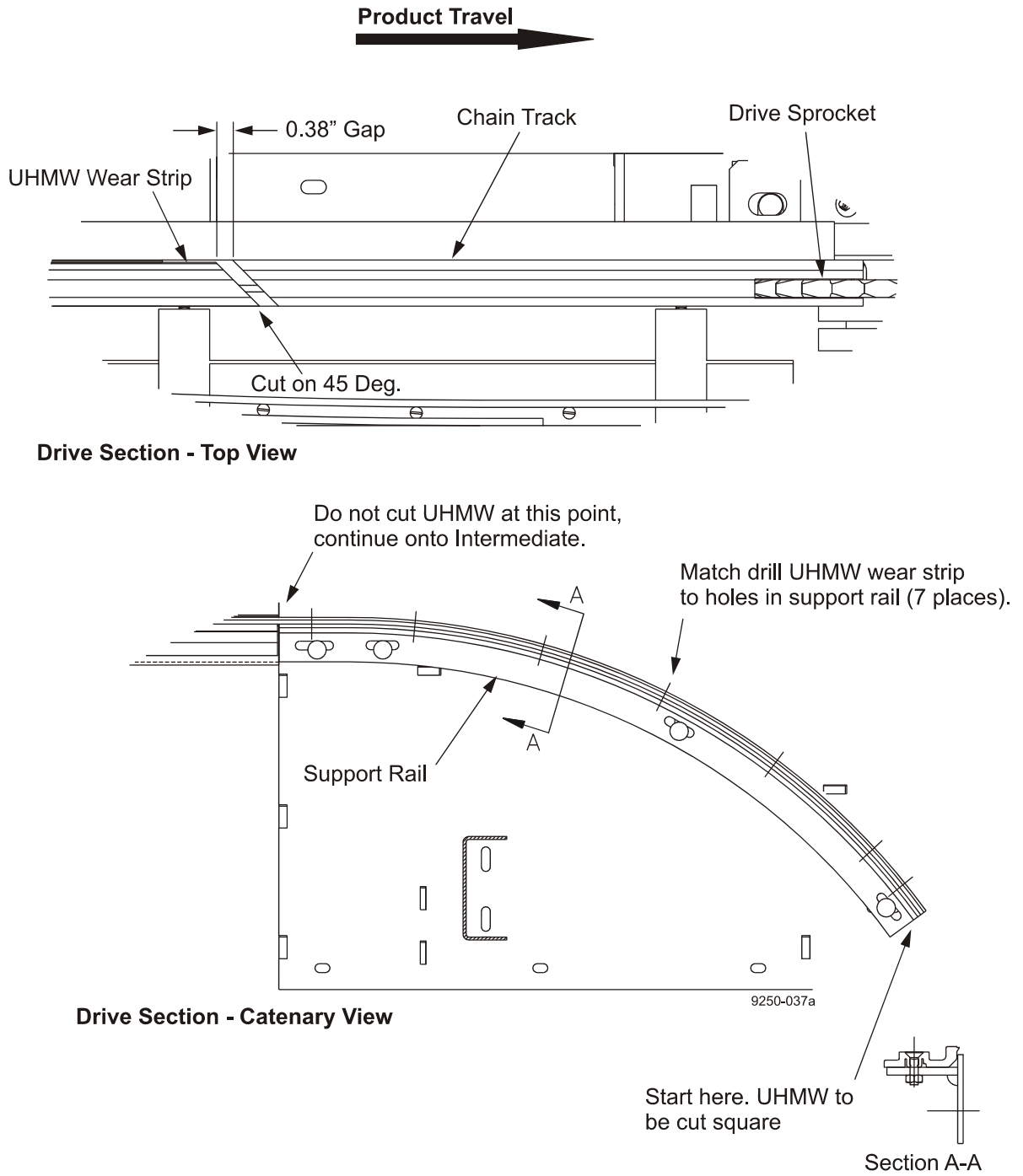


Figure G - 10 Drive Section - UHMW Wear Strip Mounting Details

## Crossover Switch

The crossover switch is fully mechanical and requires no pneumatic or electrical interface, see Figure G - 11.

To check for proper operation of the crossover switch:

- Flip one of the trigger fingers back and forth.
- The second finger trigger should move in the opposite direction as the finger being moved.

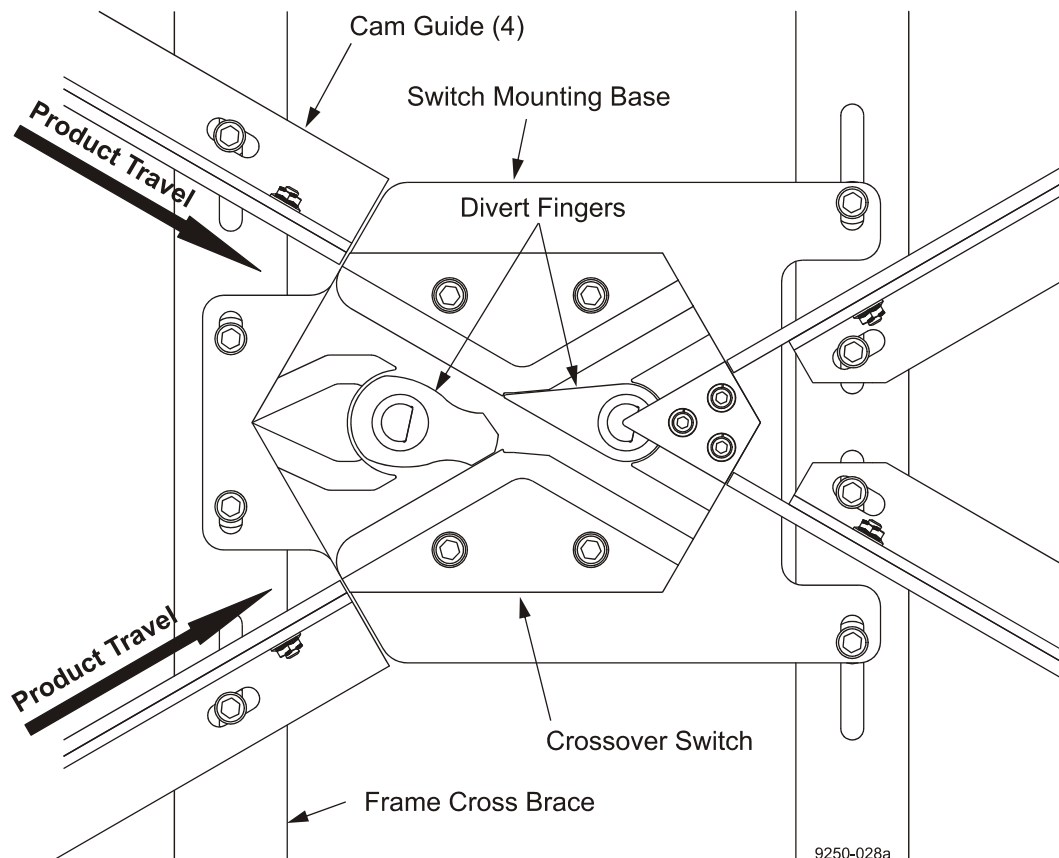


Figure G - 11 Center Crossover Switch

## LH and RH Divert Switches

Electronic controlled divert switches are used to divert the carrying tube (or slat) shoes onto a different path. Figure G - 12 shows the switch in the divert position.

- The divert switch incorporates a double acting brushless rotary actuator to control the divert finger.
  - In the non-divert position, the divert shoe pin travels through the switch and onto the pin guide track.
  - In the divert position, the divert shoe cam follower travels down the cam guide to the opposite frame side.
- Each divert switch has an embedded photo-eye and reflector to sense the divert shoe pin.
- Divert shoe timing is controlled by the DCM (Divert Control Module) by a combination of signals received from the divert switch photo-eye and divert shoe photo-eye.

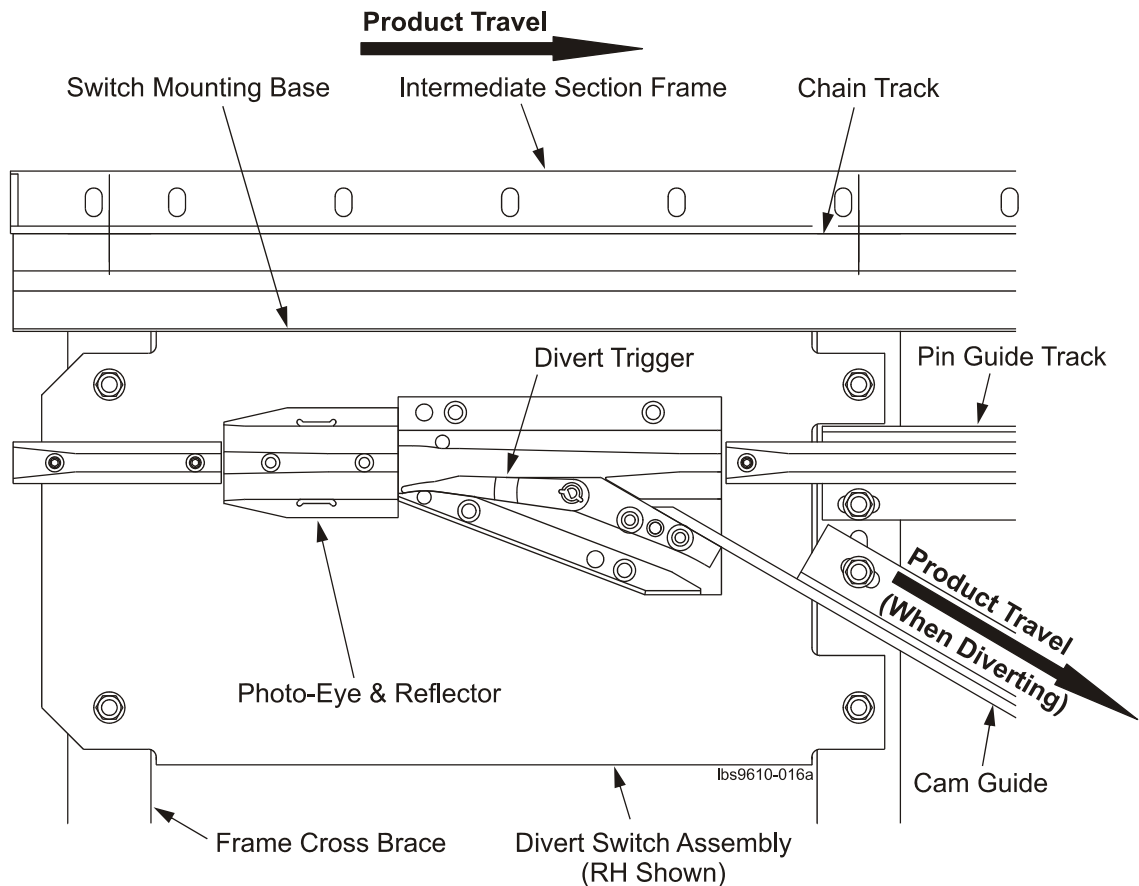


Figure G - 12 Divert Switch Detail (RH shown)



## Installing and Wiring Divert Control Modules

### Divert Control Module Operation

The Divert Control Module provides two functions to the control system. First, it controls the voltage to the brushless rotary actuator that moves the divert switch trigger. The rotary actuator has a higher voltage required to move the trigger, and a lower voltage required to hold the trigger in position. The DCM handles the timing of the outputs to the rotary actuator.

Second, the DCM fires the rotary actuator. It receives an "enable" signal from the control system and fires the rotary actuator on the next shoe's cam follower bearing sensed. It's ability to scan the photo-eye input very fast provides greater precision in the firing of the rotary actuator than is available from most control systems.

When a control system determines that the next shoe is to be diverted, an output is activated that enables the DCM. When the DCM senses the trailing edge of the bearing (Figure G - 13), the DCM activates the rotary actuator, causing shoes to be diverted. The first shoe diverted will be the shoe that was sensed by the photo-eye.

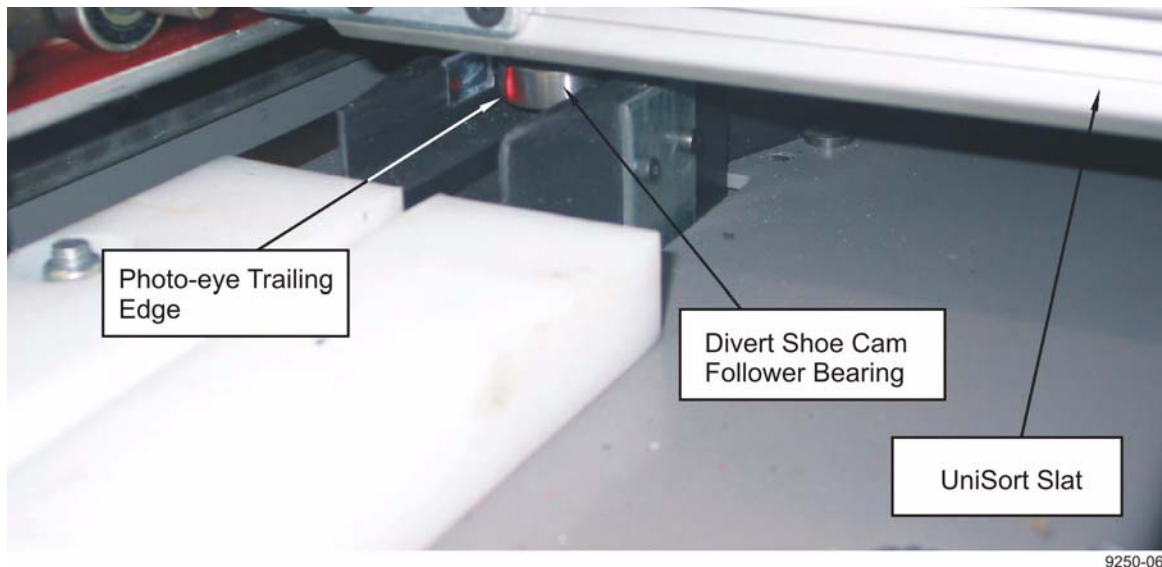


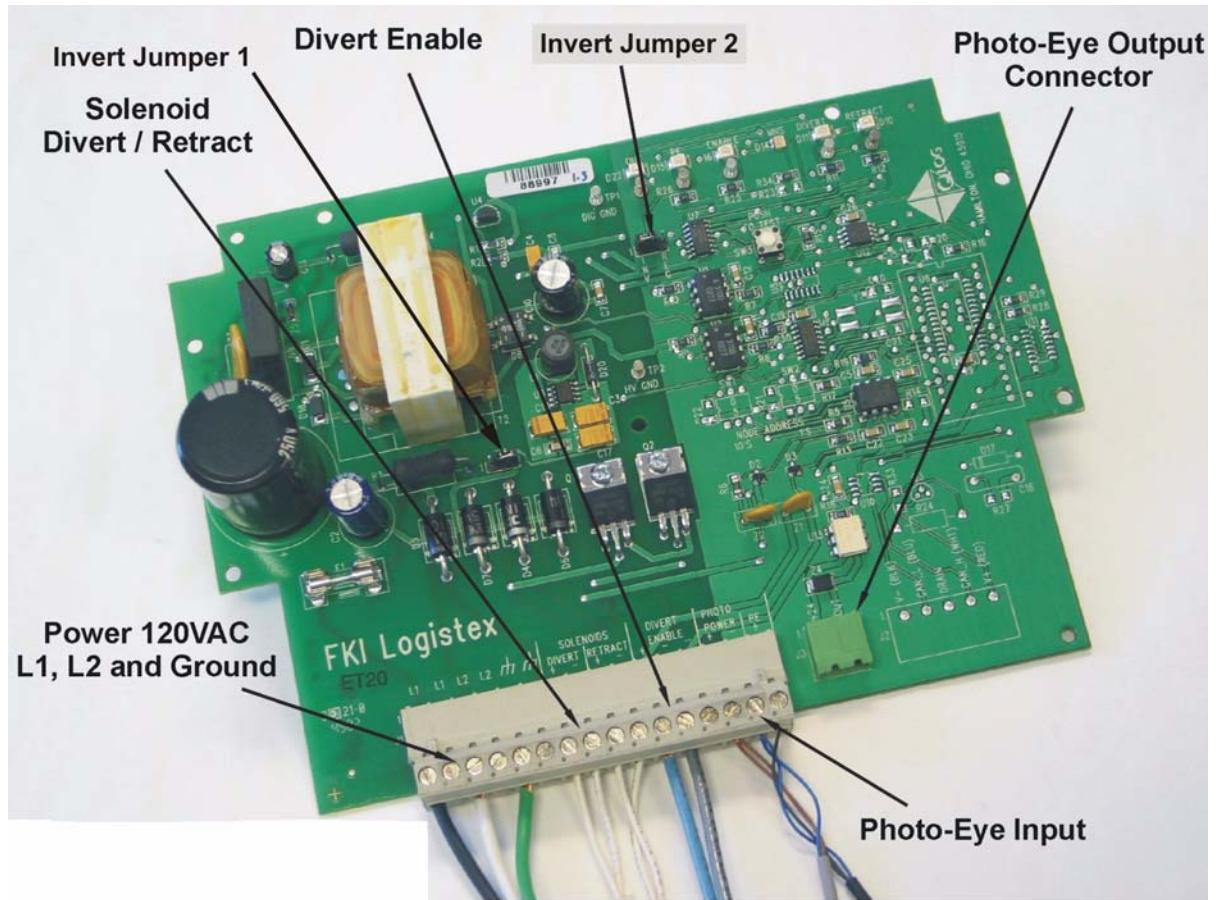
Figure G - 13 Divert Shoe Cam Follower Bearing/Photo-eye Trailing Edge

The enable signal from the control system is to remain activated until the last required shoe has been diverted. Upon seeing the trailing edge of the cam follower bearing of the first shoe to not be diverted, the DCM will return the trigger to its original position and no further shoes will be diverted.

**Note:** To ensure proper voltage is supplied to the DCM in order to achieve optimal performance, a constant voltage transformer should be used in the electrical design of the system. A constant voltage transformer recreates a well-regulated sinusoidal waveform that is well isolated from input disturbances including: impulses, brownouts, severe waveform distortion, swell, and sags.

## Connecting the Divert Control Module

Connections for the Divert Control Module can be seen in Figure G - 14



9250-064a

Figure G - 14 DCM Details

Connection	Description
Power	120Vac power must be fed to all DCMs. This will be connected to L1, L2, and ground terminals.
Brushless Rotary Actuator	The rotary actuator on the divert switch must be connected to the DCM. There are + and - terminals for both "DIVERT" and "RETRACT" directions. Note: The position on the DCM where the rotary actuators are wired are labeled "Solenoid Divert and Retract".
Divert Enable	The control system provides a "DIVERT ENABLE" signal to the DCM. This signal notifies the DCM that shoes are to be diverted, starting with the next shoe to pass by the photo-eye. A 24Vdc output from the control system is connected to the terminal marked "+" under "DIVERT ENABLE". A common from that 24Vdc power supply is connected to the terminal marked "-" under "DIVERT ENABLE". The second "-" terminal is provided so the "-" signal can be daisy-chained from one DCM to another.

Photo-eye	The photo-eye mounted in the divert switch is wired to the photo-eye terminals. The +24Vdc wire to the photo-eye is wired to the "+" terminal under "PHOTO POWER" (typically brown), and the common is wired to "-" under "PHOTO POWER" (typically blue). The signal from the photo-eye is connected to the "PE +" terminal (typically black).
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If it is desired to connect photo-eye signals back to the control system, then the separate green connector is used. On that connector, 24Vdc from your control system is connected to the terminal labeled "+24" and the signal back to your input is labeled "OUT".

- Notes:
1. Only one DC common wire need be provided. You do not need separate common wires for the divert enable and the photo-eye.
  2. Circuit breaker for DCM must be CE compliant (for CE specific applications), Allen Bradley 1492MC or equivalent.
  3. For CE compliant applications, DCM enclosure must be electrically connected to frame rail. Field installation to remove paint at interface of panel box and mounting clip and along with interface between mounting clip and frame rail. Serrated flange screws and nuts are required.

### Layout of the Divert Control Module

One of jumpers on the DCM is labeled "INV" and "REG". This jumper controls the timing of the firing of the rotary actuator.

- INV: - this setting will fire the switch when the DCM sees the trailing edge of the divert shoe bearing. This is the default setting for the UniSort VII.
- REG: - this setting will fire the switch when the DCM sees the leading edge of the divert shoe bearing.

Note: This jumper will affect the polarity of the photo-eye signal back to the control system.

The jumper installed on the DCM marked W2 should remain in position P1 unless instructed otherwise by IntelligratedL engineering. The jumper on the DCM marked W5 is for future use and should remain in the left position.

There are 7 LED's on the DCM.

LED Label	Color	Description
PIN	Red	Indicates the state of the two photo eyes installed for missing pin detection. It will be on when either photo eye is blocked. (Only functional with missing pin detection.)
MISS	Red	Indicates the state of the missing pin signal sent to the control system. A pin is assumed missing whenever the pin to pin period is 150% of the previous measurement. The signal will be sent for 160mS whenever a missing pin is detected. (Only functional with missing pin detection.)
PE	Red	Indicates the state of the photo-eye that is looking at the divert shoe's pin. It will be on when a pin is detected.
ENABLE	Red	Indicates the state of the divert signal from the control system.
CPU	Red	Blinks on and off when the DCM is powered to indicate the DCM is operational.
DIVERT	Red	This LED is on when the divert coil of the rotary actuator is energized.
RETRACT	Red	This LED is on when the retract coil of the rotary actuator is energized.

## Tracking

When tracking product, you need a "tracking pulse" -- a pulse input to the controller that signifies that the sorter has moved a specified length. In many situations, this is accomplished by mounting an encoder to the conveyor. If this is the method chosen, we recommend an encoder resolution that is less than that of the shoe pitch (preferably 1/2 the pitch, or  $5" \div 2 = 2.5"$  per pulse).

The preferred method, however, is to take the tracking pulse from one of the divert switch photo-eyes. Using this method, you must connect the first divert switch photo-eye to an input that will be used for tracking.

The first divert switch is the only switch that will have all shoes passing through it. The connection is described in the section on Connecting the Divert Control Module.

In the case of a double-sided sorter, the recommended method is to use the shoe detect photo-eye on the "setup" switch (used to place shoes on the correct side of a double-sided sorter). The setup switch is the only position on a double-sided sorter guaranteed to have every shoe pass through it.

If using the sensing of shoes to generate a tracking pulse, the photo-eye is sensing a cam follower bearing on the shoe. That bearing is approximately 1.5" in length (it is actually slightly larger, so using 1.5" as an estimate gives you a safe calculation of photo-eye "on" time). Be sure that the "on" time of the photo-eye is sufficient that the input used will not miss pulses. This would result in inaccurate tracking of product. A high-speed input, encoder input, or pulse stretcher device may be necessary to ensure accurate tracking. Even with these devices, it is advisable to keep the control system's scan time well below the shoe pitch time interval at the design speed of the sorter regardless of the method of input.

The photo-eye "on" time for sensing a bearing can be calculated as follows:

## Testing Divert Switches

$$\text{Photo-eye "ON" time (msec)} = 1 \frac{1000 \times \text{bearing size (inches)}}{\text{conveyor speed (ft/min)} \times (12\text{in/ft}) \div (60 \text{ sec/min})}$$

The function of each divert switch should be tested prior to mounting the chains, carrying tubes (or slats) and shoes. Use the following procedure to test each switch:

1. Verify the DCM and divert switches are properly wired.
2. Supply 120VAC to the DCM.
3. DO NOT supply a divert signal to the DCM.
4. Press and hold the "Push to Test" button.
5. While holding the "Push to Test" button, block the photo-eye in the divert switch with a piece of paper. The divert finger should move to, and remain in, the divert position.
6. Release the "Push to Test" button and remove the paper blocking the photo-eye. The switch should go back to the straight through position.
7. Repeat this process for all switches.

---

**CAUTION:** Under NO circumstance should the "Push to Test" button be pressed once the conveyor is operational and in service. Attempting to force a divert can result in major damage to the divert switch. Use the "Push to Test" button for setup testing only!

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## Checking Divert Switch Alignment

Use the following procedure as a final check for divert switch alignment, see Figure G - 15:

1. Insert the guide alignment tool, from the Field Kit, between the pin guide tracks located on both sides of the divert switch.
2. Check for proper alignment of the switch entry and exit areas with the pin guide tracks.
3. If adjustment is required:
  - a. Loosen the four divert switch mounting base screws.
  - b. Shift the mounting base as needed to obtain alignment.
  - c. Tighten the screws.
4. Repeat this procedure for all divert switches.

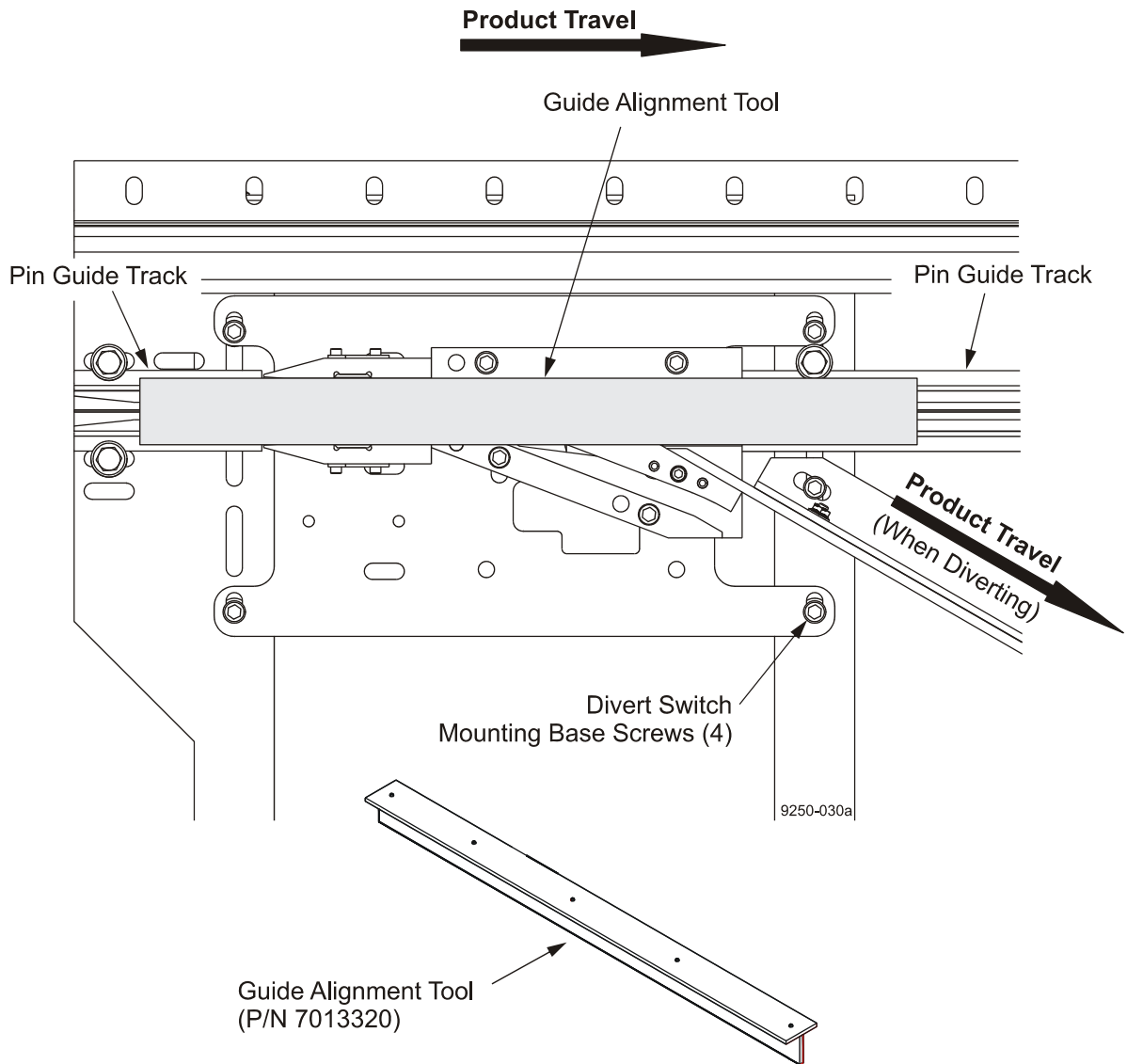


Figure G - 15 Checking Divert Switch-to-Pin Guide Track Alignment

## Checklist Prior to Chain, Chain Oiler, Tube, and Shoe Installation

Check the following before installing the conveyor chain, chain oiler, carrying tubes (or slats), and shoes.

Table G 1 Checklist

Check	Comments
Pin Guide Track Alignment	<ul style="list-style-type: none"> <li>• Ensure the side channels are aligned and the section joints tight.</li> <li>• Make any necessary adjustments to assure smooth travel of the pins through the pin guide track transitions.</li> </ul>
Chain Track Alignment	<ul style="list-style-type: none"> <li>• Verify the vertical alignment of the chain track at all section joints. The top surface of the tracks must be at the same height.</li> </ul>
Chain Track UHMW Wear Strips	<ul style="list-style-type: none"> <li>• Ensure the UHMW wear strips are properly installed and anchored.</li> </ul>
Divert and Crossover Switches	<ul style="list-style-type: none"> <li>• Verify all divert switch wiring.</li> <li>• Verify alignment and operation of all switches.</li> </ul>
Carrying Tubes	<ul style="list-style-type: none"> <li>• Inspect all tubes of signs of damage.</li> <li>• Clean dirty tubes with a suitable degreasing solvent. Use a very fine grade emery cloth or steel wool if necessary.</li> <li>• Ensure cleaning solvent does not enter the inside of the tube or remain on the end bushings. Wipe with a soaked cloth, do not spray the solvent.</li> <li>• Acceptable cleaning solvents include: Mobilarma 245 - Mobile Oil Corporation Rust Veto® 4214 - E.F. Houghton Company Tectyl 235 - Ashland Oil Company</li> <li>• Do not lubricate.</li> </ul>
Carrying Slats	<ul style="list-style-type: none"> <li>• Inspect all slats of signs of damage.</li> <li>• New slats should not require cleaning.</li> <li>• For regular maintenance, clean dirty slats with a suitable mild detergent.                             <ul style="list-style-type: none"> <li>• Dilute the mild detergent with water (30:1)</li> <li>• Dampen a cloth with the solution and wring out excess solution.</li> <li>• Wipe the belt slat with the solution dampened cloth</li> <li>• Wipe the belt slat with a cloth dampened with water.</li> <li>• Wipe the belt slat with a clean, dry cloth.</li> </ul> </li> <li>• Do not lubricate.</li> </ul>

**CAUTION:** To ensure the safety of personnel when using any solvent, pay strict attention to the solvent manufacturers' use instructions and health hazard warnings.

## Installing the Carrying Chains

The chain is boxed and shipped in matched length coils (two coils per box) in 10' and/or 20' increments. The length is based on twice the conveyor's length plus enough chain to get through the catenary and around the drive and idler sprockets:

**CAUTION:** The coils of chain in each box must be installed as a matched pair, one coil on the right side of the conveyor and the other on the left side. Maintaining this relationship is extremely important.

Notice, due to pin placement, that the ends of the chain are not alike. When installing the chains:

- Uncoil the chain for one side of the conveyor in the direction of product travel.
- Uncoil the chain for the other side of the conveyor opposite the direction of product travel.

This is necessary to correctly position the connecting links which facilitates removal of tubes and shoes.

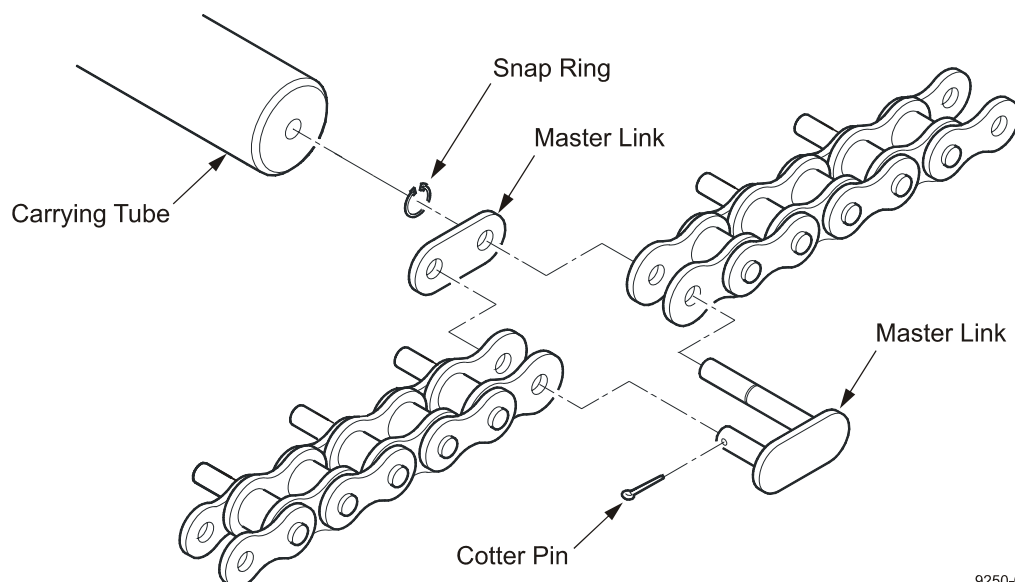
To install the carrying chains:

1. Remove the motor V-belts to allow the drive sprockets to rotate freely.
2. Check that the idler shaft is square. Adjust the pillow block bearings as necessary.
3. Install the carrying chains on both sides of the conveyor.

**NOTE:** Be sure the extended pins and connecting links of the chains are directly opposite each other. Do not fasten the ends of each chain strand together until this is verified.

4. Ensure the return run of each chain is located on the lower chain track of all sections and on the catenary in the drive section. Allow for a chain sag of 4" to 5" at the catenary.
5. Fasten the ends of each chain strand by installing the master link, see Figure G - 16.

Note: When the sorter is started, the chain will bounce in the catenary. The chain will settle approximately 5 minutes of operation.



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Figure G - 16 Roller Chain Connection

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## Installing the Trabon Chain Oiler

### Installation Procedure

The chain oiler is field installed to the idler section. Installation includes mounting the reservoir and control unit, mounting the distributor block, and installing the oil lines. During conveyor operation, the oiler supplies oil to the four lubricator brushes at preset intervals. The chain oiler system consists of:

- Oiler control and reservoir units,
- distributor block and associated tubing, and
- lubricator nozzles and mounting hardware.

---

**CAUTION:** Before installing the oiler, make certain to thoroughly review this section. Proper installation of the four lubricator brushes, as well as proper controller settings are essential for adequate lubrication of the conveyor chains. Failure to follow these steps will result in inadequate chain lubrication, causing accelerated wear of the chain.

---

1. Mount the brush assembly bracket:
  - a. Locate the brush assembly bracket on the inside of the 2nd downstream cross brace in the idler section, see Figure G - 17.
  - b. Adjust the brushes (four total) such that each brush makes contact with one side of the chain link. Set the brushes with 0.0" clearance.

---

**NOTE:** The brushes are to be located on the idler section before the turnaround so once the oil is distributed to the chain, the action of the chain coming around the sprocket will force the oil to all areas of the chain. Do not locate the brushes elsewhere on the conveyor.

---

2. Mount the distributor in the center of the frame cross brace.
  - a. Mark and drill mounting holes.
  - b. Install the distributor using the supplied hardware.
3. Install the mounting bracket on the idler frame near the brushes, see Figure G - 18.
  - a. Mark and drill mounting holes.
  - b. Install the bracket using the supplied hardware.
4. Mount the Trabon oiler control/reservoir assembly to the bracket using the supplied hardware.
5. Connect the oil line from the reservoir to the distributor and the four oil lines from the distributor to the brushes, see Figure G - 17.
  - Tube ends must be cut square and be free of burrs.
    - a. Press the fitting collet down and insert the tube until it bottoms in the fitting, then release the collet.
    - b. Once the tube has bottomed out, pull back slightly on the tube to check that it is secure.



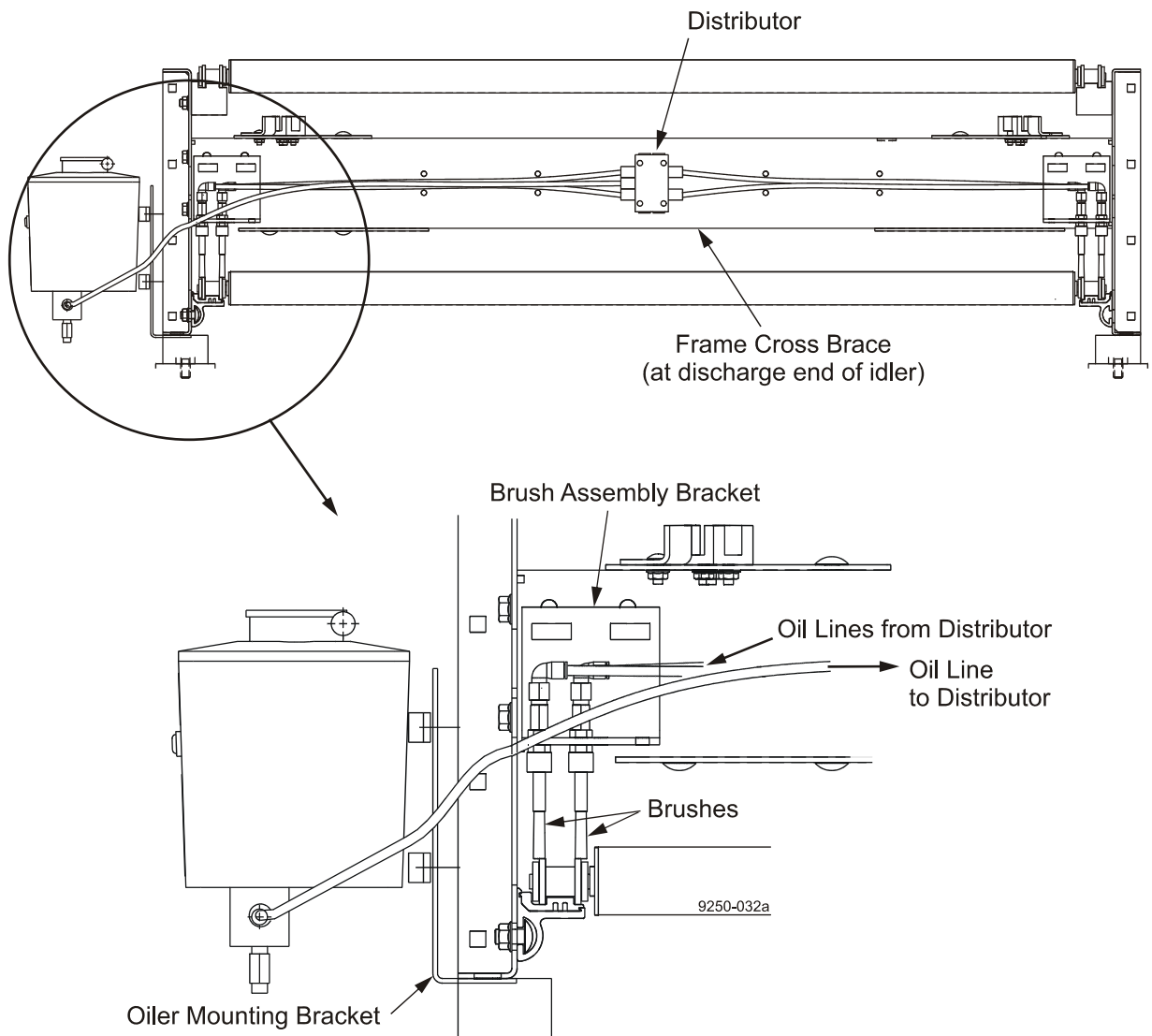


Figure G - 17 Chain Oiler Installation (Trabon Unit)

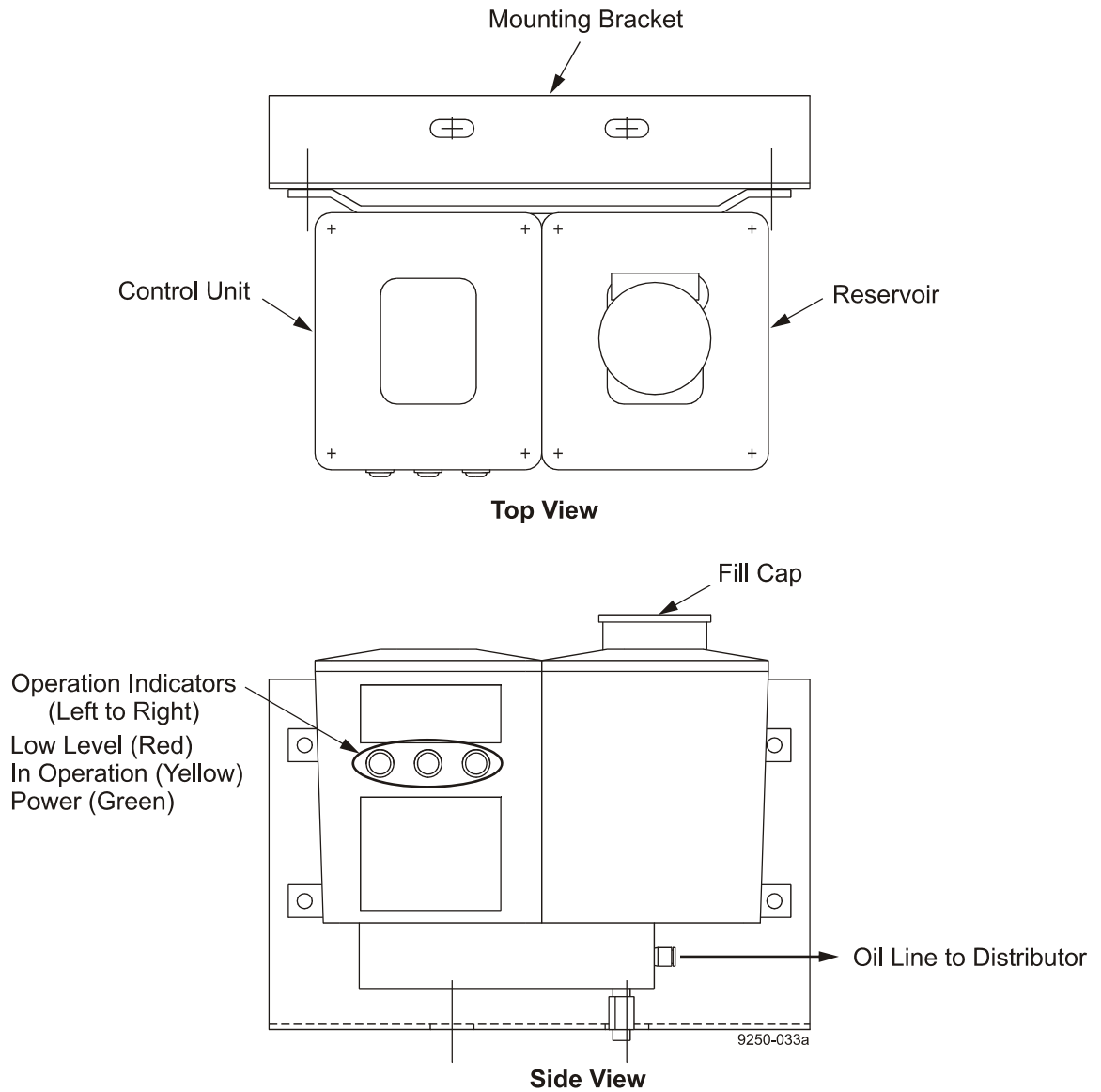


Figure G - 18 Trabon Oiler Control/Reservoir Assembly

6. Make all electrical connects at the oiler control, see Figure G - 18.

## Reservoir Filling and Initial Operation

1. Fill the reservoir with the supplied oil.

**CAUTION:**

**Initial Filling**

Ensure the reservoir is full before cycling the oiler. Do not allow the oiler to run dry.

**Use Specified Oil Only**

Use of other lubricants in the chain oiler must be reviewed and approved by Intelligrated. Do not attempt to place any other lubricants into the oiler without approval from Intelligrated. Use of other oils may accelerate chain wear.

2. Press the Manual Run button to start a lubrication cycle.
3. Run enough lubrication cycles until oil is present at all four bushes.

## Sorter Lubrication Run Time Settings

The amount of lubrication required depends on the length and speed of the conveyor and on environmental variables. Table G 2 provides initial settings and may be changed depending on whether too much or too little oil is being supplied.

Table G 2 Oiler Pump Run Time and Lube Cycle Interval Settings

Sorter Speed (FPM)	Pump On Time Minutes/Hour
150	3.2
200	4.2
250	5.3
300	6.4
350	7.4

## Setting the Pump On Time and Lube Cycle Intervals

1. Set the slide switch to minutes for cycle time.
2. Set the desired pump "On Time" using a screwdriver in the slotted head of the scale marked "On Time Minutes".
3. In a similar fashion, set the specified interval at which lube cycles are to occur using the appropriate scale under "Total Cycle Time".

Pressing the Manual Run button resets the cycle time to zero and starts a new lubrication cycle.

---

## Chain Facts

### General

- Manual chain lubrication may be necessary at start-up to facilitate smooth conveyor operation. Once the lubrication system is working correctly, manual lubrication is not necessary. Manual lubrication should be a one-time procedure.
- When the chain oiler is working correctly, the chain will appear to have a clean and uniform sheen.
- If the chain oiler is adjusted correctly, the moving chain remains relatively cool. Measure the temperature with a laser guided infrared thermometer approximately six hours after start-up. See chain temperature section.
- Do not use cleaners on the chain. Wipe off excess oil with a rag.
- During normal operation a small buildup of oil may be noticed at the chain track expansion joints (splices).
- The teeth of the drive sprockets on each end of the drive shaft must be aligned with each other.
- The links of the chains must be aligned with each other. If they are not, the carrying tubes will be at an angle producing a skewing effect.

### Chain Temperature

An effective method of evaluating the lubrication being applied to the conveyor chain is by checking the temperature of the left hand and right hand chains. The temperature of the running chains should be initially checked after six hours of operation.

To check the temperature of the chains:

- Take ambient temperature readings (temperature readings of steel objects in the vicinity of the conveyor).
- Take infrared thermometer readings of the chain at the idler end of the conveyor with the thermometer as close to the chain as is safely possible. Measure the temperature of the side plates of the chain, not the rollers.
- The chain temperature should be 5 to 10 degrees higher than the ambient temperature. If the temperature variance is greater than 10 degrees, the oiler system may need to be adjusted to deliver more oil. Freezer applications give different readings than room temperature environments.
- Each chain should be checked separately. Take the chain temperature at the same place on both sides of the conveyor.

### Chain Stretch

The drive chains do stretch with time. Check the chain sag at the catenary in the drive section. If the sag is greater than 4" to 5", chain links must be removed in 5" increments.

## Installing Takeaway Conveyors

- Refer to site specific layout/installation drawings show the locations of the take-away conveyors.
  - Use the LH or RH takeaway alignment jig to locate the takeaway conveyor.
  - Be sure to install the takeaways at the specified elevation and pitch.
1. Place the takeaway alignment jig on the wear strip side of the cam guide.
    - The jig should be placed so that the end of the jig extends out over the sorter section side rail in the direction of the divert
  2. Clamp the small plate of the jig to the cam guide.
  3. Place the junction against the sorter section near the divert position.
  4. Align the inside of the short junction rail with the outside of the jig.
  5. Bolt the junction to the sorter.

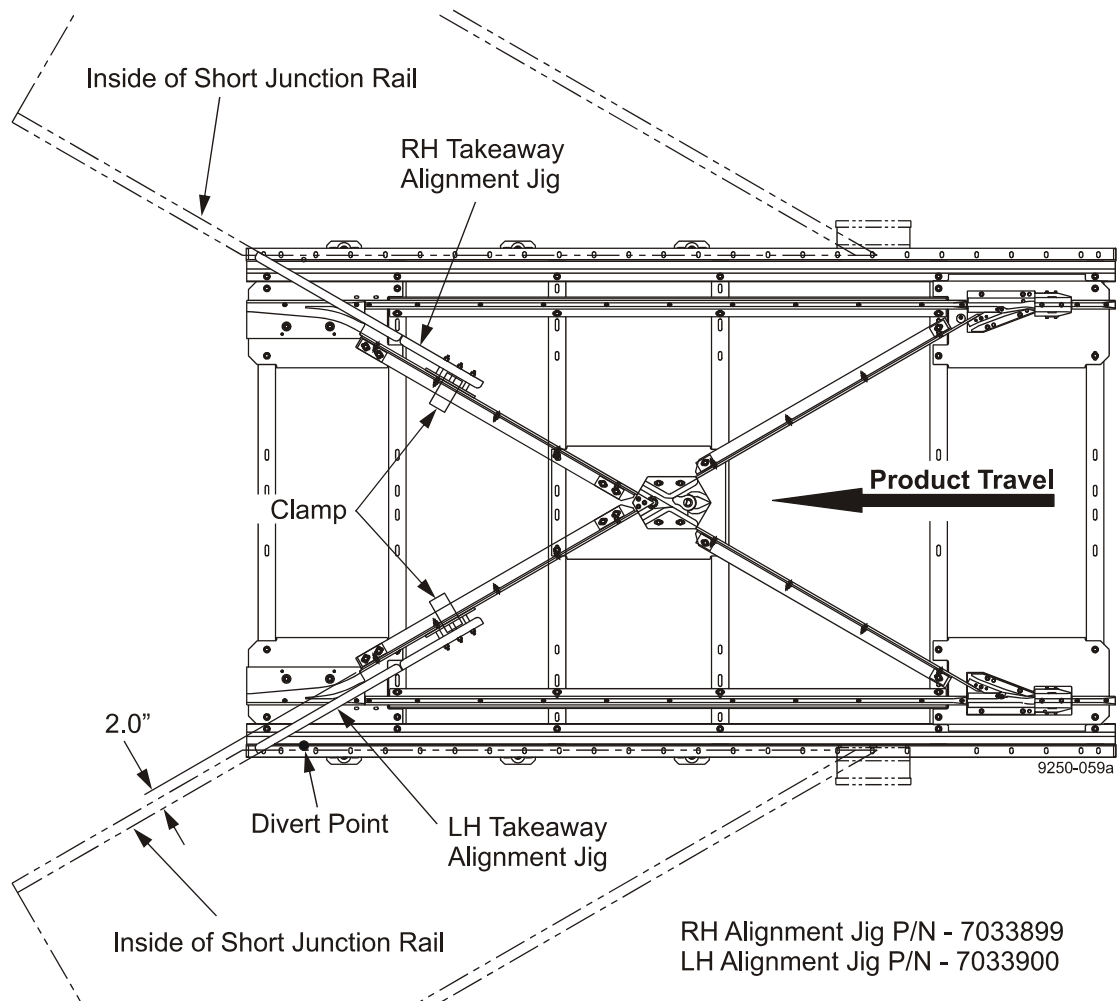


Figure G - 19 Location of Takeaway Conveyors

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## Installing Carrying Tubes and Divert Shoes

### Before Installing the Tubes

1. Ensure the chain oiler brushes are aligned over the chain link plates as covered under Installing Chain Oiler.
2. If the infeed conveyor is PTO driven from the idler, disconnect the timing belt from the PTO drive during chain installation and initial start-up. Once the UniSort VII is operating satisfactorily, connect the timing belt.

---

**NOTE:** When installing the carrying tubes (or slats), be sure they are perpendicular to the side frame. Install an even number of tubes (or slats) only. Remove/add carrying chain links as necessary. This must be done in 5" length increments.

---

### Installing the Carrying Tubes and Divert Shoes

Carrying tubes and divert shoes are shipped loose. The shoes are installed on the carrying tubes when they are installed on the conveyor.

To install the carrying tubes and divert shoes:

1. Be sure the extended pins of both carrying chain strands are exactly opposite each other.
2. Install two adjacent carrying tubes by inserting the extended chain pins into the end bushings of the two tubes on one side of the conveyor only.
3. Slide a divert shoe onto the two tubes with the ramp of the shoe facing the discharge end of the conveyor, see Figure G - 20.
4. Pry the chain upward and outward to insert the extended pins of the opposite chain into the tubes.
5. Repeat Steps 2 - 4 until all tubes with divert shoes are installed. Be sure the pins of all shoes drop into the pin guide track.

Note: When installing divert shoes with tubes, the shoes must be installed between every other tube.

### Installing the Carrying Slats and Divert Shoes

Carrying slats and divert shoes are shipped loose. The shoes are installed on the carrying slats when they are installed on the conveyor.

To install the carrying slats and divert shoes:

1. Be sure the extended pins of both carrying chain strands are exactly opposite each other.
2. Install one carrying slat by inserting the extended chain pins into the end bushings of the slat on one side of the conveyor only.
3. Install the adjacent carrying slat by inserting the extended chain pins into the end bushings of the slat on one side of the conveyor only.
4. Slide a divert shoe onto the two slats with the ramp of the shoe facing the discharge end of the conveyor, see Figure G - 20.
5. Pry the chain upward and outward to insert the extended pins of the opposite chain into the two slats.
6. Repeat Steps 2 - 5 until all slats with divert shoes are installed. Be sure the pins of all shoes drop into the pin guide track.

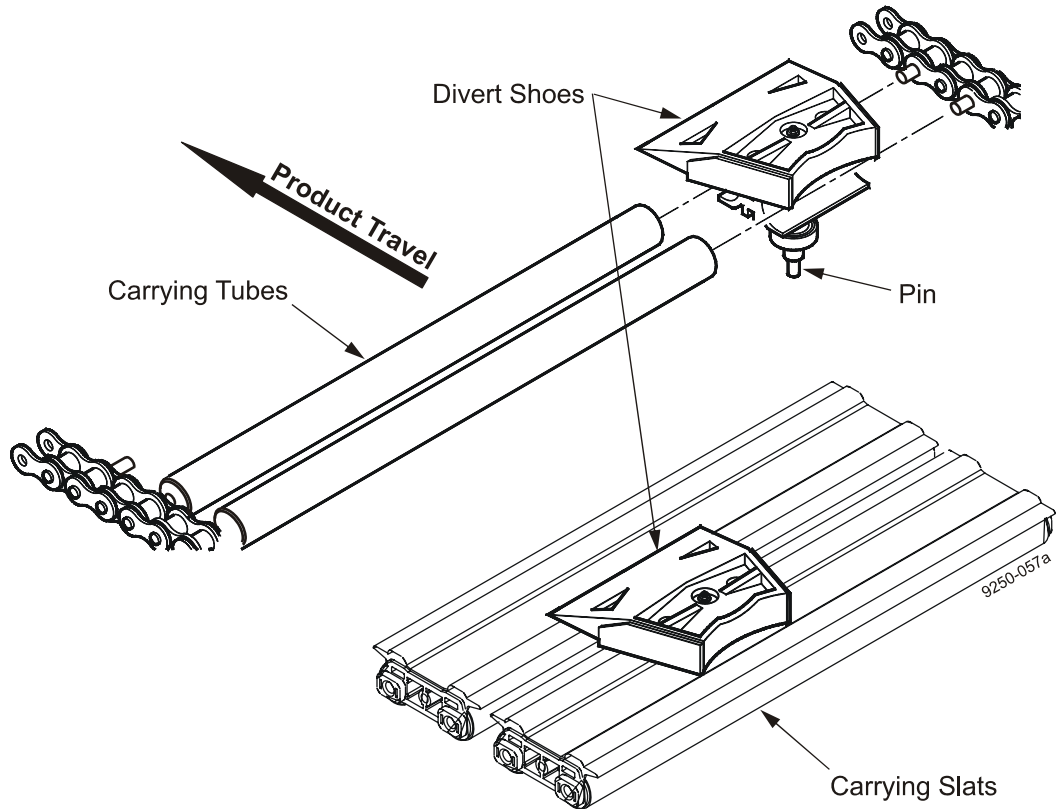


Figure G - 20 Installing Carrying Tubes/Slats and Shoes

## Carrying Chain Sag Adjustment - Drive Section Catenary

Carrying chain sag, at the catenary, is adjusted by removing chain links in 5" increments.

1. Measure the chain sag on each side of the drive; it should be 4" to 5", see Figure G - 21.

If adjustment is necessary:

2. Remove the drive belts between the motor and reducer.
3. Manually position the carrying chain until the master links are in a convenient position to remove.
4. Remove the master link, then remove two chain links (5" increment) from both chains.
5. Install the master link on both chains.

Note: Ensure the carrying tubes (or slats) are perpendicular to the side frame. If necessary, adjust the idler shaft in the idler section.

6. Install the drive belts and adjust the belt tension.

- Adjust the tension for 1/4" maximum deflection at the belt's mid-point.

Note: When the sorter is started, the chain will bounce in the catenary. The chain will settle after approximately 5 minutes of operation.

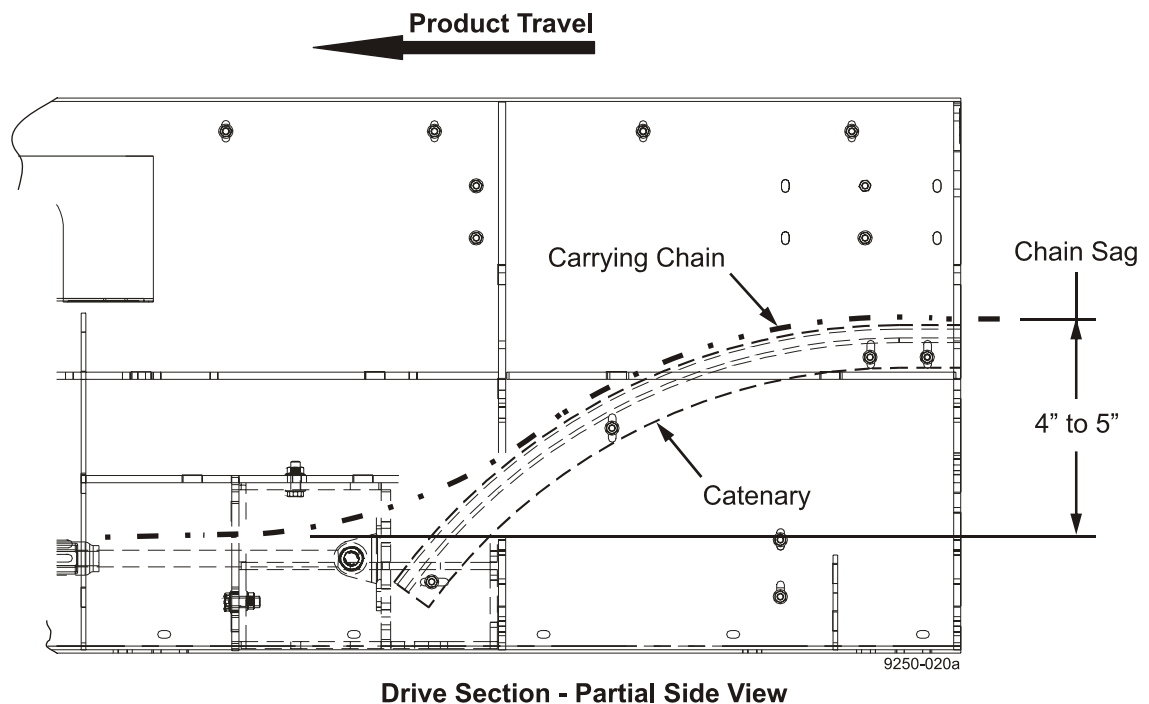


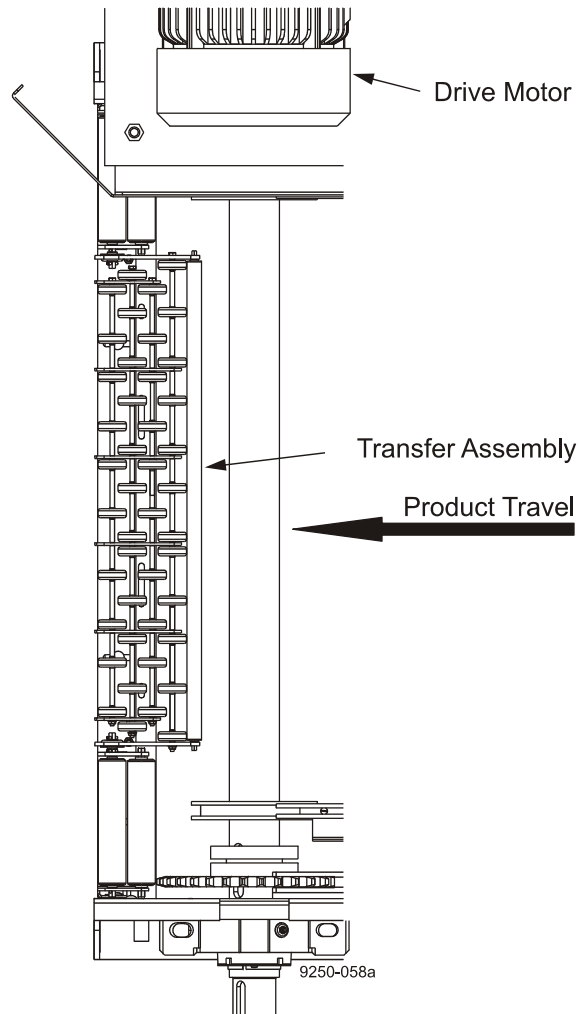
Figure G - 21 Chain Sag at Drive Section Catenary



## Installing Discharge End Conveyor

If supplied, refer to the site specific layout/installation drawing to locate and install the discharge end conveyor.

- The drive section has a factory installed transfer assembly to inhibit non-diverted product flow off the UniSort VII sortation conveyor when the discharge end conveyor is full or non-operational.
- This assembly includes a proximity switch which must be wired to the system controller, see Figure G - 22. When triggered, the proximity switch sends a signal to the system controller to drop power to the UniSort VII drive motor.



Note: Some guards or covers removed for clarity.

Figure G - 22 Drive Section - Transfer Assembly

## Installing Electrical/Control Devices

Table G 3 shows the typical electrical/control devices that may be used for controlling a conveyor. Refer to the electrical installation drawings and materials list for the exact type, location, and wiring of each device used.

Table G 3 Electrical/Control Components

Device	Function
Main Power Disconnect (may be 4-pole switch)	Switches power to the drive motor(s) and the control unit. The fourth pole switches power to the control unit. Located in the control panel.
Motor Starter(s)	Switches power to drive motor(s) via a motor disconnect switch and Variable Frequency Drive. Contact status may be supplied to control unit. Located in control panel.
Motor Disconnect	Switches power to the drive motor via the Variable Frequency Drive. The contact status is typically supplied to the control unit.
Variable Frequency Drive (VFD)	Provides smooth drive motor start-up. Typically wired between drive motor and motor disconnect switch (one per motor). Located on conveyor.
Emergency Stop Push Button/Pull Cord	Used to drop power to the drive motor. The contact status is typically supplied to the control unit. Located on the conveyor.
Divert Control Module	Used to control voltage and starting sequence to each divert switch. Divert switches will not function without the use of the DCM. Located on the conveyor.
Low Oil Reservoir Switch	The chain oiler has a low level switch. When the oil reaches a low level, the switch is closed, indicating the oiler needs lubrication.
Photo-Eye (On Divert Switch Assembly)	Used to detect the presence of the divert shoe for synchronizing divert switching. Located on each divert switch. Signal input to the control unit. Photo-eyes are not adjustable.
Proximity Switch(es) (Other uses)	Proximity switches may also be used for detecting divert shoe “out of track”, discharge end “product jam”, transfer assembly “up”, and conveyor speed.
Induction Photo-Eye(s)	Located on the conveyor to detect the leading/trailing edge of product entering the conveyor. Initiates product tracking.
Lane Full Photo-Eye	Located on each take-away conveyor (sort lane) at the point where the take-away lane is considered full. Oriented at an angle so product is detected even if small gaps between product exists. Typically used with a 3-7 second delay timer. Lane is considered full if photo-eye remains blocked for that period of time. Product diverting to the lane is then inhibited.
Product Jam Detect Photo-Eye	Located at extreme up-stream end of each take-away conveyor (sort lane). Oriented perpendicular to product flow direction. Used with 3-7 second time delay. Product jam condition indicated when product blocks entrance to take-away conveyor for that period of time. Diverting to that lane is inhibited and power to conveyor may be dropped.

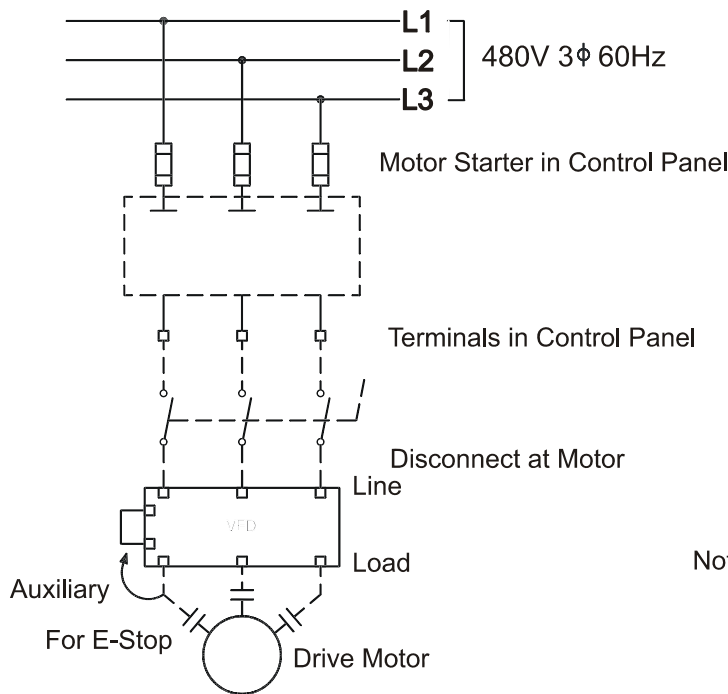
Table G 3 Electrical/Control Components (Continued)

<b>Device</b>	<b>Function</b>
Current Sensing Relay (Over-Current Detection)	Used to sense drive motor over-current condition as the result of a jam condition or mechanical/electrical problem. Power to the conveyor is dropped. Contact status is supplied to the control limit.

## Installing Electrical Power and Control Device Wiring

Install wiring from the control panel to all electrical/control devices on the conveyor according to the electrical layout drawing. Figure G - 23 shows a typical conveyor drive motor wiring diagram.

Refer to the appropriate manufacturer's instruction manuals for wiring Variable Frequency Drives, over-current relays, and photo-eyes.



Note: VFD to be mounted near motor. Refer to manufacturer's instructions for actual wiring and adjustment procedures.

9250-040a

Figure G - 23 Typical Drive Motor Wiring

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## VFD Installation and Motor Related Checks and Adjustments

### Installing the Variable Frequency Drive

A VFD (Variable Frequency Drive) is supplied for the conveyor drive motor.

- Mount the VFD as close as possible to the drive motor.
- 6" clearance on top and bottom is needed for adequate ventilation.

See the project electrical installation drawings and VFD manufacturer's manual (included in project) for specific mounting details.

Before applying power to the VFD, perform any required adjustments according to the manufacturer's manual.

- Set the acceleration ramp time to 20 seconds.

### Verifying Correct Drive Motor Rotation

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**CAUTION:** Before applying power, review the safety checks in ["Before Applying Electrical Power"](#), on page [G - 46](#), to ensure the safety of personnel.

---

- Be sure the drive motor wiring is correct.
  - Remove the drive motor V-belts.
  - Apply momentary power to the drive motor and check the direction of rotation.
  - Install the drive motor V-belts.
- 

**CAUTION:** A drive motor wiring error can result in reversed motor operation and/or possible drive motor damage.

---

### Final VFD Adjustments

Perform the final VFD adjustments (with power applied) according to the manufacturer's manual.

When the VFD is correctly adjusted, the conveyor will accelerate smoothly to operating speed without jerking or surging of the carrying chains.

### Drive Over-Current Relay/Sensor Adjustments

The drive over-current relay/sensor is adjusted to match the starting current of the drive motor listed on the motor name plate. Refer to the manufacturer's instruction sheet for adjusting the over-current relay/sensor.

## Checking Safety Features

### IJD (Internal Jam Detector)

The IJD is used to detect:

- Divert shoe pin out of track.
- Carton flap, piece of banding, etc., extending between and below the carrying tubes (or slats).

When any of these conditions are detected, the IJD drops power to the drive motor.

IJDs are included on the idler section, the drive section, and approximately every seventy feet (70') of intermediate section. The electrical installation drawing shows the IJD wiring to the control panel.

An IJD consists of a flipper blade, extending across the width of the conveyor, a trip arm and a limit switch. Movement of the flipper blade actuates the limit switch, see Figure G - 24.

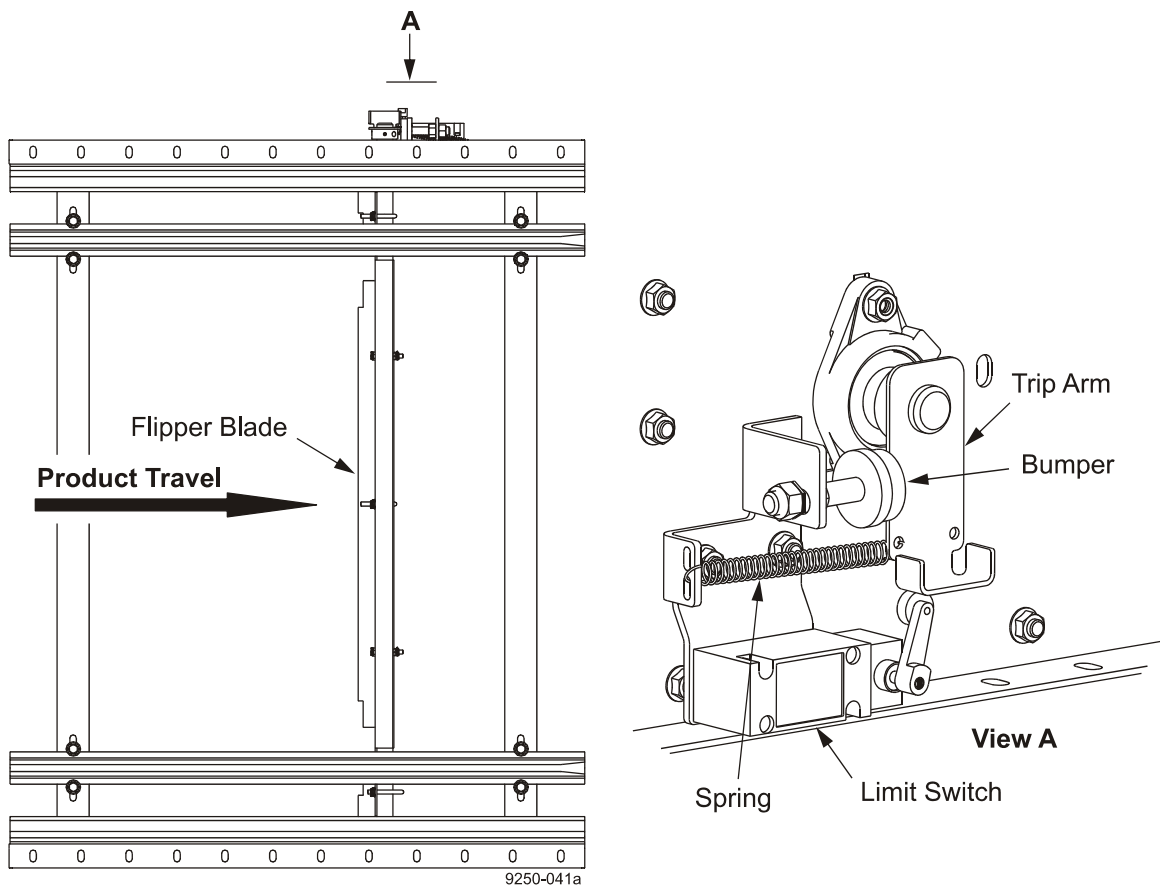


Figure G - 24 Internal Jam Detector

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## IJD Checks to Perform at Install

Confirm the IJD assembly pivots up.

Confirm drive motor power is dropped when the IJD limit switch is tripped.

To adjust the internal jam detector, see Figure G - 24:

1. Loosen the flange bearing bolts so the bearing drops to the lowest position.
2. Place a magnetic mount torpedo level vertically on the flipper blade.
3. Place a 1/8" thick flat underneath the flipper blade on each end of the blade.  
The objective is to position the flipper blade so it is perpendicular to the carrying tubes and 1/8" above them.
4. Grasp the trip arm and rotate the arm against the rubber bumper until the flipper blade is vertical.  
The flange bearing will move up or down as you do this. If you cannot move the arm far enough, adjust the rubber bumper so the flipper plate is vertical.
5. Tighten the flange bearing bolts.
6. Remove the 1/8" thick flats.
7. Adjust the limit switch arm, if necessary.
  - a. Loosen the limit switch arm.
  - b. Rotate the arm until limit switch arm roller is in the normal operating position when the IJD flipper blade is in the vertical position and the trip arm is over the limit switch arm roller.  
When the IJD has detected a jam condition, the trip arm is moved off the limit switch arm roller and trips the limit switch. In this condition, power is dropped to the drive motor.
  - c. Tighten the limit switch arm.

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**NOTE:** The IJD flipper plate in the drive section is only one half a normal flipper plate. The half plate faces upward (bottom half is blank) with the angled portion facing in the direction of product travel (towards the discharge end). Adjusting this IJD is the same as that described above except that slats/tubes must be above the flipper plate and the 1/8" flats are placed between the flipper plate and the slats/tubes above it.

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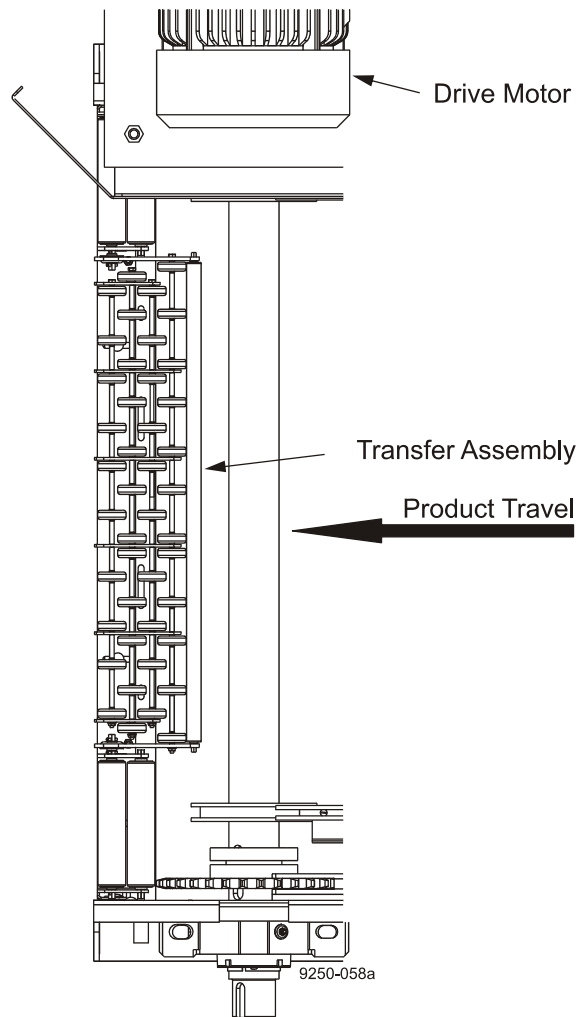
## Transfer Assembly

The transfer assembly is installed at the end of the drive section to inhibit product flow of non-diverted product, see Figure G - 25.

The transfer assembly is mounted to a pivoting bracket. When the assembly pivots to the up position, a proximity switch sends a signal to the system controller to drop power to the UniSort VII drive motor.

The transfer assembly should be adjusted so that an out of place shoe passes under the transfer assembly.

Check the transfer assembly to ensure it pivots freely.



Note: Some guards or covers removed for clarity.

Figure G - 25 Transfer Assembly



## Installing Product Containment Guarding

Side guides are installed onto the conveyor after all of the after-sort takeaway lines have been installed and installation adjustments have been made.

Side guides installed on the conveyor's "divert" side must not interfere with the product movement along the main-line or at the divert point(s), see [Figure G - 26](#).

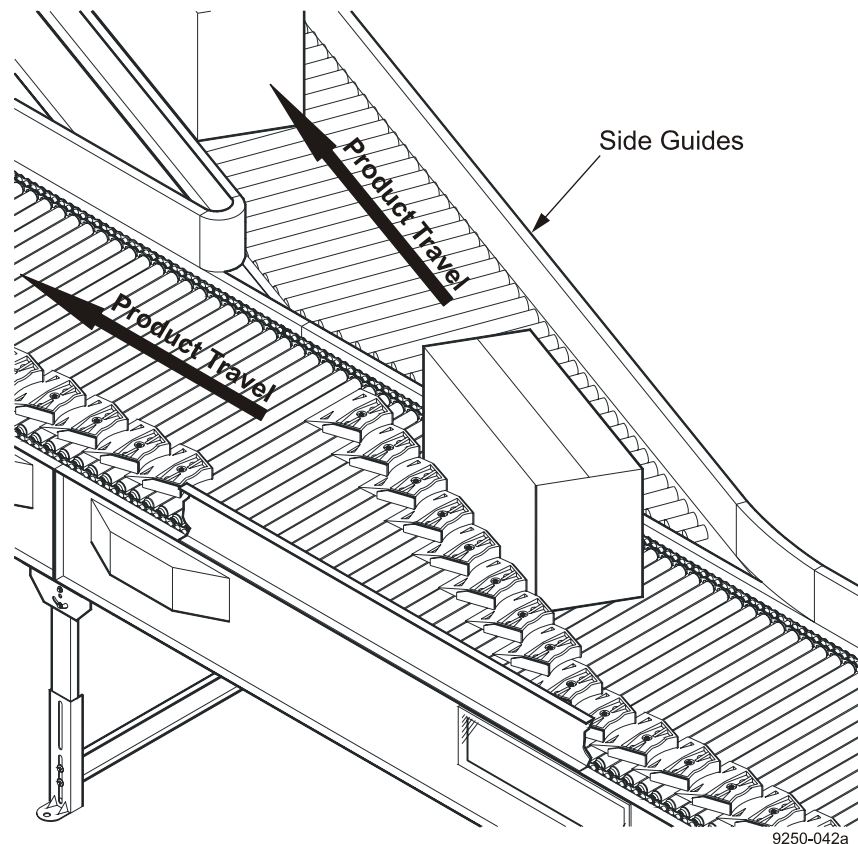


Figure G - 26 Product Containment Guarding

## Installing Personnel Safety Guarding

Personnel safety guarding prevents contact with conveyor moving parts.

To install personnel safety guarding, refer to the installation/layout drawing because requirements vary by installation.

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**CAUTION:** The drive section V-belts are fully enclosed for personnel safety and the sorter shoes are protected by plow guards covers. If these guards are removed during installation, re-install them before turning on the conveyor.

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## Final Installation Adjustments

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**CAUTION:** Electrical power must be applied to perform the final checks. To ensure the safety of personnel and minimize the possibility of damage to the conveyor, verify the following before applying electrical power.

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### Before Applying Electrical Power

1. Be sure the carrying chains, carrying tubes (or slats), and divert shoes are correctly installed.  
Ensure the carrying tubes (or slats) are perpendicular to the conveyor side frames. Check for any bent, nicked or dirty tubes.
2. Check the divert shoes to make sure they slide freely on the carrying tubes.  
Be certain the pin of each divert shoe is in the pin guide track on the non-divert side.
3. Be sure all floor supports are correctly installed.  
Check the tightness of all mounting bolts including those fastening the conveyor sections together.
4. Check to see that the left and right side carrying chains have equal and correct tension.
5. Connect a hand crank to the reducer input shaft to and rotate the chain and check that the chain moves freely (not necessarily easily) and without catching.
6. Inspect the conveyor thoroughly for foreign objects in the chain and conveyor sections and in between the runs of tubing. Look for stray bolts, tubes, shoes, tools, spare parts, etc.
7. Check the electrical connections at the conveyor and control panels.
8. Check the tension of the V-belts between the drive motor and reducer.
9. Be sure the drive unit safety guarding is installed.
10. Be sure the divert switch access cover plates are installed.
11. Check the reducer for correct oil type and oil level.  
Refer to manufacturer's instructions.  
Be sure any required oil breather plug has been correctly installed.
12. Be sure the VFD is adjusted per the manufacturer's instructions.
13. Check the over-current relay/sensor for correct wiring and to see that it is adjusted for first time power turn-on. Refer to manufacturer's instructions.
14. Before applying electrical power, instruct all personnel to stand clear of the conveyor. An alert will sound before the conveyor starts.

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## After Applying Electrical Power

1. Perform the final VFD adjustments according to the manufacturer's manual.  
When the VFD is correctly adjusted, the conveyor will accelerate smoothly to operating speed without jerking or surging of the carrying chains.
2. Observe the carrying chains, they should travel smoothly around each of the sprockets located in the drive and idler sections.
3. Apply a divert signal (electrical) to each DCM.  
The shoes should travel smoothly to the divert side and return downstream to the non-divert side. The shoe return is located next to the drive section.
4. Remove the electrical signal and verify that the shoes travel smoothly through the divert switch.

---

**CAUTION:** Immediately correct the cause of any divert shoe binding on the carrying tubes (or slats). Excessive friction may result in current overload or cause carrying tubes to become detached. See Section H - Maintenance.

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5. Verify that the carrying chain oiler has the correct oil type, quantity, and is adjusted to keep the chains properly lubricated.  
The conveyor should be operating while making the final chain oiler adjustment.
6. Check the operation of all safety devices.

## Final Installation Checks

1. Current overload relay/sensor adjusted to trip at current shown on electrical installation drawing.
2. Control unit and all control devices are installed and operational per the electrical layout installation drawing.
3. Check for smooth start-up of the conveyor when power is applied.
4. With product being diverted, verify that product is being smoothly and correctly diverted onto the correct take-away conveyors.
5. Be sure that installed guard rail will not result in product jams.
6. Check all safety devices to be sure they operate as designed.
7. Be sure that all safety labels are in place and guarding installed.
8. Make any necessary adjustments.

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## SECTION H: MAINTENANCE

### Introduction

Recommended service checks and equipment maintenance are outlined in this section for typical, intermittent-duty conveyor applications. Additional maintenance and servicing schedule adjustments may be required for continuous-duty operation or extreme environmental conditions.

The indicated preventive maintenance time intervals are based on a conveyor which is operating eight hours per day in 40° F to 110° F environmental temperatures.

All newly installed equipment should be frequently inspected and serviced as needed during the first 40 hours of operation. Thereafter, an appropriate maintenance program should be established and followed, see Table H 1. The time intervals should be appropriately adjusted for more than eight hours per day operation and/or operation in a harsh environment. Also, sorting product that produces an extraordinary amount of dust, dirt, or any other type of contamination may require more frequent preventive maintenance.

Maintaining separate service log sheets on each type of conveyor is recommended for plants operating more than one shift. Each log sheet should show dates, detailed inspection service information, and name or initials of person(s) performing the equipment inspection or service for future reference.

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**CAUTION:** Before performing maintenance on a conveyor, make certain that the conveyor's power disconnect is locked in the OPEN position and tagged to prevent accidental or unexpected application of power.

Do not perform maintenance while the conveyor is running unless specifically instructed to do so in this manual. Note: Other than checking of chain tension, it is NOT necessary to have the conveyor turned ON to perform any of the work described in this section.

Maintenance must be performed only by qualified personnel who are trained in normal and emergency operations of the conveyor and who understand all safety devices, their locations, and functions.

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Before restarting a conveyor:

- Remove all foreign objects from the conveyor.
- Be sure that all guards and safety devices are properly installed and working.
- Make sure that all persons are clear of the conveyor and are aware that the conveyor is about to be restarted.

Intervals indicated for performing maintenance should be considered for 8 hour per day operation. An application may subject the equipment to conditions that would necessitate more frequent maintenance. This may best be determined by performing maintenance more frequently when the conveyor is first put into operation, and then lengthening the intervals based on experience.

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**NOTE:** Power does not need to be applied to the conveyor drive motor except to observe divert switching and to verify the operation of the safety and control devices.

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Table H 1 Scheduled Maintenance

	Components	Item Check									
		Lubrication	Oil Level	Tension	Wear	Alignment	Fasteners	Set Screws	Proper Position	Physical Condition	Operation
Weekly	Chain Oiler		X							X	X
	Carrying Chains	X									
	Carrying Tubes (Slats)									X	
	Control Devices - on Conveyor						X			X	X
	DCM (Divert Control Module)									X	
	Divert Shoes									X	X
	Divert Switches										X
	General Structure						X			X	
	Safety Guards and Devices						X		X	X	X
Monthly (175 Hrs.)	Carrying Chains			X							
	Carrying Tubes									X	
	Divert Shoes						X				
	Divert Switches									X	
	Reducer	X	X								
	Sprockets/Hubs/Pulleys					X		X			
	Supports/Hangers						X			X	
	UHMW Wear Strips						X			X	
	V-Belts			X	X	X					
Semi Annually (1040 Hrs.)	Bearings	X					X				
	Carrying Chains			X							
	Drive Motor	X					X				
	Plastic Parts				X					X	
	Reducer	X	X				X				

## Making A Window

Opening a “window” in the conveyor involves removing several tubes (or slats), see Figure H - 1. This is best done at the idler (cannot be done near a spur).

To remove tubes (or slats):

1. Remove the side guide on one side of the conveyor (if present).
2. Pry up the chain until the shoe pins clear the pin guide. Slide the shoes to the center.
3. Continue prying up and out on the chain until it is clear of the track.
4. While holding the chain in this position, push the necessary tubes (or slats) away from the chain until they clear the extended pins.
5. Lift each tube (or slat) away from the conveyor and place it on a clean surface.

After removing the tubes (or slats) needed to create a “window”, return any remaining shoes to their position over the pin guide, place the chain back into its track, and shake the shoes to make sure they have resealed.

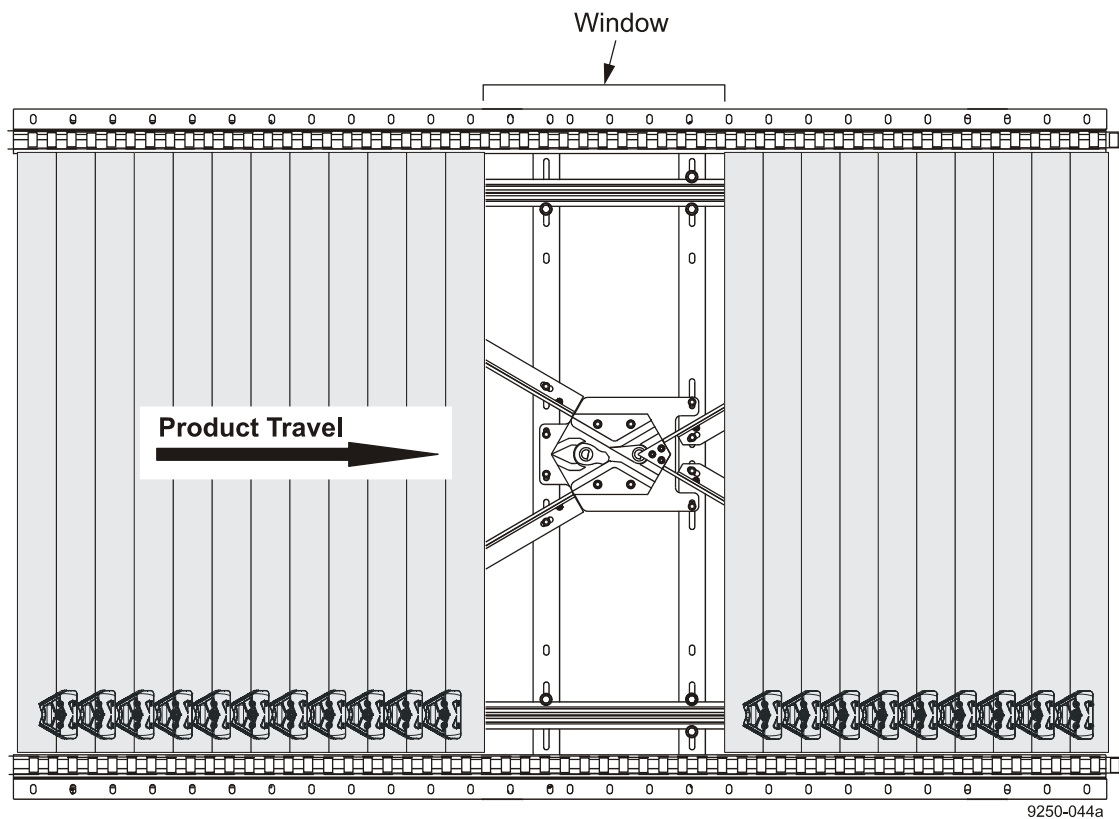


Figure H - 1 Window in the Tubes/Slats (Slats shown)

## Scheduled Maintenance

### Initial Start-Up and Run-In Period

#### Power Unit Reducer

**CAUTION:** Do not assume that this unit has been properly lubricated. Prior to start-up, be sure the reducer has been filled with the proper type, grade, and amount of oil.

The reducer is shipped from the factory filled with Mobil SCH 630 Synthetic lubricant.

Table H 2 lists gear lubricants recommended for use in the reducer. Contact Intelligrated in the event the lubricants listed below are not available or when considering using another lubricant. Conventional lubricants may be used, however synthetic lubricants are recommended for maximum reducer life.

Table H 2 Approved Reducer Lubricants

Manufacturer and Designation	Ambient Temperature Range	AGMA Viscosity Grade and Viscosity @ 104° F (SSU/cST)
Mobil Oil Company, Mobilgear SCH 630	15° to 150° F (-10° to 50° C)	Grade 5 918-1122 SSU 198-242 cST
Shell Oil Company, Hyperia Oil 220	15° to 150° F (-10° to 50° C)	Grade 5 918-1122 SSU 198-242 cST
Texaco, Inc., Pinnacle 220	15° to 150° F (-10° to 50° C)	Grade 5 918-1122 SSU 198-242 cST
Mobil Oil Corporation, Mobilgear SCH 629	0° to 90° F (-20° to 30° C)	Grade 4 626-765 SSU 135-165 cST
Texaco, Inc., Pinnacle 150	0° to 90° F (-20° to 30° C)	Grade 4 626-765 SSU 135-165 cST

## Safety Provisions

Check that warning signs and labels posted on or near the conveyor equipment are not removed, painted over, or altered at any time.

Check all safety devices, warning lights, and alarms associated with the conveyor system for proper operation and serviced as needed.

## Daily Inspections

Perform walk-through inspections of the conveyor equipment each day. For continuous duty applications, conduct inspections each shift. Listen for unusual noises and carefully observe the system.

To ensure the personnel safety, check safety guards, warning signs, lights, and alarms associated with the conveyor, and keep them in good condition. Immediately report and correct any unusual noise, oil leak, or operational problem.



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## Weekly Inspections

### Chain Oiler

Check the reservoir level and fill with Mobil, DTE Heavy-Medium, ISO-68 oil as needed.

Verify that the oiler is cycling properly, refer to the “Sorter Lubrication Run Time Settings” in Section G.

- Adjust the settings as needed if insufficient or excessive oil is being applied to the carrying chain.

### Carrying Chains

Confirm that the carrying chains are receiving the proper amount of lubrication.

### Carrying Tubes

Check the carrying tubes to be sure they are clean, straight and smooth. Replace bent or nicked carrying tubes.

Clean the carrying tubes by wiping with a degreaser type solvent. Clean extremely dirty or rusty tubes with steel wool or a fine grade emery cloth with a degreaser. See “Carrying Tubes (Cleaning)”, on page H - 8, for recommended solvents.

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**CAUTION:** For trouble free divert shoe operation, the carrying tubes must be maintained in good physical condition. Do not apply any lubricant to the carrying tubes without first consulting the manufacturer.

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### Carrying Slats

Check all slats for physical damage and replace as needed. Be sure all slat linear belts slide freely and repair any that are damaged.

Check the carrying slats to be sure they are clean, straight and smooth. Replace bent or nicked carrying slats.

New slats should not require cleaning.

For regular maintenance, clean dirty slats with a suitable mild detergent.

- Dilute the mild detergent with water (30:1)
- Dampen a cloth with the solution and wring out excess solution.
- Wipe the belt slat with the solution dampened cloth
- Wipe the belt slat with a cloth dampened with water.
- Wipe the belt slat with a clean, dry cloth.

Do not lubricate.

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**CAUTION:** For trouble free slat operation, the slats must be maintained in good physical condition. Do not apply any lubricant to the carrying slats without first consulting the manufacturer.

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## Control Devices

Mounted on the conveyor - Be sure all photo-eye and reflector fasteners are tight. Check tightness and physical condition of all wire/conduit fittings.

## Divert Control Module

Check the divert control module wiring, making sure any loose connections are promptly fixed. Check the condition of the DCM box to make certain the cover is closed and there is no damage to the box.

## Divert Shoes

Check all divert shoes for physical damage and replace damaged shoes. Be sure all shoes slide freely and repair any that are binding.

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**NOTE:** Typical causes of binding include: dirty or bent carrying tubes and shoe fasteners adjusted to tight.

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## Divert Switches

Observe the shoes as they divert and listen for unusual clicking sounds at each divert switch. If a random clicking sound occurs, a divert shoe pin may be damaged. If a repetitive clicking sound occurs, the divert switch may be out of adjustment or improperly synchronized (control timing).

## General Structure/Operation

Check the physical condition of fasteners on the following structural items: floor supports, section joint fasteners, product containment guard rail, and take-away conveyor mountings.

## Safety Guards and Devices

Check the drive section safety guard for loose fasteners or physical damage. Check all personnel safety guards for looseness or physical damage. These guards may include, for example, conveyor underside guards, safety netting and/or solid type guards mounted on top of the conveyor side frames.

Check the physical condition and operation of all safety devices, including the:

- Emergency Stop pull cord.
- Discharge end transfer assembly, see Figure H - 9.
- Internal jam detector(s), see Figure H - 10.
- Non-diverted product out of position at drive section.
- Product jam photo-eyes.
- Divert switch access cover plates.
- Any other specially applied safety devices.

## Monthly Maintenance

### Lubricants

Lubricate the conveyor with the following:

Table H 3 Lubricants for the UniSort VII Conveyor

Component	Ambient Temperature	Lubricant
Carrying Chains	+20° F to +40° F +41° F to +120° F	Mobil, DTE Heavy-Medium, ISO-68. Consult Intelligrated before using any other lubricants.
Pillow Block Bearings	-25° F to +120° F	Lithium Base, NLGI-2 Bearing Grease.
Idler Shaft	-25° F to +120° F	Lithium Base, NLGI-2 Bearing Grease.
Reducers	Refer to Manufacturer's Instruction Manual. The reducer may be supplied with synthetic type lubricant. Do not mix synthetic lubricants without checking compatibility. It is a good practice to flush out one type of lubricant prior to using any other type or brand.	
Drive Motor	Refer to Manufacturer's Instruction Tag or Sheet.	

### Carrying Chains

Check the carrying chain tension after the first month of operation. The carrying chain should sag 4" to 5", at the catenary in the drive section, when the conveyor is not operating, see Figure H - 2.

To adjust, remove links in 5" increments (2 links).

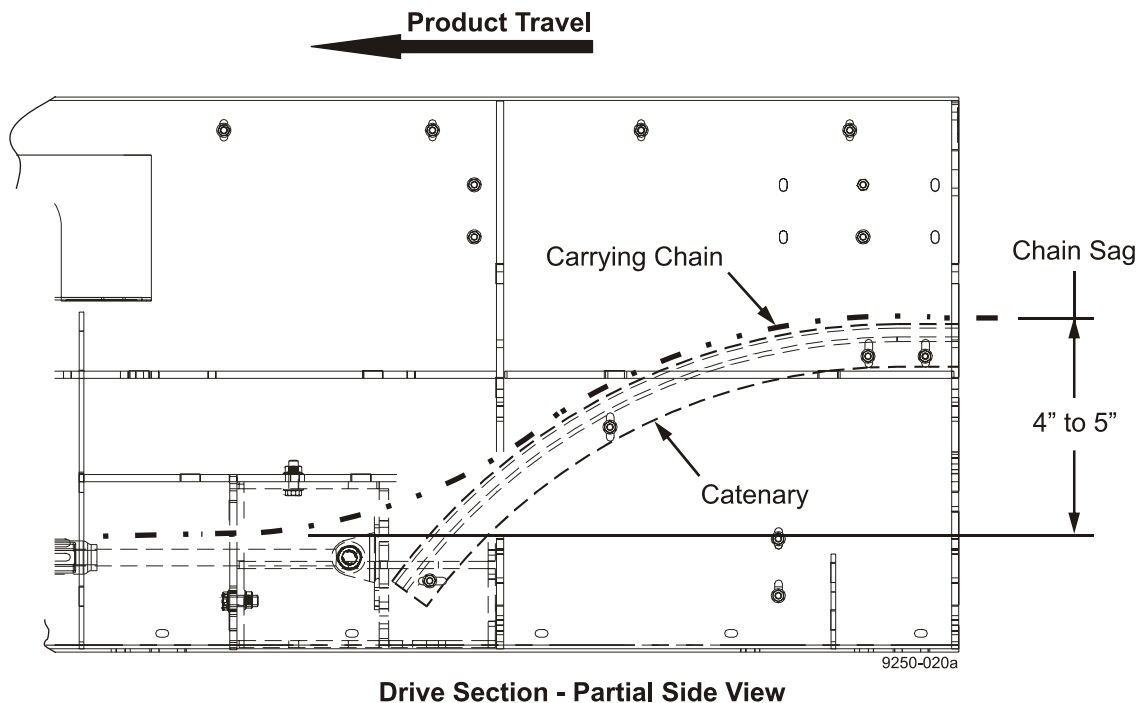


Figure H - 2 Chain Sag at Drive Section Catenary

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## Carrying Tubes (Cleaning)

Periodically check the carrying tubes for cleanliness. To clean the tubes, wipe them with a suitable solvent/degreaser. For extremely contaminated tubes, use a very fine grade emery cloth or steel wool alone or with a cleaning solvent.

Be careful not to allow solvent to enter the tubes or to remain in contact with the end bushings. Do not spray the tubes.

Do not lubricate the carrying tubes. This may cause malfunctions by allowing contamination to build-up on the tubes. It is only necessary to keep the tubes clean for trouble-free operation.

Use the following solvents/degreasers to clean the tubes:

- Mobilarma 245 - Mobile Oil Corporation
- Rust Vetro ® 4214 - E.F. Houghton Company
- Tectyl 235 - Ashland Oil Company

To ensure the safety of personnel, pay strict attention to the solvent manufacturers' instructions concerning use and health hazard warnings.

## Carrying Slat (Cleaning)

New slats should not require cleaning.

For regular maintenance, clean dirty slats with a suitable mild detergent.

- Dilute the mild detergent with water (30:1)
- Dampen a cloth with the solution and wring out excess solution.
- Wipe the belt slat with the solution dampened cloth
- Wipe the belt slat with a cloth dampened with water.
- Wipe the belt slat with a clean, dry cloth.

Do not lubricate.

## Divert Shoes

Check the nuts on the divert shoes. Do not overtighten; this will cause the shoes to bind on the carrying tubes.

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**NOTE:** The divert shoes should slide freely when pushed by hand. To check, lift a shoe from the pin guide track and push the shoe across the carrying tubes.

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Return Wedge - If the shoe pads show unusual wear, check the position of the shoe return wedge in the drive section.

## Divert Switches

Inspect each divert switch for dirt or product spillage and clean as required. Be sure the top of the proximity switch is free of contamination.

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## Reducer

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**CAUTION:** Always lock out the electrical power prior to working on the reducer or related power transmission devices.

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Check the reducer oil level. Fill as needed with approved lubricants, see [Table H 2, "Approved Reducer Lubricants,"](#) on page 4.

## Sprockets/Hubs/Pulleys

Check the tightness of set screws used in sprockets, hubs, and pulleys. Recheck alignment if any set screws are found loose.

## Supports/Hangers

Be sure all floor supports are in good condition and have not been damaged. Check that all fasteners are securely tightened and that none are missing.

## UHMW Wear Strips

Check the physical condition of the UHMW wear strips located in the chain track.

- The wear strips should be smooth and not contain any damaged sections.
- The UHMW strips should be properly anchored and not interfering with the flow of the chain.

If problems exist with the UHMW strips, the chain in that conveyor section will need to be removed and the UHMW wear strips replaced.

## V-Belts

Inspect the drive section V-belts for proper tension, wear, and alignment. Do not over tighten the V-belts.

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**CAUTION:** Be sure to reinstall the drive section safety guarding.

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## Semi Annual Maintenance

### Bearings

Check the tightness of all pillow block bearing mounting bolts. Lubricate each bearing using no more than two grease gun shots of lithium base NLGI-2 grease.

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**CAUTION:** Over lubrication may result in bearing failure.

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### Carrying Chains

Check the carrying chain tension, see “Unscheduled Maintenance Functions”, on page H - 11, for details.

### Drive Motor

Remove any build-up of dirt or dust around the motor vent openings.

Check the motor to see that all mounting bolts are securely tightened and the motor lead wires securely connected.

Unless otherwise specified wick-oil sleeve bearings should be lubricated every 2000 to 4000 hours after the first 4000 hours of operation with 3 or 4 drops of light-grade mineral oil or SAE-10W motor oil.

### Plastic Parts

Inspect all plastic parts for signs of unusual wear and deterioration. Replace any worn plastic parts.

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**CAUTION:** If carrying tubes come loose, perform a thorough inspection to isolate the cause. Do not operate the conveyor with bent carrying tubes, incorrect carrying chain tension, damaged divert shoes, or damaged divert switches.

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### Reducer

Check the tightness of reducer mounting bolts and torque arm (if equipped).

For information on changing oil, oil type, and operating oil level, see “Power Unit Reducer”, on page H - 4, for details.

## Unscheduled Maintenance Functions

### Divert and Crossover Switches

#### Cleaning the Divert Switches

1. Make a window in the conveyor to access the divert switches.
2. Move the window to the location of a divert switch.
3. Use compressed air to blow out debris in the switch mechanisms.
4. Wipe the switches with a clean, dry soft cotton towel to remove any oil or debris which may have collected.
5. It may be necessary to use a mild detergent to get all of the debris off of the switches.

**CAUTION:** Never use a solvent based cleaner on the divert switches. Solvent based cleaners may damage the polymer materials in the switch and will destroy the photo-eye lens covers.

6. Look for loose or broken parts. Replace parts as required.
7. Examine the divert finger, making certain it moves freely and returns to the straight through position.

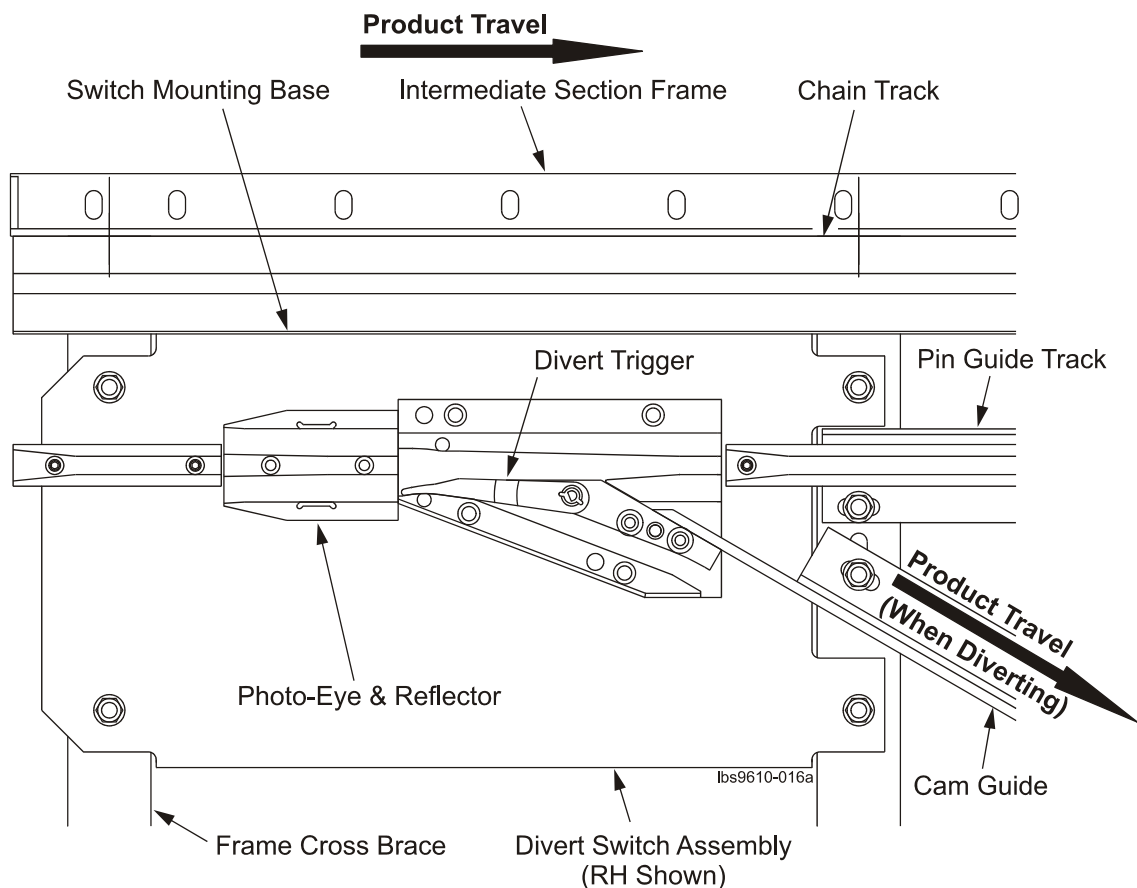
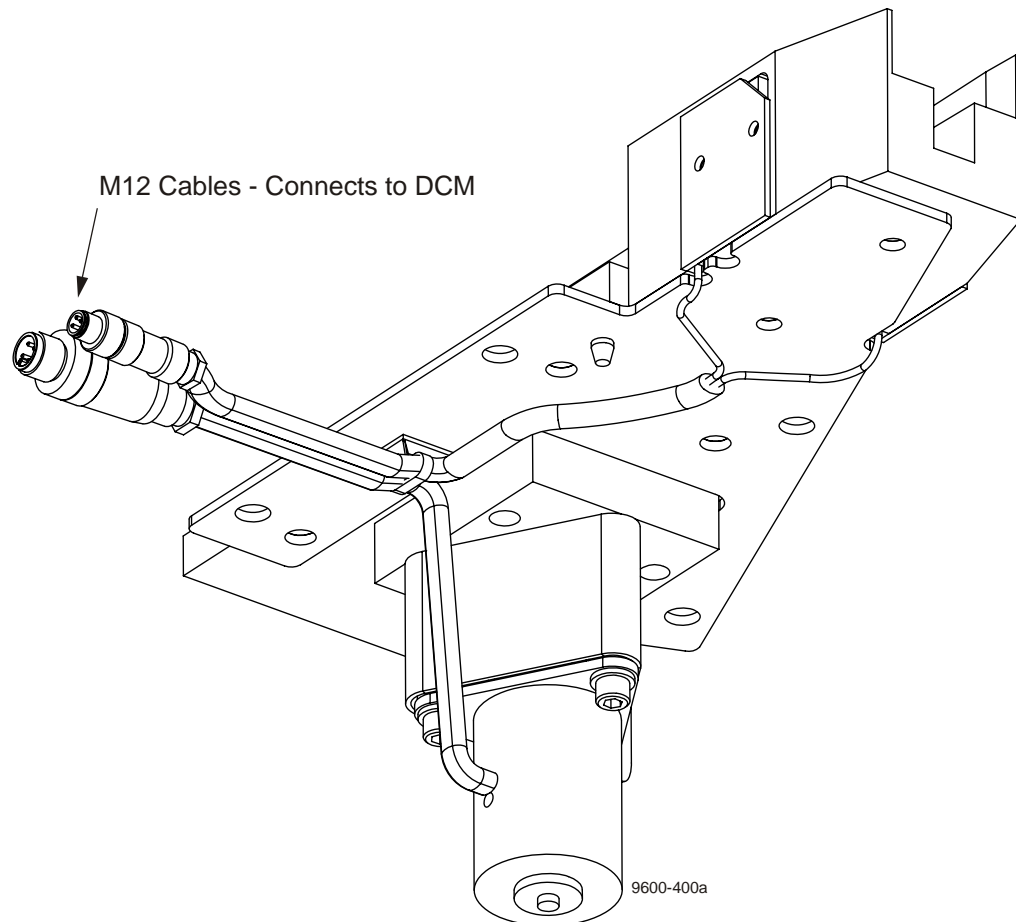


Figure H - 3 Divert Switch

## Divert Switch Actuator Assembly Replacement

The divert switch actuator assembly consists of the trigger, spacer block, and rotary actuator, see Figure H - 5. Use this procedure to replace the assembly.

1. Turn the conveyor Off and perform "Lockout/Tagout".
2. Remove window on side of conveyor.
3. Disconnect the M12 cable connected to the DCM, see Figure H - 4.



Divert Switch Assembly - Bottom View

Figure H - 4 Divert Switch M12 Cables to Divert Control Module

4. Remove the actuator assembly hardware.

Note: The screws were installed with Loctite 609 and torqued to 48 in/lbs at assembly.



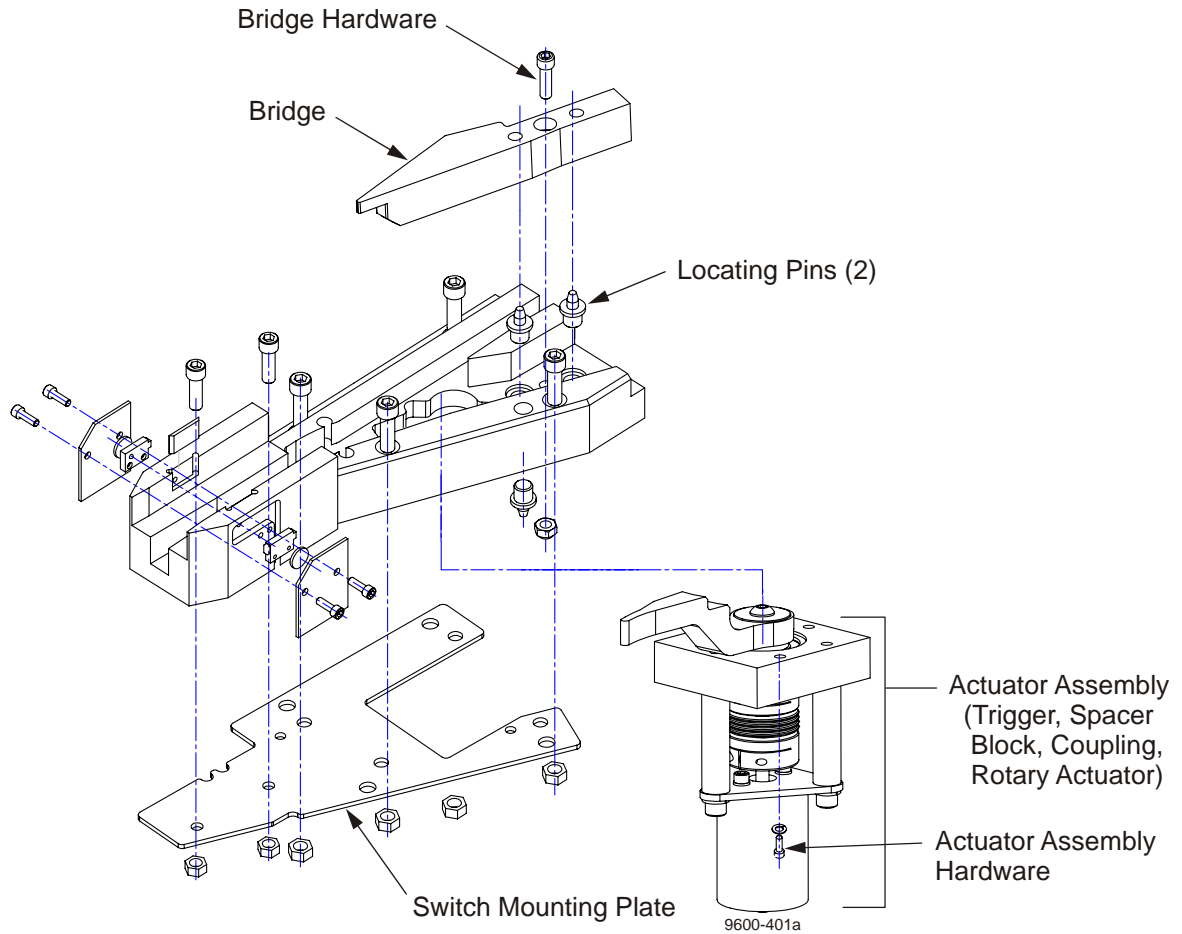


Figure H - 5 Divert Switch Details

5. Remove the actuator assembly from the divert switch.
6. Install the new actuator assembly into the divert switch.
  - a. Apply Loctite 609 to the threads of the mounting screws.
  - b. Install the screws and washers.
  - c. Torque the screws to 48 in/lbs.
7. Re-connect the M12 cable, see Figure H - 4.

## Divert Switch Trigger Replacement

1. Turn the conveyor off and perform "Lockout/Tagout".
2. Remove some slats/tubes and shoes from the sorter apron to create a working window.
3. Remove the 1/4-28 x 1/2" long screw, see Figure H - 6.
4. Remove the 1" O.D. washer and lock washer.
5. Remove the trigger. There are notches on the bottom of the trigger for a small gear puller, if necessary.
6. Install the new trigger and replace the washers.
7. Apply Locktite 609 to the screw and reinstall with 55 in/lbs of torque.
8. Replace the slats/tube and shoes to the sorter apron.
9. Remove all tools from the conveyor.
10. Remove the "Lockout/Tagout".
11. Restore power to the conveyor and test divert switch operation.

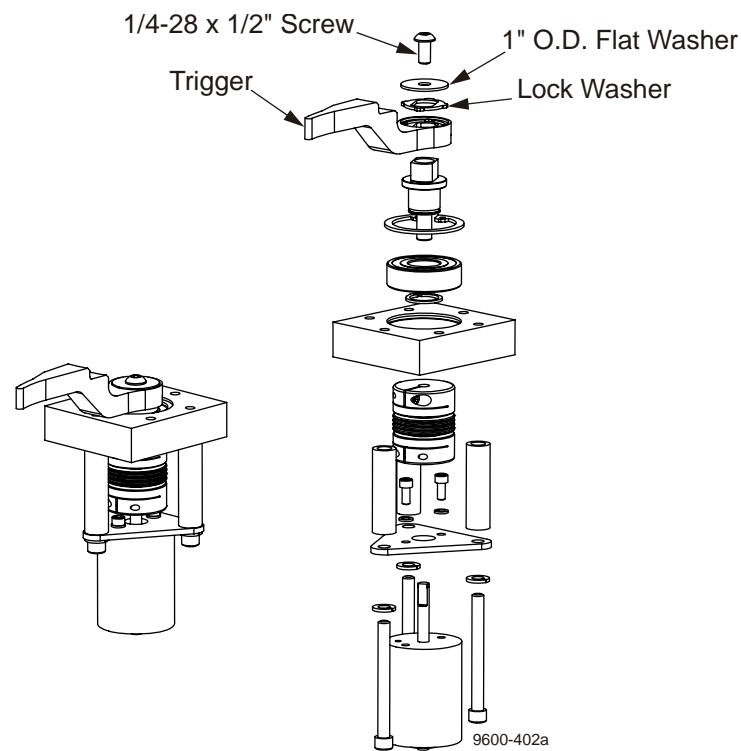


Figure H - 6 Divert Switch Trigger Replacement

## Heat Sink Installation on the Justifier Switch for Dual-Sided Sorters

Use the following procedure to field install a heat sink on the justifier switch on dual-sided sorters, see [Figure B - 4](#) for the location of the justifier switch.

1. Turn the sorter off and perform Lockout/Tagout.
2. Make a window above the justifier switch to access the switch. See [Figure H - 7](#).
3. Apply a thin layer of heat sink compound #10-8109 on the outside surface of the brushless torque actuator (BTA) of the heat sink.

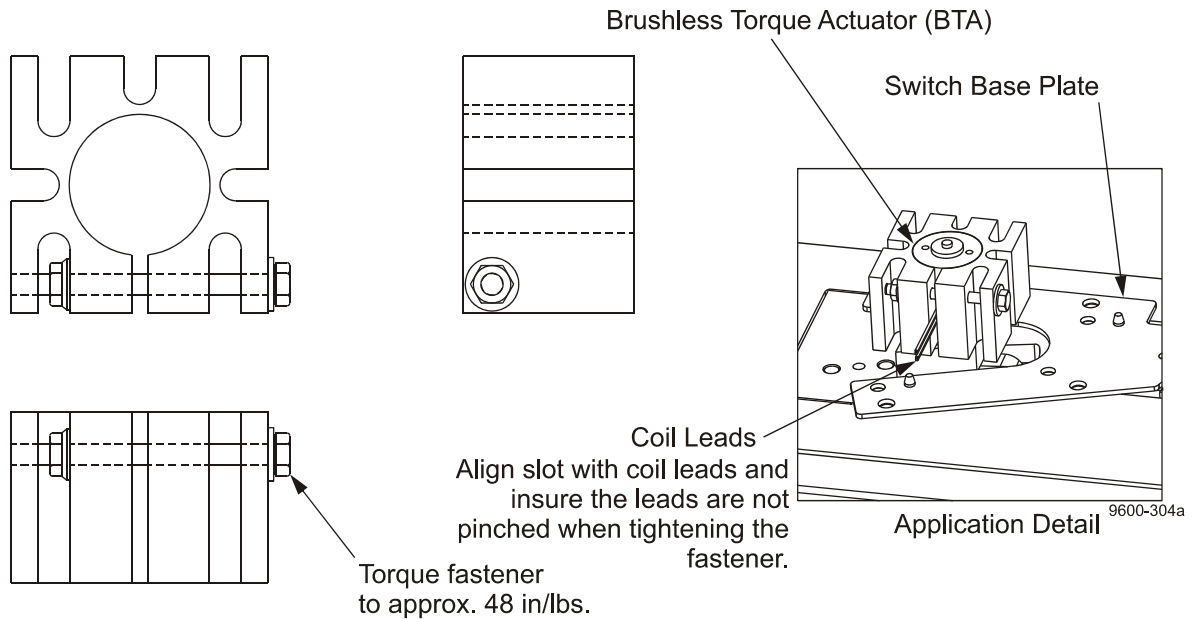


Figure H - 7 Heat Sink Installation on Dual-Sided Sorter Justifier Switches

4. Position the heat sink over the BTA; aligning the slot in the heat sink with the BTA coil leads.
5. Torque the fastener to approximately 48-in/lbs; being careful not to pinch the coil leads.
6. Re-install the slat and shoes; closing the access window.
7. Restart the sorter.

## Cleaning the Center Crossover Switch

1. Make a window in the conveyor to access the crossover switches.
2. Move the window to the location of a crossover switch.
3. Use compressed air to blow out debris in the switch mechanisms.
4. Wipe the switches with a clean, dry soft cotton towel to remove any oil or debris which may have collected.
5. It may be necessary to use a mild detergent to get all of the debris off of the switches.

---

**CAUTION:** Never use a solvent based cleaner on the crossover switches. Solvent based cleaners may damage the polymer materials in the switch.

---

6. Look for loose or broken parts. Replace parts as required.
7. Examine the divert fingers, making certain they move freely.

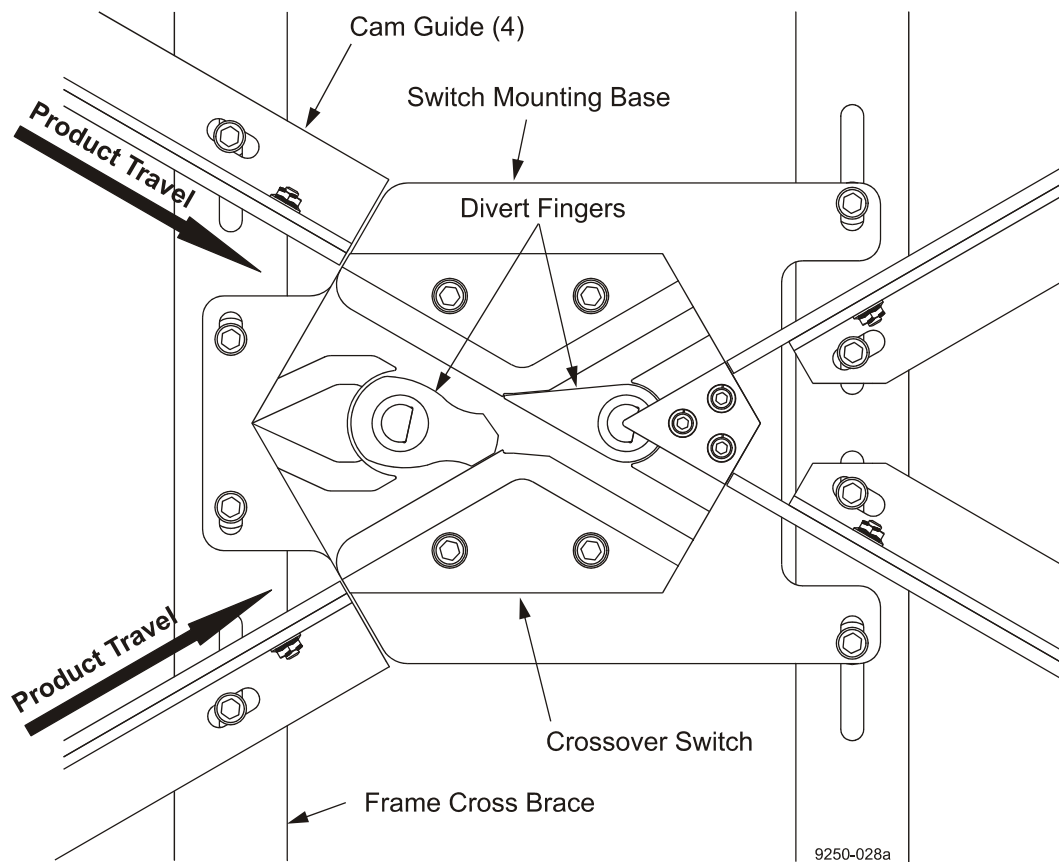


Figure H - 8 Center Crossover Switch

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## Chain Maintenance

### Chain Temperature

An effective method of evaluating the lubrication being applied to the conveyor chain is by checking the temperature of the left hand and right hand chains. The temperature of the running chains should be initially checked after six hours of operation.

To check the temperature of the chains:

- Take ambient temperature readings (temperature readings of steel objects in the vicinity of the conveyor).
- Take infrared thermometer readings of the chain at the idler end of the conveyor with the thermometer as close to the chain as is safely possible. Measure the temperature of the side plates of the chain, not the rollers.
- The chain temperature should be 5 to 10°F (3 to 6°C) higher than the ambient temperature.

If the temperature variance is greater than 10°F (6°C), the oiler system may need to be adjusted to deliver more oil. Freezer applications give different readings than room temperature environments.

- Each chain should be checked separately. Take the chain temperature at the same place on both sides of the conveyor.

### Chain Stretch

The drive chains do stretch with time. To compensate for chain stretch (short conveyors only) adjust the drive shaft take-up screws, thereby moving the drive shaft. Conveyors that are relatively short must be manually adjusted because they do not have a catenary section.

### Chain Wear

Chain wear is checked by measuring the center-to-center distance over six pins. For a new chain this measurement is 12.5" (317.5mm). The chain should be replaced when the center-to-center distance over six pins measures 12.75" (323.9mm).

### Carrying Chain Shortening

The procedure in this section is used to remove carrying chain links in order to maintain the proper chain sag at the catenary take-up.

- Remove chain links in 5" increments from both carrying chains.
- Remove the same amount of chain links from both carrying chains at the same location on both chains. This is necessary to keep the chains properly matched and timed.

### Tools Needed to Shorten the Chain

- Two come-alongs, preferably chain types.
- Four 1/2" grade 8 eyebolts.
- Eight nuts and flat washers, used to attach the eyebolts to the chain.
- Chain breaker or hand grinder, used to break the chain.
- Two master links, one for each chain.

### Chain Shortening Procedure

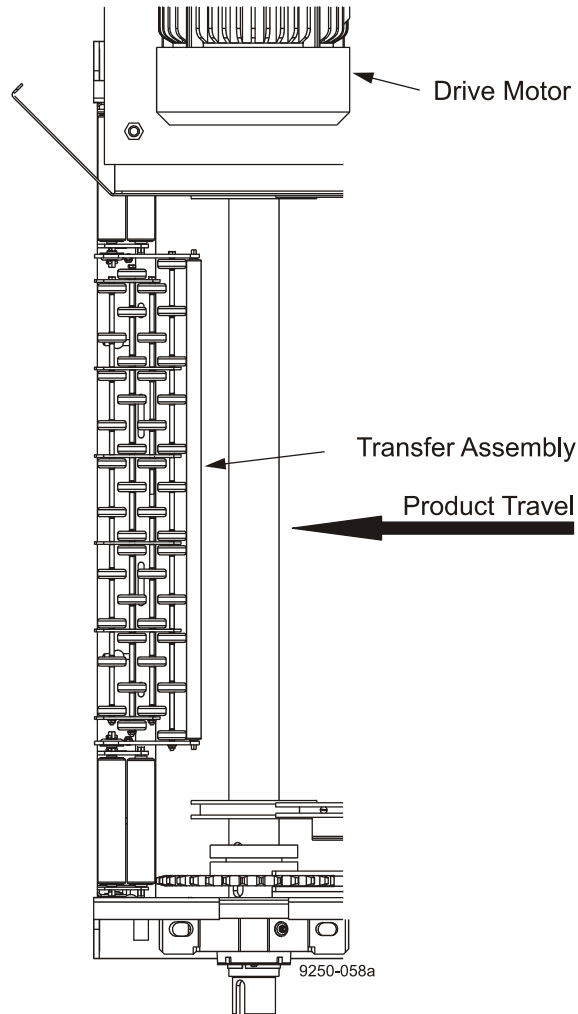
1. Position the chain so that the master links are near the catenary take-up.
2. Turn the conveyor Off and perform "Lockout/Tagout".
3. Remove a 10' section of side guard near the catenary take-up, if equipped.
4. Make a 5' to 6' window in the conveyor, sufficient enough to break the chain.

- 
- Refer to “Making A Window”, on page H - 3, to remove the slats (or tubes) from the sorter.
5. Attach two eyebolts on each chain at the same location on both chains:
    - a. Place a nut and flat washer on the eyebolt.
    - b. Insert the eyebolt, with eye facing up, through a chain link.
    - c. Place another flat washer and nut to the bottom of the eyebolt.
    - d. Tighten the nuts to secure the eyebolt to the chain link.
    - e. Repeat steps a. through d. to install another eyebolt approximately 10’ from the first eyebolt.
    - f. Repeat steps a. through e. for the other chain.
  6. Attach the two come-alongs to each chain:
    - a. Attach the come-along to one of the eyebolts on the chain.
    - b. Attach the come-along chain to the other eyebolt on the same chain.
    - c. Repeat steps a. and b. to attach the other come-along to the eyebolts on the opposite chain.
  7. Equally tighten the come-alongs until the desired chain sag is acquired in the catenary.
- Note: Make sure that you can remove at least 5 inches of chain before breaking the chains, this best done at a existing master link.
- It must be done in 5 inch increments and exactly in the same location on each chain.
8. Break the chain at the correctly determined location.
    - Use a chain breaker or hand grinder to break the chain.
  9. Remove identical chain lengths from both chains and reconnect the chains using new master links.
  10. Disconnect the come-alongs and remove all eyebolts, nuts, and washers from the chain.
  11. Verify the proper amount of chain sag is in the catenary.
  12. Install the slats (or tubes) to close the window in the conveyor.
    - Check for any tools, bolts, or debris that might have fallen into the sorter during this procedure.
  13. Install the side guard.
  14. Apply power and test run the sorter in the jog mode.
  15. Re-calibrate the sorter.
    - **Any time the chain has been altered the sorter must be calibrated.**

## Transfer Assembly

Confirm the transfer assembly pivots up and down freely.

Confirm drive motor power is dropped when the assembly is pivoted to the up position.



Note: Some guards or covers removed for clarity.

Figure H - 9 Transfer Assembly

## Internal Jam Detector

Confirm the IJD assembly pivots up.

Confirm drive motor power is dropped when the IJD limit switch is tripped.

To adjust the internal jam detector, see Figure H - 10:

1. Loosen the flange bearing bolts so the bearing drops to the lowest position.
2. Place a magnetic mount torpedo level vertically on the flipper blade.
3. Place a 1/8" thick flat underneath the flipper blade on each end of the blade.  
The objective is to position the flipper blade so it is perpendicular to the carrying tubes and 1/8" above them.
4. Grasp the trip arm and rotate the arm against the rubber bumper until the flipper blade is vertical.  
The flange bearing will move up or down as you do this. If you cannot move the arm far enough, adjust the rubber bumper so the flipper plate is vertical.
5. Tighten the flange bearing bolts.
6. Remove the 1/8" thick flats.

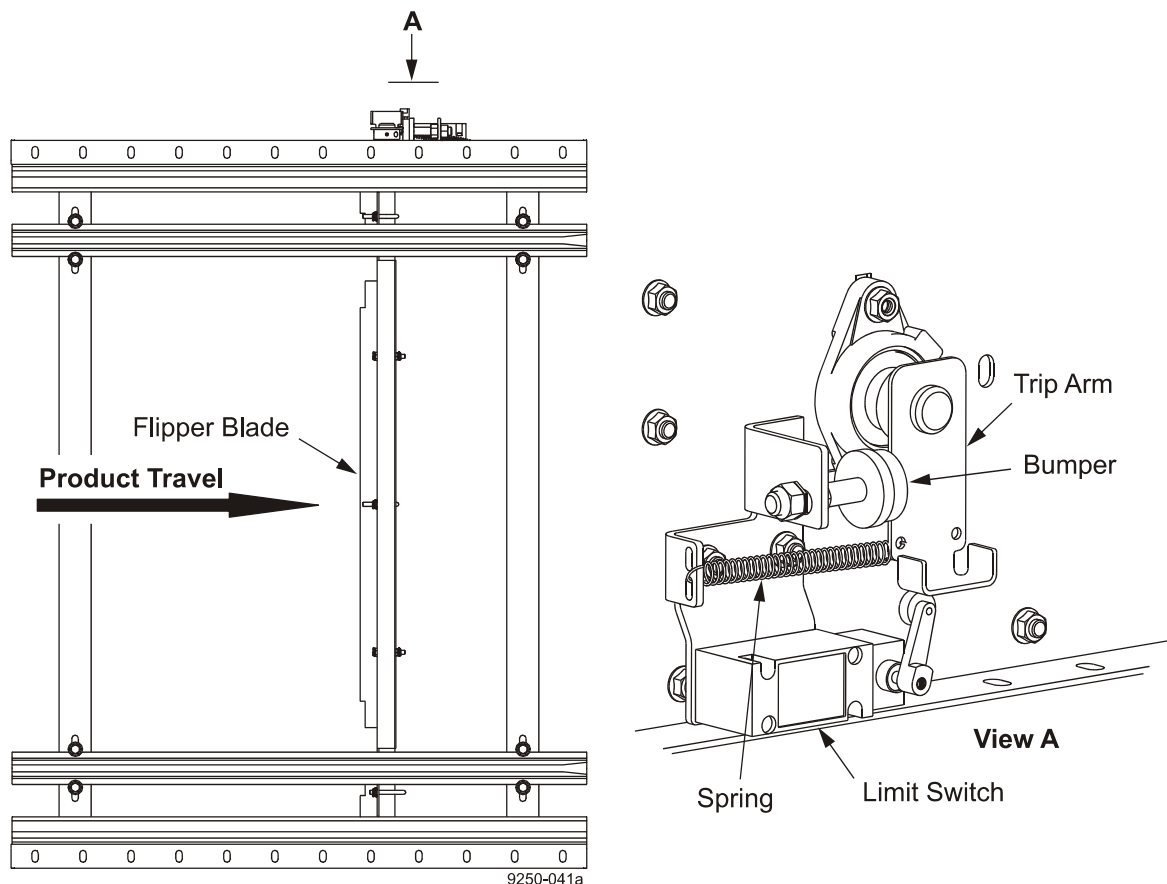


Figure H - 10 Internal Jam Detector

7. Adjust the limit switch arm, if necessary.
  - a. Loosen the limit switch arm.



- b. Rotate the arm until limit switch arm roller is in the normal operating position when the IJD flipper blade is in the vertical position and the trip arm is over the limit switch arm roller.

When the IJD has detected a jam condition, the trip arm is moved off the limit switch arm roller and trips the limit switch. In this condition, power is dropped to the drive motor.

- c. Tighten the limit switch arm.

---

---

**NOTE:** The IJD flipper plate in the drive section is only one half a normal flipper plate. The half plate faces upward (bottom half is blank) with the angled portion facing in the direction of product travel (towards the discharge end). Adjusting this IJD is the same as that described above except that slats/tubes must be above the flipper plate and the 1/8" flats are placed between the flipper plate and the slats/tubes above it.

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## Reducer Maintenance

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**NOTE:** If the unit is not going to be operated for an extended period of time, fill the unit completely with the proper oil. This will help prevent internal oxidation of the critical parts. Before resuming use, be sure the oil is of the proper type and at the proper level. Operating a unit full of oil causes overheating and leakage through the oil seals and the breather plug.

---

---

**CAUTION:** Store the reducer in a dry location where the temperature remains relatively constant, not passing through the dew point. Do not store the unit outdoors. If the temperature passes through the dew point, moisture will condense on the inside of the unit. This will reduce the life of the reducer.

---

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Check the unit for oil leaks and the source of those leaks.

The most common leak points are pipe plugs, oil seals, and the cover gasket. Rather than waiting for parts during unscheduled down time, you may wish to order replacement parts when the leaks are minor. Occasionally the breather plug is not properly located at the highest point in the unit. Relocate the breather plug, if required, especially if the lubricant is foaming out of the breather. Many leaks are caused by overfilling the unit with oil. Check the proper oil level. Do not let any leak go unattended as loss of oil will eventually cause a failure.

Be careful not to confuse the fill plugs with the oil level hole. The reducer has fill plugs in several locations because it can be mounted in four different positions.

In cases of severe service applications, such as extreme exposure to water, high humidity, dirty or dusty environment, or chemicals in the air which react with lubrication oil, the oil change interval must be shortened depending on the severity of the conditions.

For better drainage, drain the oil when the unit is warm. Remove and examine the magnetic drain plug for metal chips and particles. An excessive amount of metal particles signals internal problems. Consult Intelligrated if you think the amount is excessive. Small amounts of metal particles are normal and should simply be cleaned off prior to reinstallation. After draining, remove debris by thoroughly flushing the inside of the unit with clean oil. Remove and clean the breather plug to ensure that the air passage is clear. Reinstall the drain plug and breather plug after using a thread sealant.

For units that see a significant seasonal swing in ambient temperature, change the grade of oil as needed (thinner oil in winter, thicker oil in summer). See Scheduled Maintenance topic in this section.

---

## Reducer Temperature

Do not allow the reducer to become covered with dirt, dust or other debris. The insulating properties of these coverings could cause the unit to overheat. This will lead to a breakdown of the lubrication, causing premature failure of the reducer components.

Check the reducer temperature with an infrared thermometer. Measure the temperature at several locations and use the highest reading. The reducer temperature must not exceed 175° (90° ambient temperature).

## Other Reducer Maintenance

Be sure the reducer shaft set screws are properly torqued.

Check the torque arm fittings for tightness and wear.

When an optional backstop is installed, be sure the set screw on the OD of the cap is tight against the output shaft.

At oil change intervals during normal maintenance, add grease to the grease fitting on the shaft seal or the optional puller cap (whichever is installed), as instructed in the reducer assembly instructions.

Check the V-belts for wear and proper tension.

Check the V-belt sheaves for tightness to the motor and input shafts.

Check the electrical connections to the motor.

Ensure that all required guard and safety devices are in place and function properly.

In environments where a buildup of unwanted surface coverings is expected, clean the outer surfaces of the reducer often. Ensure that the breather is clear after cleaning.

## Troubleshooting

Basic troubleshooting provisions are outlined in Table H 4. When troubleshooting a specific conveyor system, always check the maintenance information.

**CAUTION:** Do not clear jams or reach into any unit before first turning off the equipment power source(s) and making certain that all moving parts are fully stopped. To avoid personal injury or equipment damage, lock out and tag out the conveyor operation control(s) before attempting to correct any malfunction.

Table H 4 Basic Troubleshooting Problems and Solutions

Problem	Cause	Solution
Drive Motor Does Not Run	Tripped Safety Device <ul style="list-style-type: none"> <li>• Internal jam detector is tripped.</li> <li>• Product jam on conveyor.</li> <li>• Infeed/discharge end safety rollers out of position.</li> <li>• Emergency Stop on.</li> <li>• Product out of position detected at drive section shoe return.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify limit switch is not actuated, see Figure H - 10. Remove any debris.</li> <li>• Clear jam, verify position and operation of applicable photo-eyes.</li> <li>• Verify roller(s) are in safe position, proximity switch is actuated indicating rollers in correct position, see Figure H - 9.</li> <li>• Verify Emergency Stop is Off.</li> <li>• Check for product on wrong side of shoes at drive section. Check photo-eye and proximity switch.</li> </ul>
	Electrical Power Circuits/Drive Motor <ul style="list-style-type: none"> <li>• Drive motor defective.</li> <li>• Motor disconnect switch.</li> <li>• VFD, misadjusted/defective.</li> <li>• Drive overcurrent relay/sensor.</li> <li>• Motor contactor.</li> <li>• Power fuses/circuit breakers.</li> <li>• Motor start PB/main power switch.</li> <li>• Wiring.</li> </ul>	<ul style="list-style-type: none"> <li>• Check drive motor and wiring.</li> <li>• Check that motor disconnect switch is On and not defective.</li> <li>• Refer to VFD manufacturer's manual for troubleshooting.</li> <li>• Verify overcurrent relay/sensor not tripped or defective. Check adjustment.</li> <li>• Verify motor contactor is not defective.</li> <li>• Check for blown fuses, tripped circuit breakers.</li> <li>• Check that main power switch is on and motor start PB is not defective.</li> <li>• Check all wiring for any loose connections or broken wires.</li> </ul>

Table H 4 Basic Troubleshooting Problems and Solutions (Continued)

Problem	Cause	Solution
Drive Motor Starts, But Stops Immediately or Conveyor Does Not Reach Specified Operating Speed	<ul style="list-style-type: none"> <li>Over current relay/sensor is tripping.</li> </ul>	<ul style="list-style-type: none"> <li>Check adjustment of relay/sensor.</li> <li>Check carrying chains for proper lubrication and tension.</li> <li>Check carrying tubes for contamination or divert shoes binding.</li> <li>Check for any binding in drive and idler sections.</li> <li>Check drive motor for free rotational movement.</li> </ul>
	<ul style="list-style-type: none"> <li>VFD misadjusted or defective.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to VFD manufacturer's instructions and verify adjustments.</li> </ul>
Conveyor Takes Long Time to Reach Speed or Carrying Chains Jerk When Starting	<ul style="list-style-type: none"> <li>VFD misadjusted or defective.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to VFD manufacturer's instructions and verify adjustments.</li> </ul>
	<ul style="list-style-type: none"> <li>Carrying chains not properly lubricated.</li> </ul>	<ul style="list-style-type: none"> <li>Check for proper operation of automatic chain oiler, make adjustments as necessary.</li> </ul>
	<ul style="list-style-type: none"> <li>Carrying chains tension incorrectly.</li> </ul>	<ul style="list-style-type: none"> <li>Check carrying chain tension and adjust if required. Re-adjust VFD.</li> </ul>
Conveyor Shuts Off Automatically During Normal Operation	<ul style="list-style-type: none"> <li>Safety device(s) tripped.</li> </ul>	<ul style="list-style-type: none"> <li>See the "Drive Motor Does Not Run" checks in this section.</li> </ul>
	<ul style="list-style-type: none"> <li>Low oil level in chain oiler reservoir.</li> </ul>	<ul style="list-style-type: none"> <li>Check and refill if required. Use Mobile, DTE Heavy-Medium, ISO-68 oil only. Do not use other lubricants without approval of Intelligrated.</li> </ul>
	<ul style="list-style-type: none"> <li>Electrical power circuit/device problem.</li> </ul>	<ul style="list-style-type: none"> <li>See to "Electrical Power Circuits/ Drive Motor" in this section.</li> </ul>
	<ul style="list-style-type: none"> <li>Recirculation/overflow conveyor full or not operating.</li> </ul>	<ul style="list-style-type: none"> <li>Clear full condition.</li> <li>Troubleshoot drive/power unit.</li> </ul>
	<ul style="list-style-type: none"> <li>Sort control unit.</li> </ul>	<ul style="list-style-type: none"> <li>Verify control unit is not inhibiting drive motor power due to possible control unit failure/wiring problem.</li> </ul>
Drive Switching Noisy at One or More Divert Switches	<ul style="list-style-type: none"> <li>Some divert shoes binding/carrying tubes contaminated.</li> </ul>	<ul style="list-style-type: none"> <li>Clean carrying tubes/adjust shoe fasteners as necessary.</li> </ul>

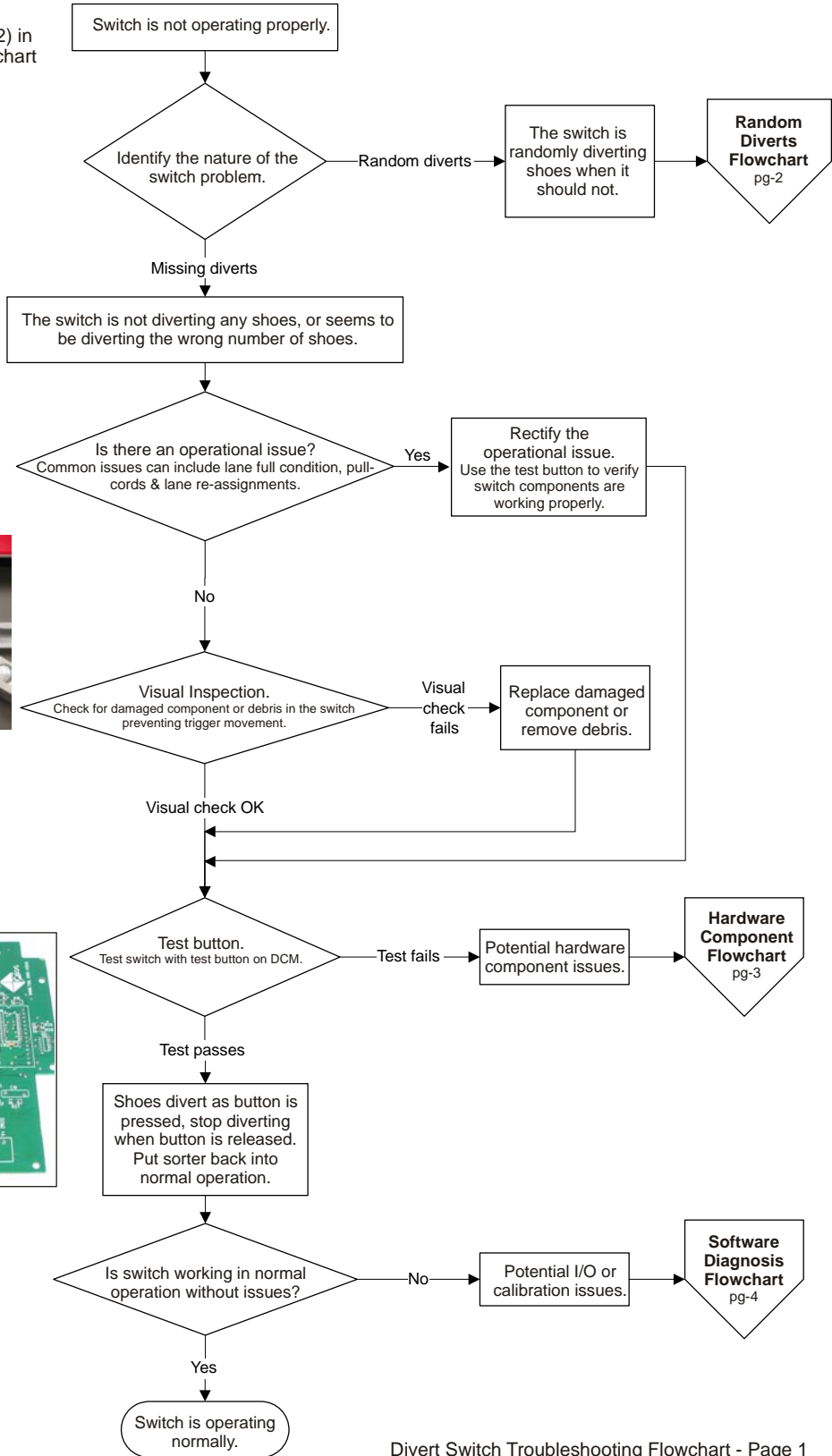
Table H 4 Basic Troubleshooting Problems and Solutions (Continued)

Problem	Cause	Solution
Divert Shoes "Jump" During Diverting	<ul style="list-style-type: none"> <li>• Divert switch block binding, misaligned, or damaged.</li> <li>• Divert shoe pin damaged.</li> <li>• Pin guide track(s) misaligned.</li> </ul>	<ul style="list-style-type: none"> <li>• Align, adjust, or replace switch block as necessary. (see "Divert Switch Operational Mechanisms Check and Alignment".)</li> <li>• Replace.</li> <li>• Align pin guide track.</li> </ul>
Inoperative Divert Switch	<ul style="list-style-type: none"> <li>• See "Divert Switch Troubleshooting Flowchart", on page H - 26,.</li> </ul>	
All Divert Switches Inoperative - Conveyor Drive Motor Operates - Conveyor Runs at Correct Speed	<ul style="list-style-type: none"> <li>• +24 Vdc supply voltage for proximity switches.</li> <li>• Loss of 110 Vac for brushless rotary actuators.</li> <li>• Control system failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Check +24 Vdc power supply and wiring.</li> <li>• Check 110 Vac wiring and control unit.</li> <li>• Troubleshoot control system per control supplier's instructions.</li> </ul>
Induction Conveyor Inoperative	<ul style="list-style-type: none"> <li>• Conveyor not at speed.</li> </ul>	<ul style="list-style-type: none"> <li>• First proximity switch defective and/or auxiliary contact on motor starter defective.</li> </ul>
	<ul style="list-style-type: none"> <li>• Induction conveyor drive-power unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify induction conveyor run not inhibited by control unit.</li> <li>• Troubleshoot induction conveyor drive-power unit.</li> </ul>

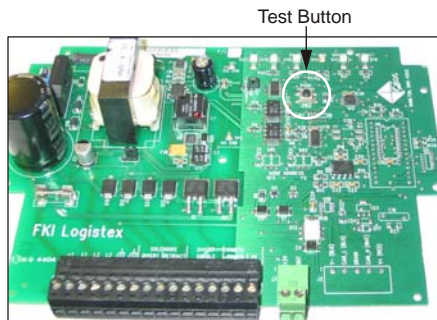
# Divert Switch Troubleshooting Flowchart

This flowchart is intended to help diagnose and troubleshoot switch problems associated with sliding shoe sorters. This procedure assumes the sorter has been fully commissioned and operational under BOSS system control. For additional information on BOSS software tests mentioned in this flowchart, see the documentation provided with the site specific BOSS documentation.

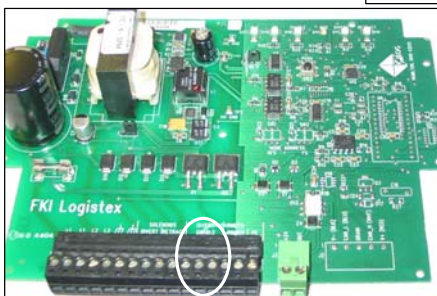
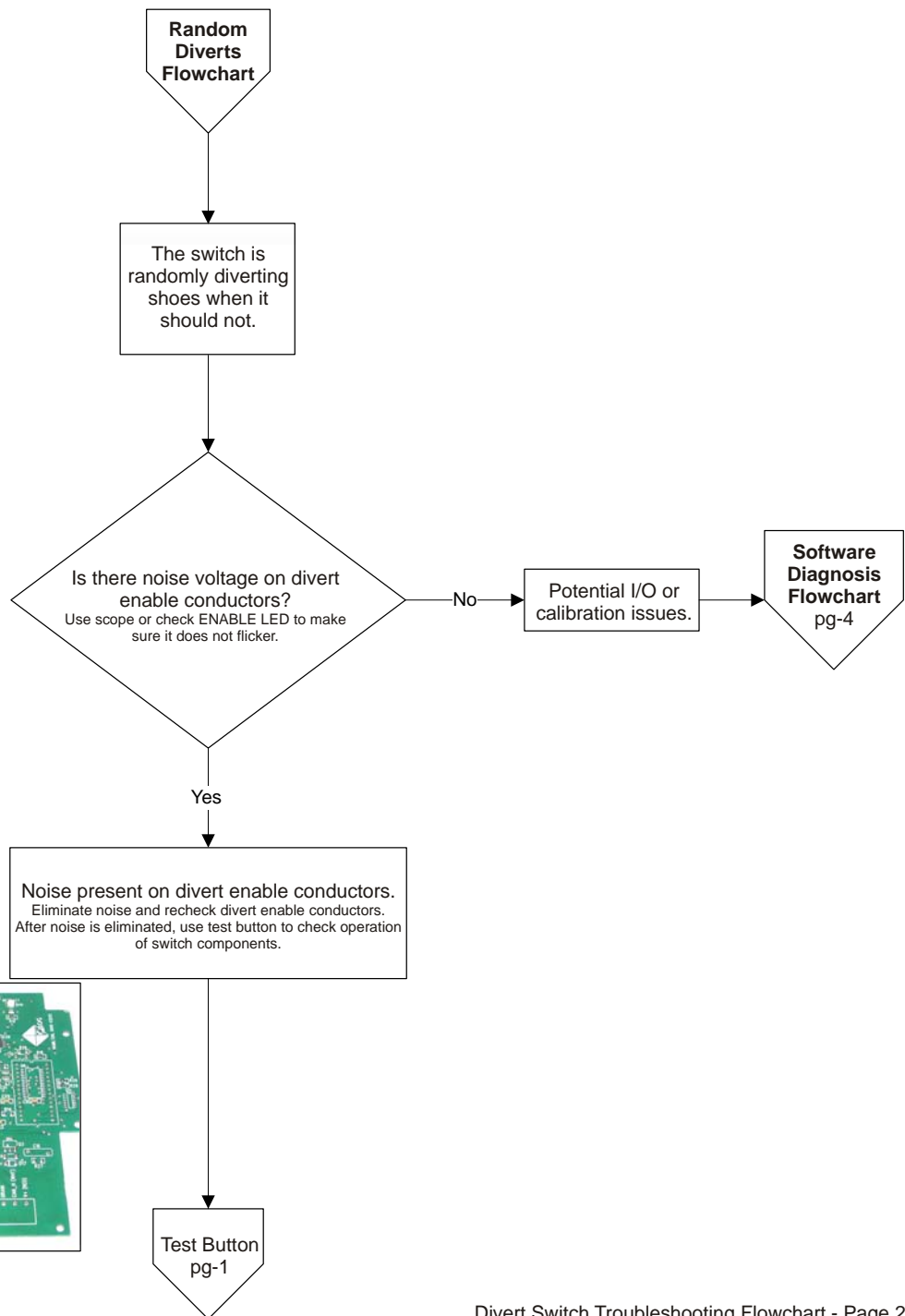
Note:  
References to page numbers (ex: pg-2) in this flowchart are to pages of the flowchart and not to pages of this chapter.



Check for Damage or Debris

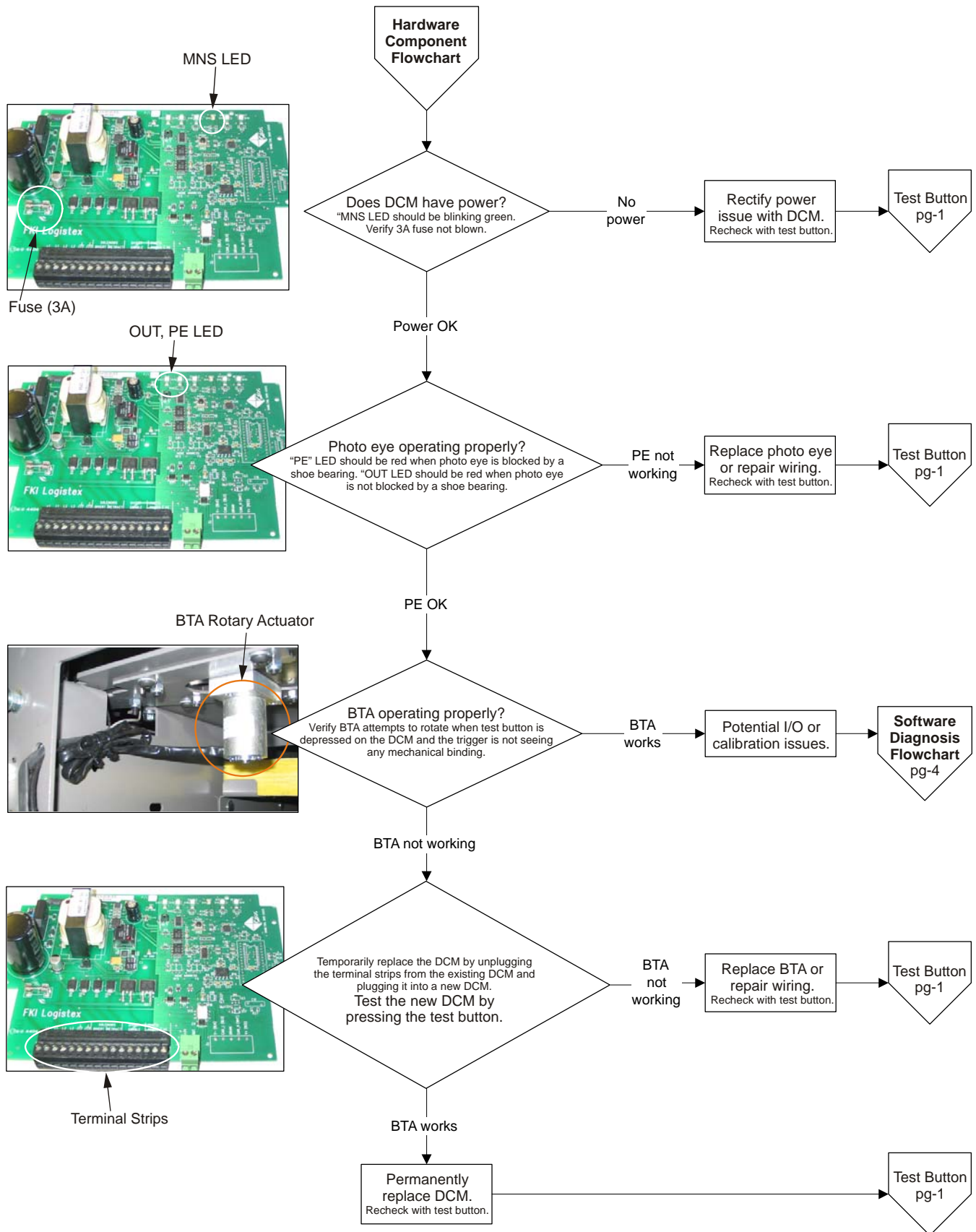


DCM



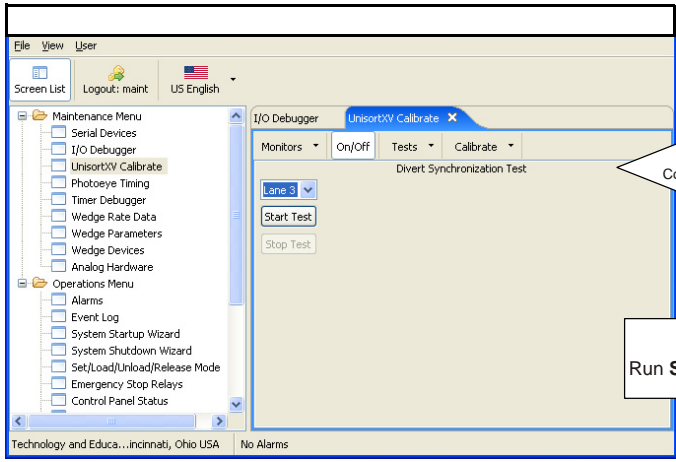
Divert Enable

Divert Switch Troubleshooting Flowchart - Page 2

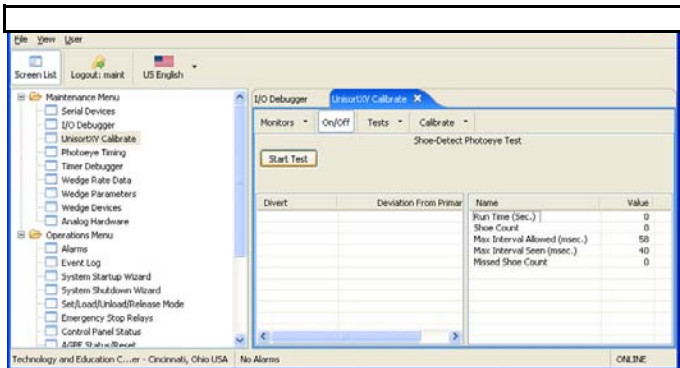
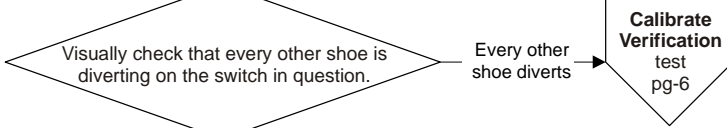
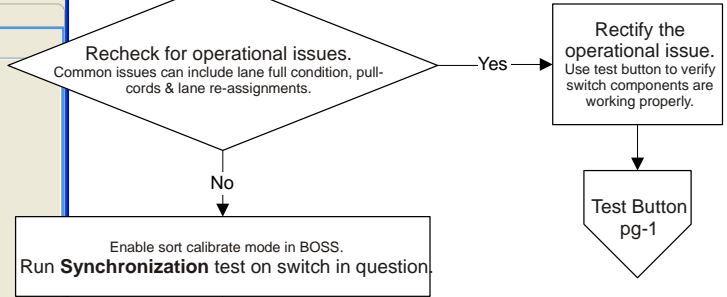




Software  
Diagnosis  
Flowchart

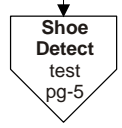


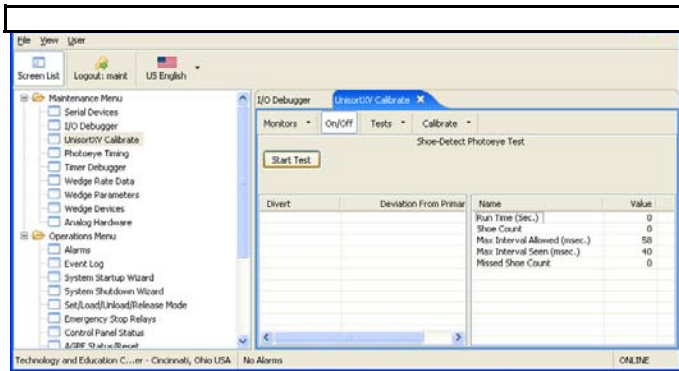
Synchronization Test



Shoe Detect Photo Eye Test

Shoes do not divert  
or  
Shoes divert erratically

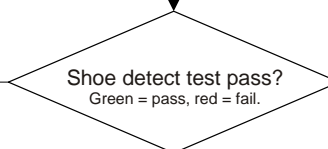




Shoe Detect Photo Eye Test



Perform shoe detect test to verify software is getting all switch photo eye inputs.



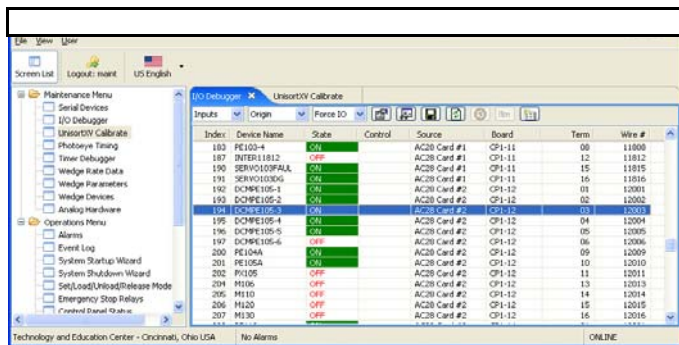
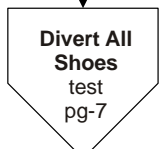
Fail

Pass

The issue is likely an I/O problem, Exit sort calibrate mode in BOSS.

There may be a mechanical component issue.

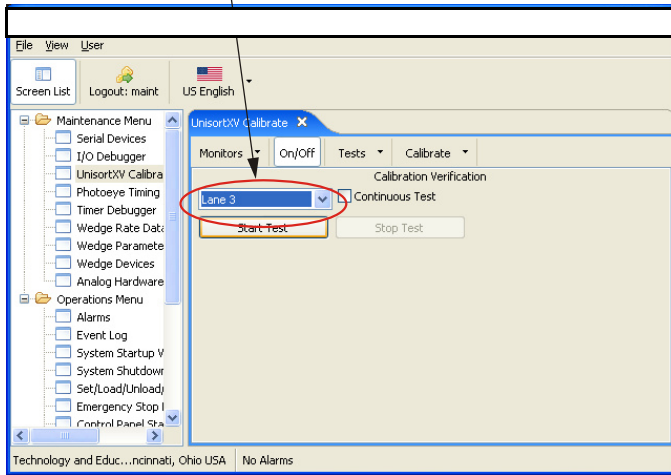
Open I/O debugger, find photo eye input (DCM PE) and resolve I/O issue. Once I/O issue is resolved, shoe detect test should pass.



I/O Debugger

Exit sort calibrate mode in BOSS. Switch should be operating normally.

Calibration Verification Test



Calibrate Verification test

Run calibrate verification test to see if there is a calibration problem.

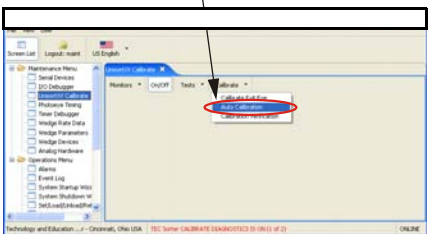
Which switch is causing the problem?

Set up switch on a dual sided sorter

Any other scenario

First switch on a single sided sorter

Auto Calibration



Run test on Lane 1.

Run test on Lane 2.

Run test on switch in question.

Calibrate verification test pass?

Fail

Pass

Re-calibrate sorter. Select Auto Calibration. Start Test.

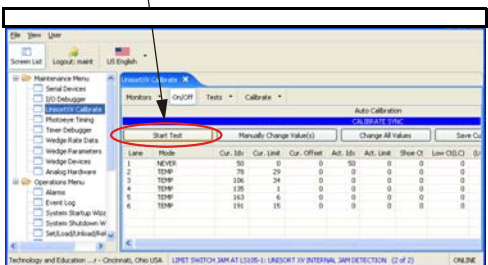
Switch seems to be operating properly from a mechanical and electrical perspective.

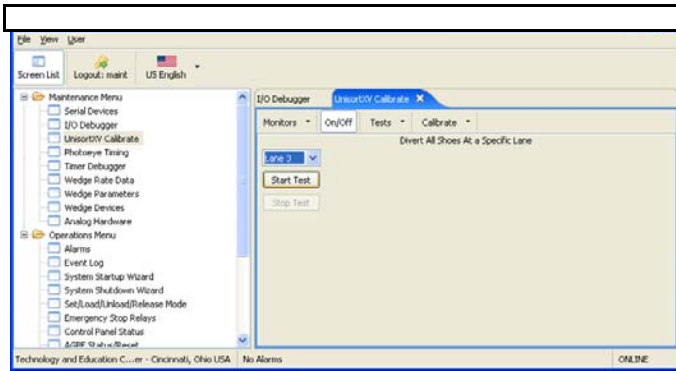
Exit sort calibrate mode in BOSS. Recheck operational issues.

Exit sort calibrate mode in BOSS. Switch should be operating normally.

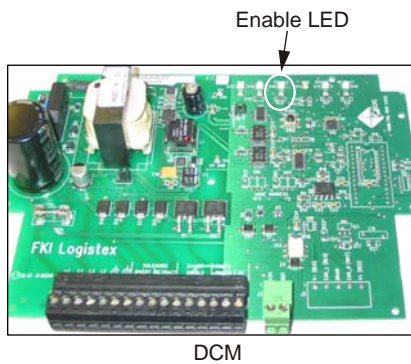
Check operational issues pg-1

Auto Calibration Start Test

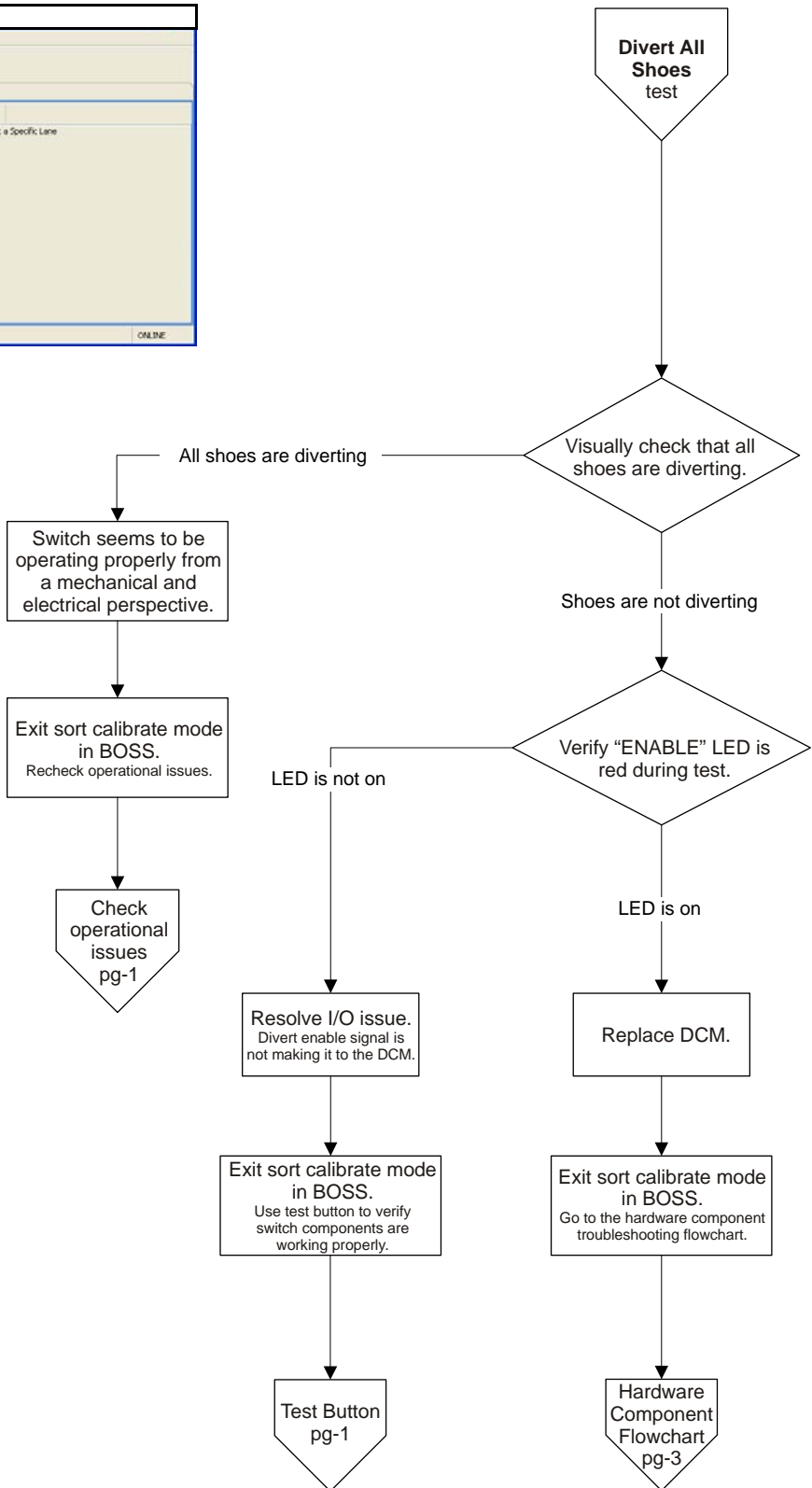




Divert All Shoes Test



DCM



Divert Switch Troubleshooting Flowchart - Page 7

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***SECTION I: PARTS IDENTIFICATION*****General Information**

This section provides a list of common spare parts for a preventive maintenance program to minimize downtime. The parts shown in this section apply to the standard product line.

The following pages illustrate the location of spare parts as they apply to each particular unit. For parts not shown in the section, refer to the application specific Bill of Material.

Part Numbers shown as TBD (To Be Determined) are under development at the time of manual publication.

## UniSort VII Infeed Belt Units

### UniSort VII Infeed Belt - Dual-Sided Sorter - Part Listing

Key	Description	Belt Width		
		22"	28"	34"
		Part Number		
1	Belt	Refer to site specific "Spare Parts List"		
2	Infeed Roller	7012410	7012409	7012404
3	Roller	7005185	7005009	7005186
4	Axle	7005189	7005010	7005190
5	PU, 5.5x.134,["W"+12.75],RL, 1.68 SFT	7014077	7014186	7014074
6	Bearing	7013194		
7	Roller	7005193	7005011	7005194
8	Axle	7005197	7005012	7005198
9	Sprocket	7001557		
10	BU,TL,DODGE,2012X1.688	7115238		
11	Timing Belt	7014060		
15	Tensioner Drive	7002214		
16	Idler Pulley	7002213		
17	Idler Shaft	7002212		

UniSort VII Infeed Belt - Dual-Sided Sorter - Drawing

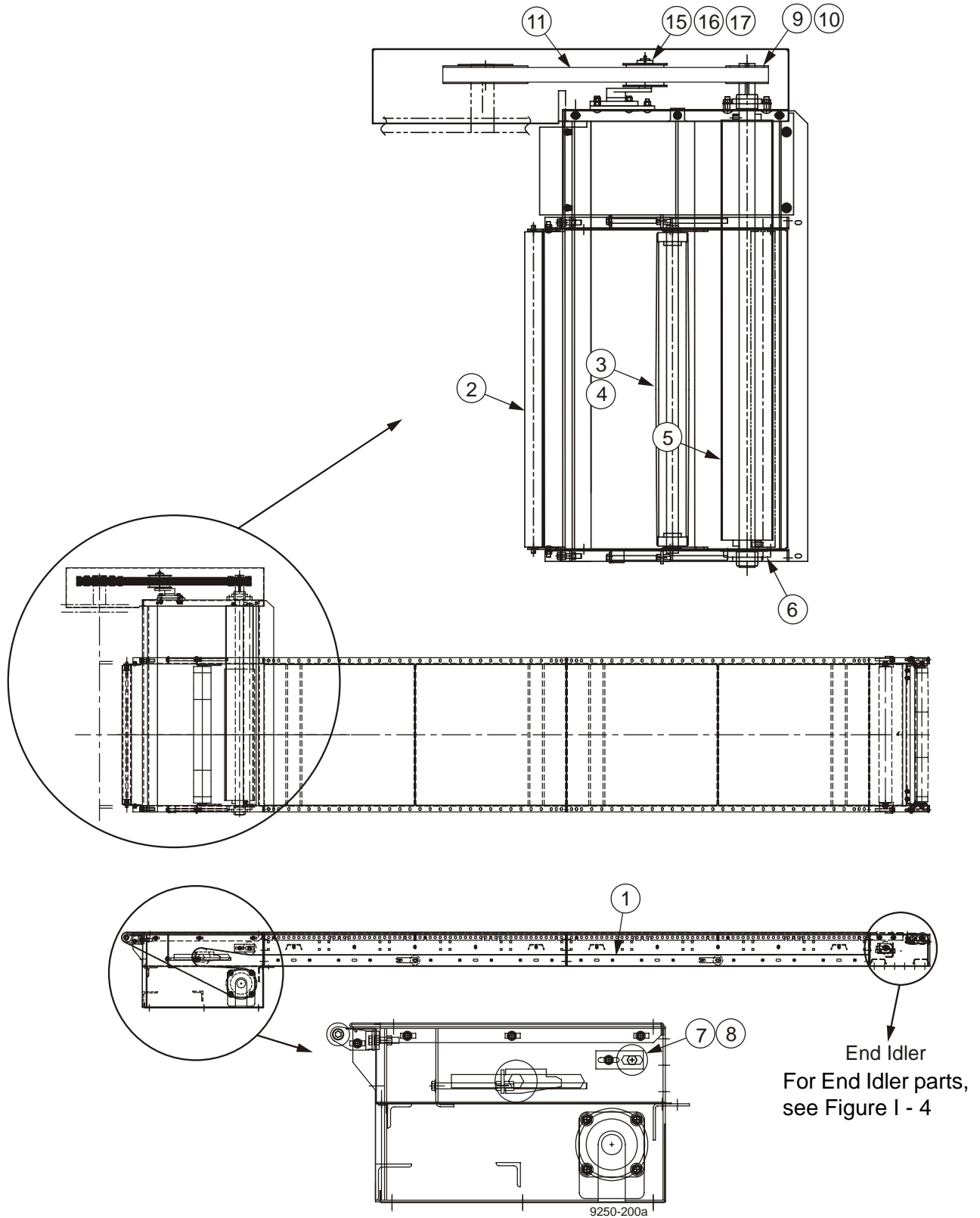


Figure I - 1 UniSort VII Infeed Belt - Dual-Sided Sorter

## UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Divert Side - Part Listing

Key	Description	Belt Width		
		22"	28"	34"
		Part Number		
1	Belt	Refer to site specific "Spare Parts List"		
2	Infeed Roller	7012410	7012409	7012404
3	Roller	7005185	7005009	7005186
4	Axle	7005189	7005010	7005190
5	PU, 5.5x.134,["W"+6.5],RL, 1.68 SFT	7092056	7014077	7014186
6	Bearing	7013194		
7	Roller	7005193	7005011	7005194
8	Axle	7005197	7005012	7005198
9	Sprocket	7001557		
10	BU,TL,DODGE,2012X1.688	7115238		
11	Timing Belt	7014060		
15	Tensioner Drive	7002214		
16	Idler Pulley	7002213		
17	Idler Shaft	7002212		



**UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Divert Side - Drawing**

Note:  
PTO on same side as aftersort conveyor.

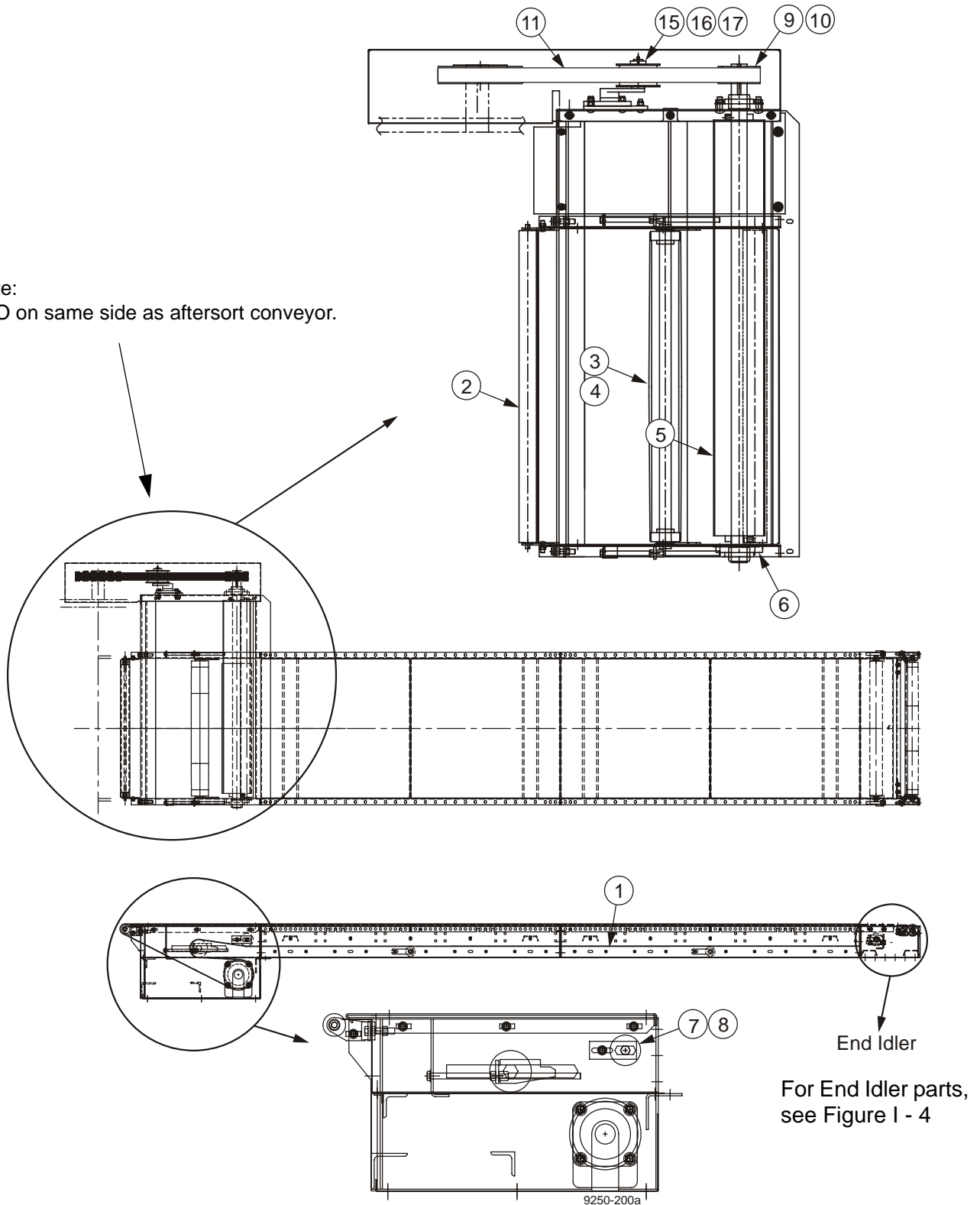


Figure I - 2 UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Divert Side

## UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Switch Side - Part Listing

Key	Description	Belt Width		
		22"	28"	34"
		Part Number		
1	Belt	Refer to site specific "Spare Parts List"		
2	Infeed Roller	7012410	7012409	7012404
3	Roller	7005185	7005009	7005186
4	Axle	7005189	7005010	7005190
5	PU, 5.5x.134,["W"+12.75],RL, 1.68 SFT	7014077	7014186	7014074
6	Bearing	7013194		
7	Roller	7005193	7005011	7005194
8	Axle	7005197	7005012	7005198
9	Sprocket	7001557		
10	BU,TL,DODGE,2012X1.688	7115238		
11	Timing Belt	7014060		
15	Tensioner Drive	7002214		
16	Idler Pulley	7002213		
17	Idler Shaft	7002212		

### UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Switch Side - Drawing

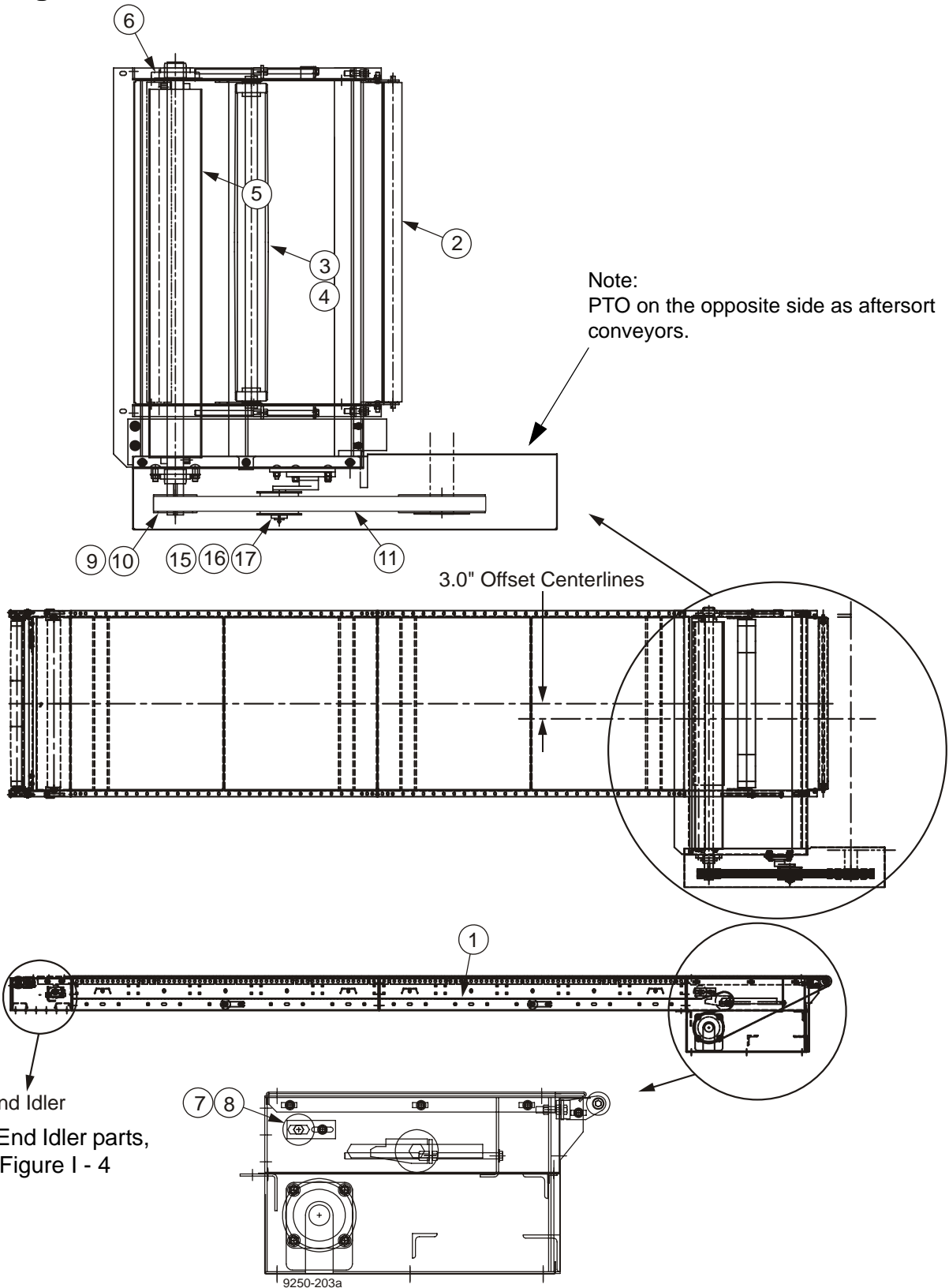


Figure I - 3 UniSort VII Infeed Belt - Single-Sided Sorter with PTO on Switch Side

---

**End Idler****End Idler - Part Listing**

Key	Description	Belt Width		
		22"	28"	34"
		Part Number		
1	Roller	7061011	7061012	7065042
2	Axle	7065040	7065041	7065043
3	Roller, 2.38" Diameter	7085044	7085047	7085051
4	Roller, 3.50: Diameter	7009230	7009231	7009232

**End Idler - Drawing**

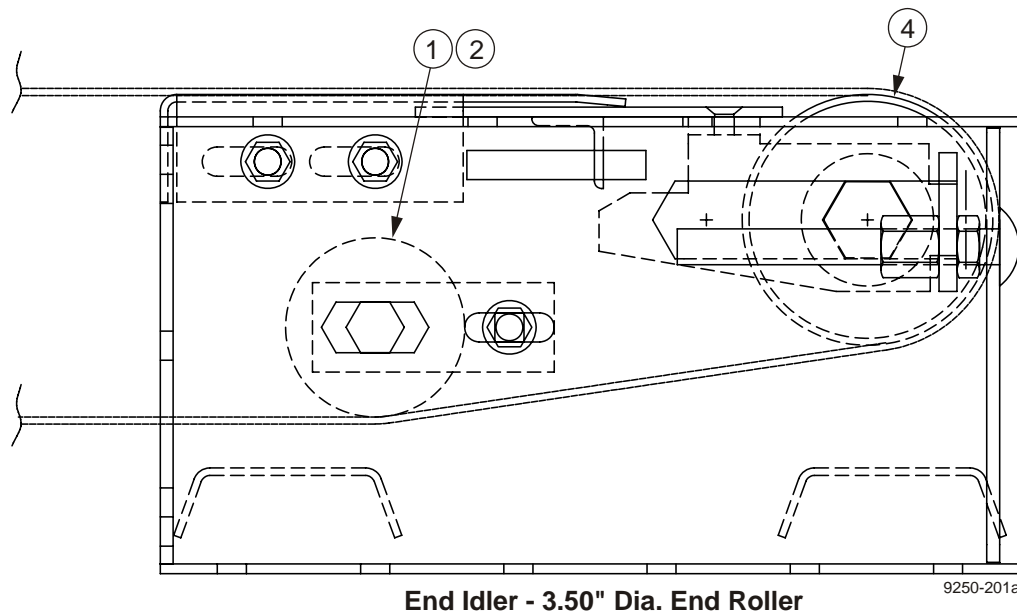
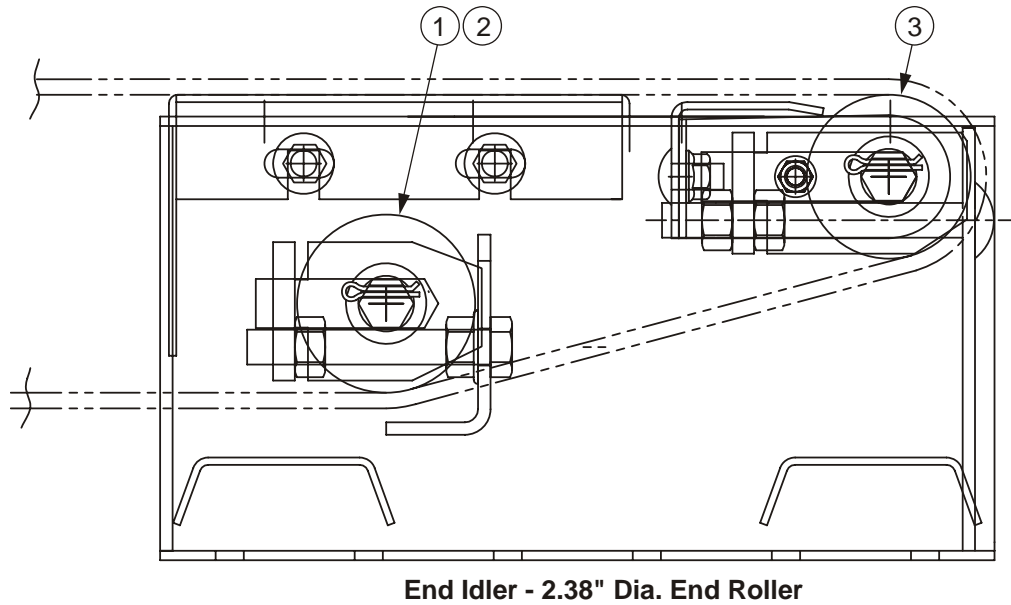


Figure I - 4 End Idlers

# UniSort VII - Conveyor Sections

## Idler/Intermediate Section - S-Sided Divert - Part Listing

Key	Description	Part Number	
		LH	RH
1	Disc, Split, Cam - Return	7035439	
2	Sprocket, Idler, Floating	7036312	
3	Bearing, Pillow Block	7036490	
4	Switch, Assembly, Divert	7085684	7085683
5	Cam Guide	See Table I 1	
6	Cam Guide, Return	7001982	7001983
7	Re-entry, Block, UHMW	7001809	7001810
8	Pusher Guide Realign	7004727	7004728
	Pusher Guide Return (Underside - not shown)	7003811	
9	Sprocket, Idler, Keyed	7001767	
10	Thrust Bearing	7001769	
18	Shaft - 36.5 BF	7092040	
	Shaft - 42.5" BF	7035413	
	Shaft - 48.5" BF	7035414	
	Shaft - 54.5" BF	7035415	

## Idler/Intermediate Section - D-Sided Return, S-Sided Divert - Drawing

30° RH Divert Shown

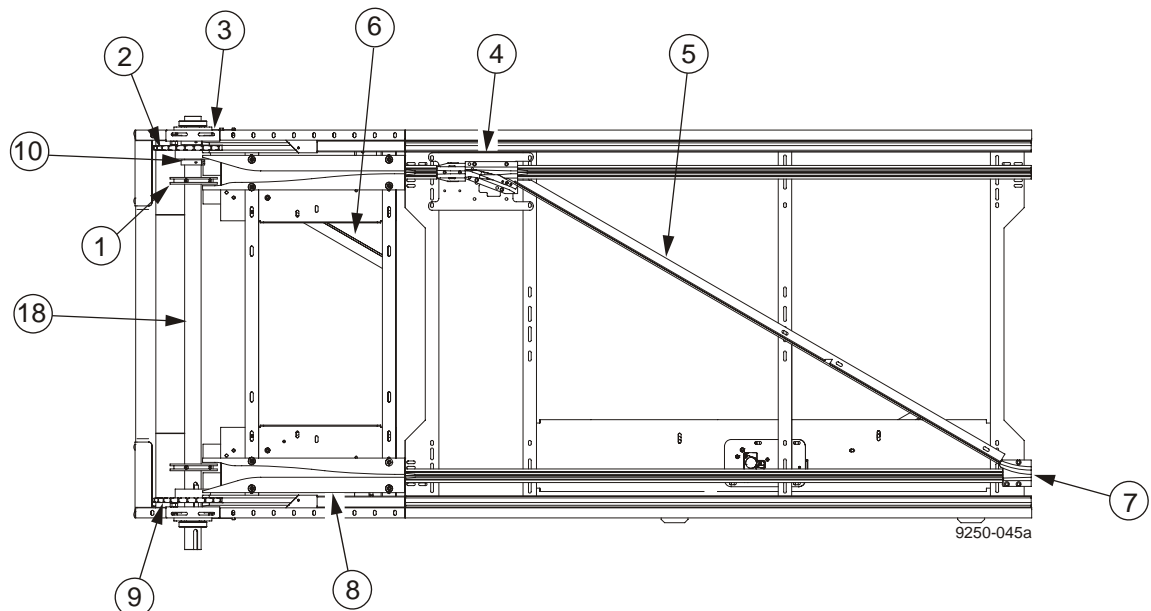


Figure I - 5 Idler/Intermediate Section - Dual-Sided Return, Single-Side Divert - Drawing

---

 Single-Sided Divert Cam Guide Table

Table I 1 Dual-Sided Return, Single-Sided Divert Cam Guide Table

Key	Description	Part Number	
		Angle	Flat
<b>42.5" (BF)</b>			
5	Cam Guide, LH Divert	7004855	7004829
	Cam Guide, RH Divert	7004856	7004830
<b>48.5" (BF)</b>			
5	Cam Guide, LH Divert	7001840	7001823
	Cam Guide, RH Divert	7001841	7003222
<b>54.5" (BF)</b>			
5	Cam Guide, LH Divert	7003842	7003844
	Cam Guide, RH Divert	7003843	7003845

## Idler/Intermediate Section - D-Sided Return, D-Sided Divert - Part Listing

Key	Description	Part Number
1	Disc, Split, Cam - Return	7035439
2	Sprocket, Idler, Floating	7036312
3	Bearing, Pillow Block	7036490
4	Pusher Guide Realign	7004727
	Pusher Guide Return (Underside - not shown)	7003811
5	Switch, RH Divert	7085683
6	Cam Guide	See Table I 2
7	Switch, Crossover	7004500
8	Cam Guide	See Table I 2
9	Cam Guide, Return	See Table I 2
10	Cam Guide, Return	See Table I 2
11A	Re-entry, Block, UHMW LH	7004821
11B	Re-entry, Block, UHMW RH	7004820
12	Cam Guide	See Table I 2
13	Cam Guide	See Table I 2
14	Switch, LH Divert	7085684
15	Pusher Guide Realign	7004728
	Pusher Guide Return (Underside - not shown)	7003811
16	Sprocket, Idler, Keyed	9001767
17	Thrust Bearing	7001769
18	Shaft - 36.5 BF	7092040
	Shaft - 42.5" BF	7035413
	Shaft - 48.5" BF	7035414
	Shaft - 54.5" BF	7035415



**Idler/Intermediate Section - D-Sided Return, D-Sided Divert - Drawing**

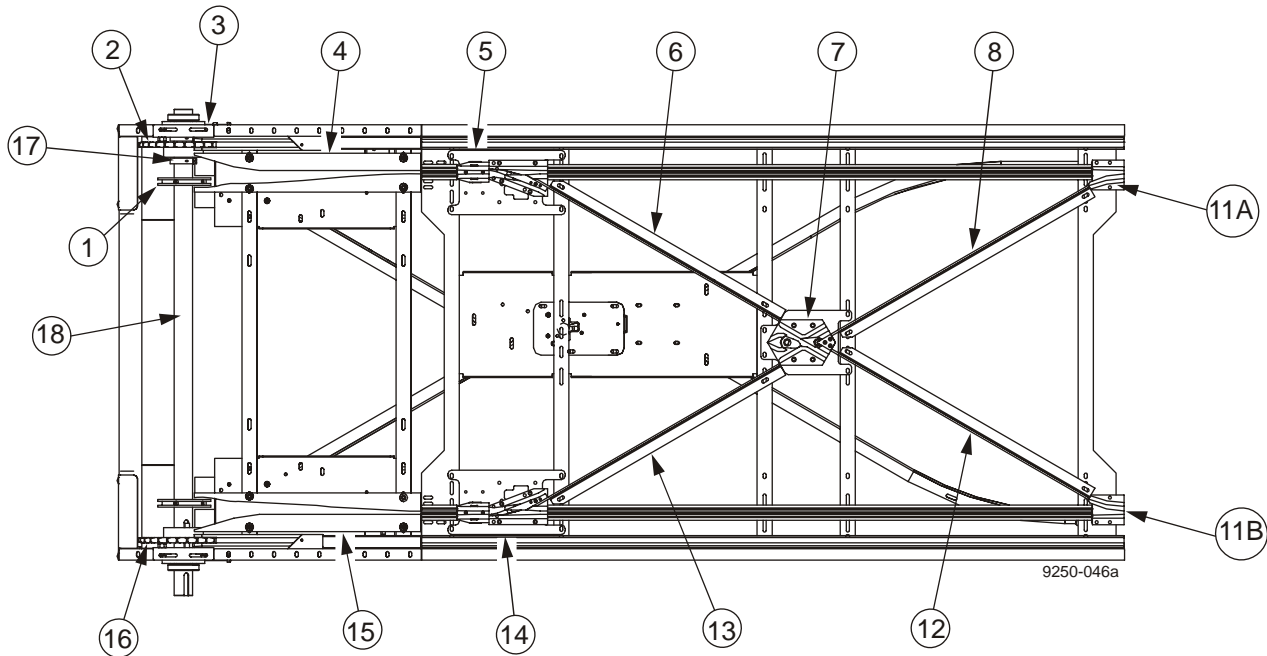


Figure I - 6 Idler/Intermediate Section - Dual-Sided Return, Dual-Side Divert - Drawing

**Dual-Sided Return, Dual-Sided Divert Cam Guide Table**

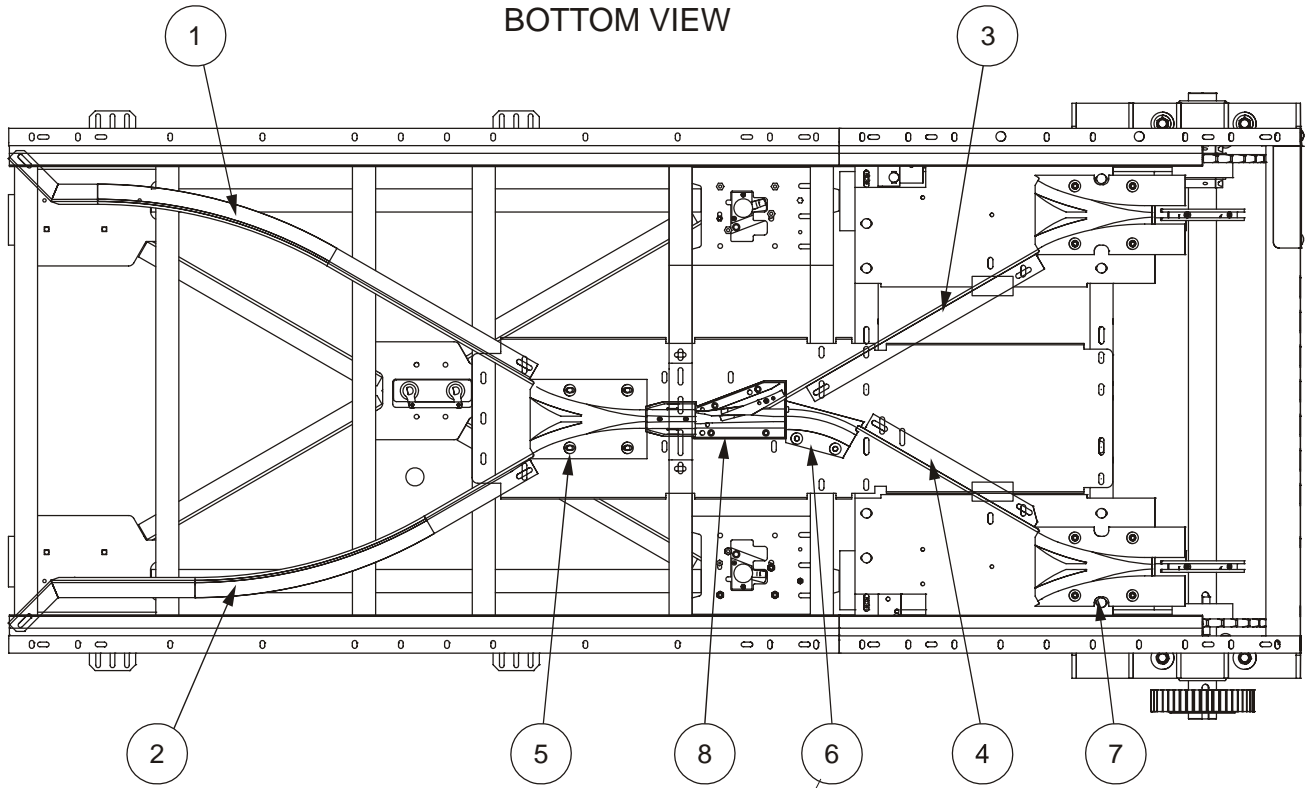
**Table I 2 Dual-Sided Return, Dual-Sided Divert Cam Guide Table**

Key	Description	Part Number	
		Angle	Flat
<b>42.5" (BF)</b>			
6	Cam Guide	7004847	7004853
8	Cam Guide	7004848	7004850
12	Cam Guide	7004859	7004851
13	Cam Guide	7004846	7004852
<b>48.5" (BF)</b>			
6	Cam Guide	7004841	7001821
8	Cam Guide	7004842	7004844
12	Cam Guide	7004843	7004845
13	Cam Guide	7004840	7001820
<b>54.5" (BF)</b>			
6	Cam Guide	7003829	7003833
8	Cam Guide	7003830	7003834
12	Cam Guide	7003831	7003835
13	Cam Guide	7003828	7003832

## Idler/Intermediate Section - D-Sided Return

Table I 3 Dual-Sided Return Part Listing

Key	Description	Part Number	
<b>42.5" BF</b>			
1	Cam Guide Return	7003733	
2	Cam Guide Return	7003717	
3	Cam Guide Return, Switched	LH Bias 7003764	RH Bias 7003763
4	Cam Guide Return, Unswitched	LH Bias 7003751	RH Bias 7003752
<b>48.5" (BF)</b>			
1	Cam Guide Return	7004497	
2	Cam Guide Return	7004490	
3	Cam Guide Return, Switched	LH Bias 7004483	RH Bias 7004533
4	Cam Guide Return, Unswitched	LH Bias 7004480	RH Bias 7004479
<b>54.5" (BF)</b>			
1	Cam Guide Return	7003720	
2	Cam Guide Return	7003736	
3	Cam Guide Return, Switched	LH Bias 7003766	RH Bias 7003765
4	Cam Guide Return, Unswitched	LH Bias 7003753	RH Bias 7003754
5	Return Block	7004486	
6	Justify Block	7004834	
7	Return Block	7003821	
8	Switch Assy, LH Bias (shown)	7085686	
	Swifh Assy, RH Bias (Opposite)	7085685	



Same Part Number for RH and LH

Figure I - 7 Idler Intermediate Section - Dual Sided Return

Note: LH bias shown, RH bias switches in the opposite direction

### Intermediate Section - LH Divert - Part Listing

Key	Description	Part Number
1	Switch, Assembly, LH Divert	7085684
2	Cam Guide	See Table I 4
3	IJD, Assembly, Limit Switch on Right Side of Sorter (22"W) (36.5" BF)	7066981
	IJD, Assembly, Limit Switch on Right Side of Sorter (28"W) (42.5" BF)	7003456
	IJD, Assembly, Limit Switch on Right Side of Sorter (34"W) (48.5" BF)	7003457
	IJD, Assembly, Limit Switch on Right Side of Sorter (40"W) (54.5" BF)	7003458
4	Re-entry, Block, UHMW	7004821

### Intermediate Section - LH Divert - Drawing

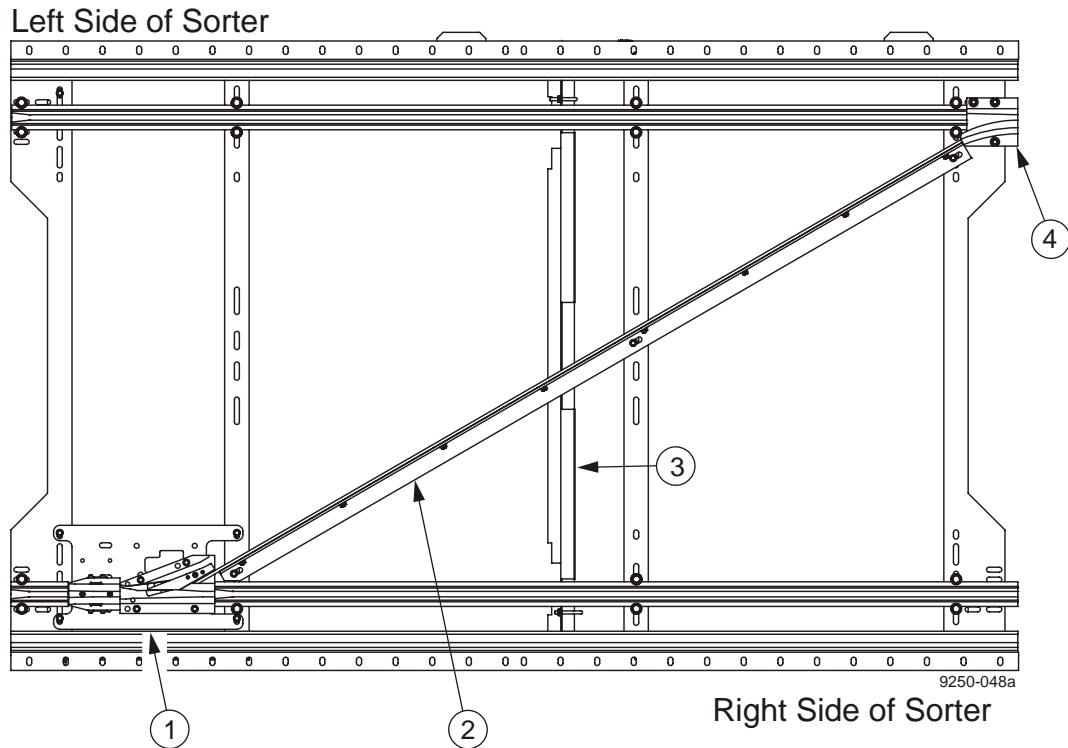


Figure I - 8 Intermediate Section - LH Divert - Drawing

---

 Single-Sided LH Divert Cam Guide Table

Table I 4 Single-Sided LH Divert Cam Guide Table

Key	Description	Part Number	
		Angle	Flat
<b>42.5" (BF)</b>			
2	Cam Guide	7004855	7004829
<b>48.5" (BF)</b>			
2	Cam Guide	7001840	7001823
<b>54.5" (BF)</b>			
2	Cam Guide	7003842	7003844

### Intermediate Section - RH Divert - Part Listing

Key	Description	Part Number
1	Switch, Assembly, RH Divert	7085683
2	Cam Guide	See Table I 5
3	IJD, Assembly, Limit Switch on Left Side of Sorter, (36.5" BF)	7066980
	IJD, Assembly, Limit Switch on Left Side of Sorter, (42.5" BF)	7001827
	IJD, Assembly, LimitSwitch on Left Side of Sorter, (48.5" BF)	7001828
	IJD, Assembly, Limit Switch on Left Side of Sorter, (54.5" BF)	7001829
4	Block, Entry, UHMW	7004820

### Intermediate Section - RH Divert - Drawing

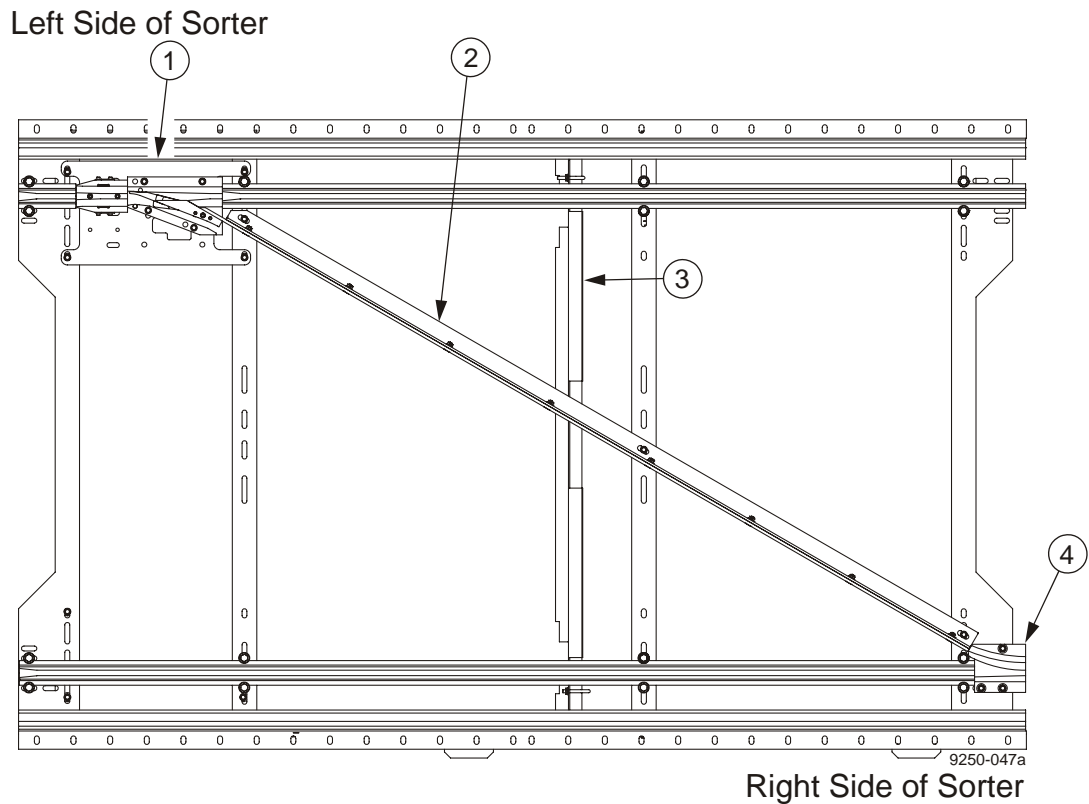


Figure I - 9 Intermediate Section - RH Divert - Drawing

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 Single-Sided RH Divert Cam Guide Table

Table I 5 Single-Sided RH Divert Cam Guide Table

Key	Description	Part Number	
		Angle	Flat
<b>42.5" (BF)</b>			
2	Cam Guide	7004856	7004830
<b>48.5" (BF)</b>			
2	Cam Guide	7001841	7003222
<b>54.5" (BF)</b>			
2	Cam Guide	7003843	7003845

### Intermediate Section - Dual-Sided Divert - Part Listing

Key	Description	Part Number	
1	Switch, Assembly, RH Divert	7085683	
2	Cam Guide	See Table I 6	
3	Switch, Assembly, Crossover	7004500	
4	Cam Guide	See Table I 6	
5	Block, Entry, UHMW	7004821	
6	Block, Entry, UHMW	7004820	
		Limit Switch on the	
		Right Side	Left Side
7	IJD, Assembly, (42.5" BF)	7003456	7001827
	IJD, Assembly, (48.5" BF)	7003457	7001828
	IJD, Assembly, (54.5" BF)	7003458	7001829
8	Cam Guide	See Table I 6	
9	Cam Guide	See Table I 6	
10	Switch, Assembly, LH Divert	7085684	

### Intermediate Section - Dual-Sided Divert - Drawing

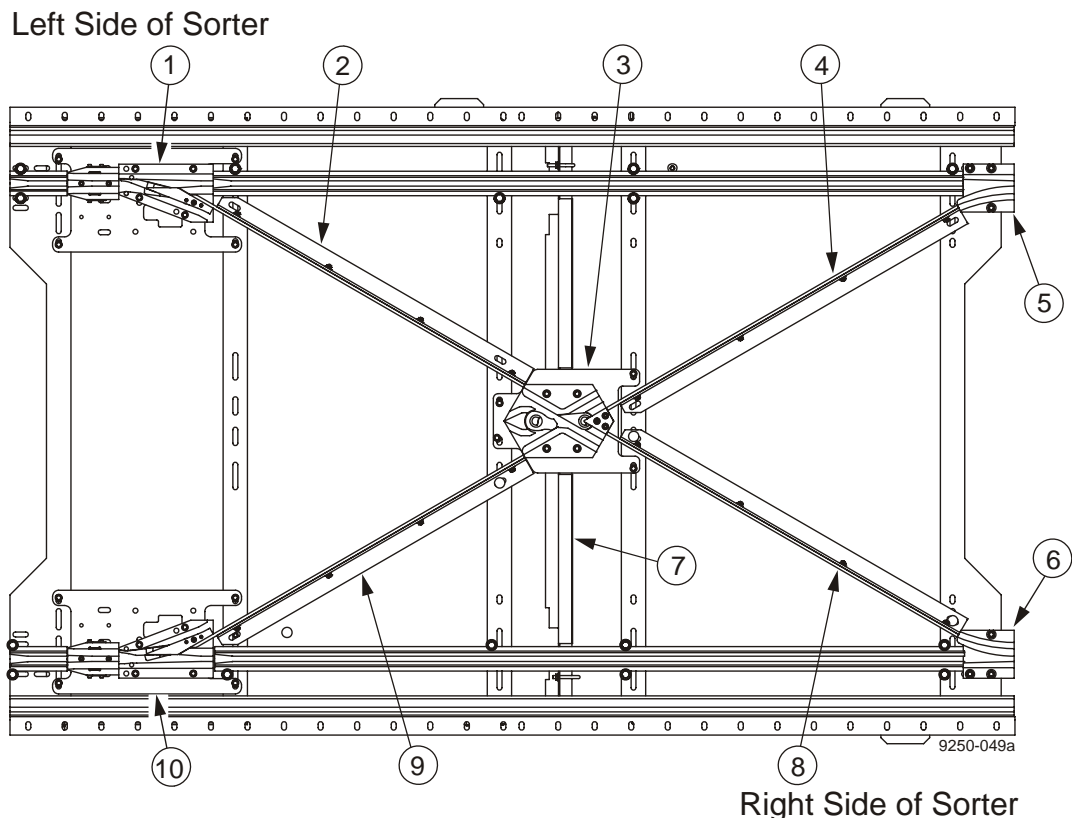


Figure I - 10 Intermediate Section - Dual-Sided Divert - Drawing



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 Dual-Sided Divert Cam Guide Table

Table I 6 Dual-Sided Divert Cam Guide Table

Key	Description	Part Number	
		Angle	Flat
<b>42.5" (BF)</b>			
2	Cam Guide	7004847	7004853
4	Cam Guide	7004848	7004850
8	Cam Guide	7004859	7004851
9	Cam Guide	7004846	7004852
<b>48.5" (BF)</b>			
2	Cam Guide	7004841	7001821
4	Cam Guide	7004842	7004844
8	Cam Guide	7004843	7004845
9	Cam Guide	7004840	7001820
<b>54.5" (BF)</b>			
2	Cam Guide	7003829	7003833
4	Cam Guide	7003830	7003834
8	Cam Guide	7003831	7003835
9	Cam Guide	7003828	7003832

### Drive Section - Part Listing

Key	Description	Part Number
1	Motor Sheave	*
	Motor Sheave Bushing	*
2	Motor	*
3	Disc Assembly, Shoe Guide	7004444
4	Sprocket	7004408
5	Reducer	*
6	Reducer Sheave	*
	Reducer Sheave Bushing	*
7	V-Belts	*
8	Pillow Block Bearing 3.43" Dia.	7013180
9	Shaft - 36.5" BF	7066997
	Shaft - 42.5" BF	7001648
	Shaft - 48.5" BF	7001647
	Shaft - 54.5" BF	7001646

\*Refer to application Bill of Material

### Drive Section - End View

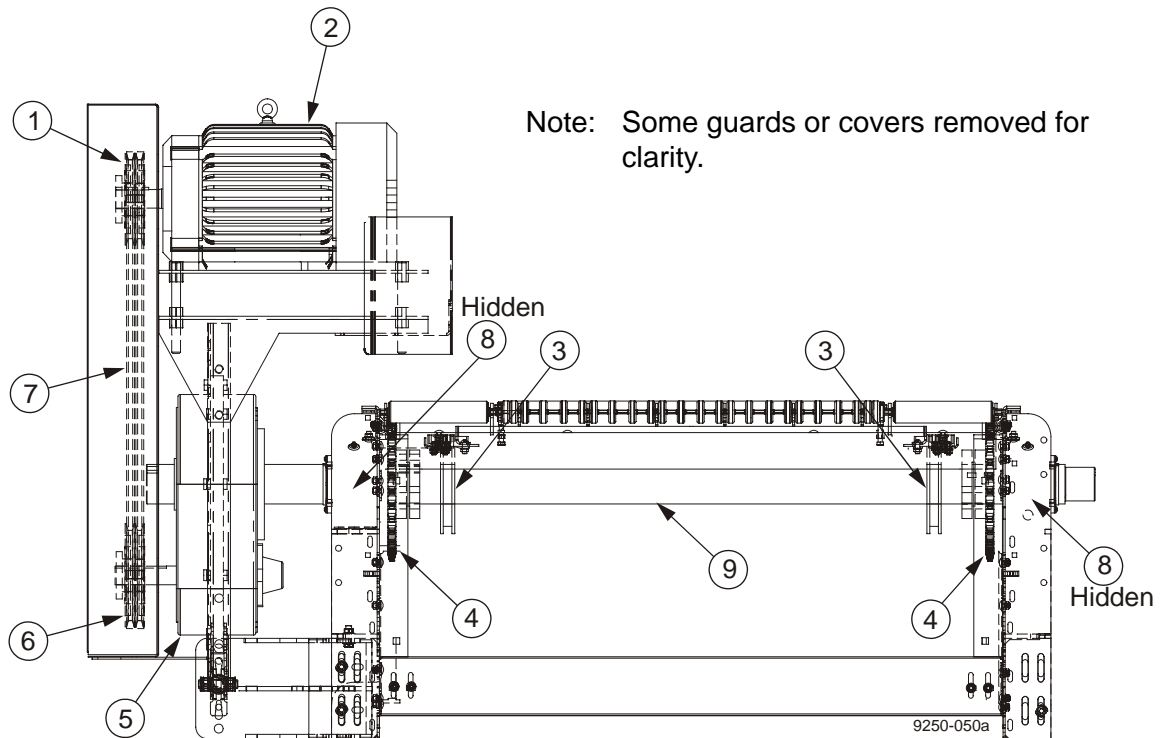


Figure I - 11 Drive Section - End View

## UniSort VII - Features

### Chain, Carrying Tubes and Slats, and Divert Shoe - Part Listing

Key	Description	Part Number
1	Chain, Carrying, #100 (240" long matched set of 2)	7004536
2	Chain Coupling (not shown)	7854668
3	Tube, Carrying, (22"W) SS - 36.5" BF	7035467
	Tube, Carrying, (28"W) SS/(22"W) DS - 42.5" BF	7035468
	Tube, Carrying, (34"W) SS/(28"W) DS - 48.5" BF	7035469
	Tube, Carrying, (40"W) SS/(34"W) DS - 54.5" BF	7035470
	Tube, Carrying, (40"W) DS - 60.5" BF	7035471
	Slat, Carrying, (22"W) SS - 36.5" BF	7035403
	Slat, Carrying, (28"W) SS/(22"W) DS - 42.5" BF	7035404
	Slat, Carrying, (34"W) SS/(28"W) DS - 48.5" BF	7035405
	Slat, Carrying, (40"W) SS/(34"W) DS - 54.5" BF	7035406
	Slat, Carrying, (40"W) DS - 60.5" BF	7035407
4	Shoe 30DS Tube/Slat	7035364

### Chain, Carrying Tubes and Slats, and Divert Shoe - Drawing

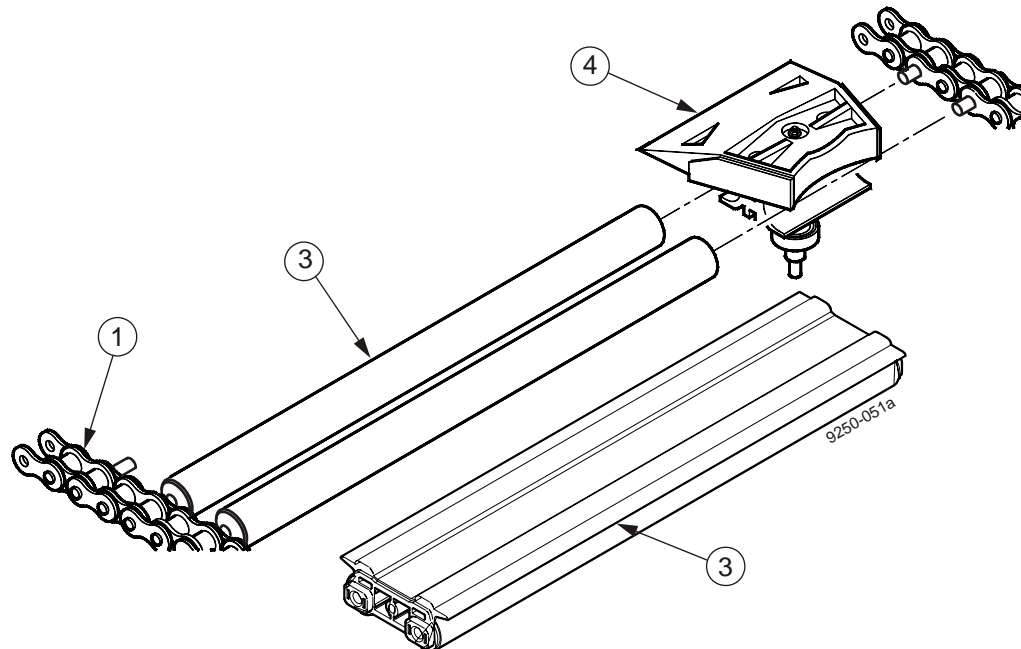


Figure I - 12 Chain, Carrying Tubes and Slats, and Divert Shoes

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**Crossover Switch - Part Listing**

<b>Key</b>	<b>Description</b>	<b>Part Number</b>
1	Gate, Crossover	7001211
	Bearing	7740545
2	Crossover, Assembly	7004500
3	Trigger, Crossover	7001212
	Bearing	7740545
-	Arm, Rocker (Mounted on underside - not shown)	7001206
-	Linkage, Arm, Nylair (Mounted on underside - not shown)	7001213

---

**Crossover Switch - Detail**

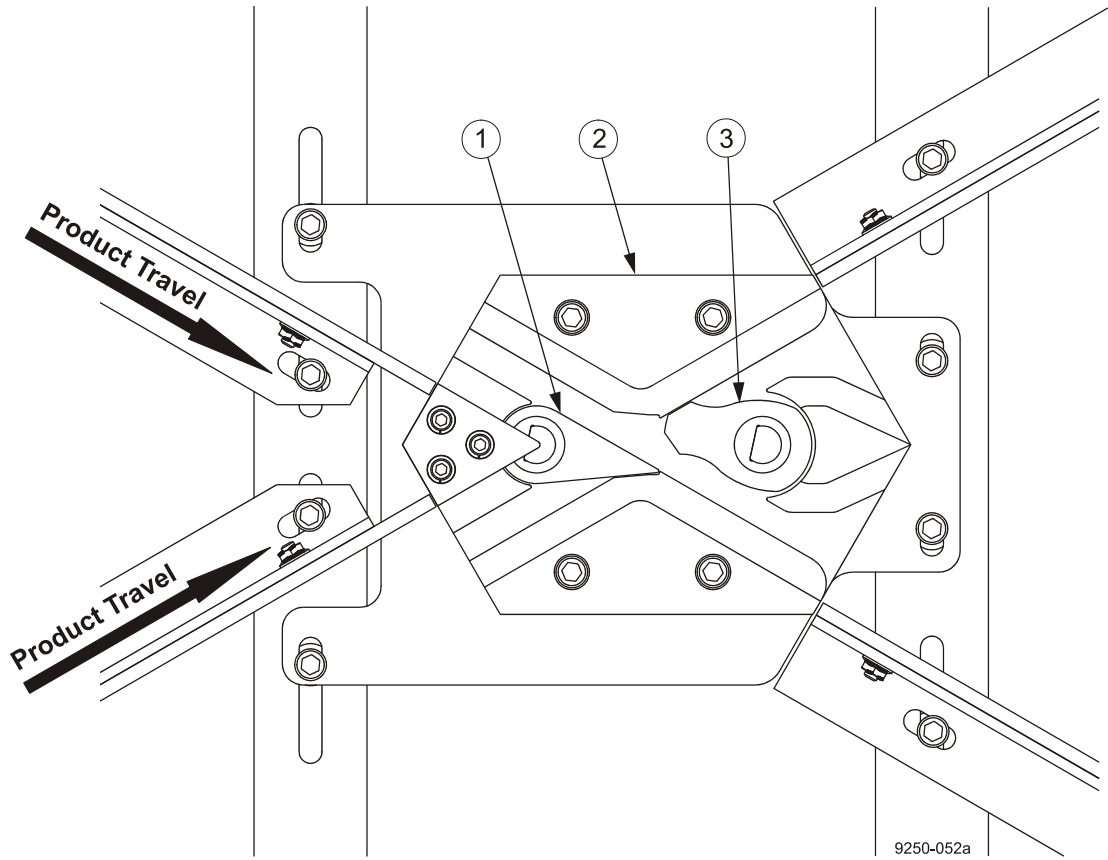


Figure I - 13 Crossover Switch - Detail

## Divert Switches - Part Listing

Key	Description	Part Number
1	Bridge, Switch, LH	7001407
	Bridge, Switch, RH	7001406
2	Trigger, Switch, LH, Nycast	7085864
	Trigger, Switch, RH, Nycast	7085863
3	Lens, Photo-eye	7001128
	Transmitter, Photo-eye, Connector	7085897
4	Assembly, Rotary Actuator, LH Includes: Trigger, Spacer Block, Coupling, Rotary Actuator	7085791
	Assembly, Rotary Actuator, RH Includes: Trigger, Spacer Block, Coupling, Rotary Actuator	7085790
5	BTA Heat Sink Assembly on a Dual-Sided Sorter Justifier Switch	7043415
6	Coupling	7085855
7	RH Actuator	7085887
8	LH Actuator	7085888
9	Lock Washer	7085808
10	Switch, Assembly, LH Divert	7085884
11	Switch, Assembly, RH Divert	7085883

**Divert Switches - Detail**

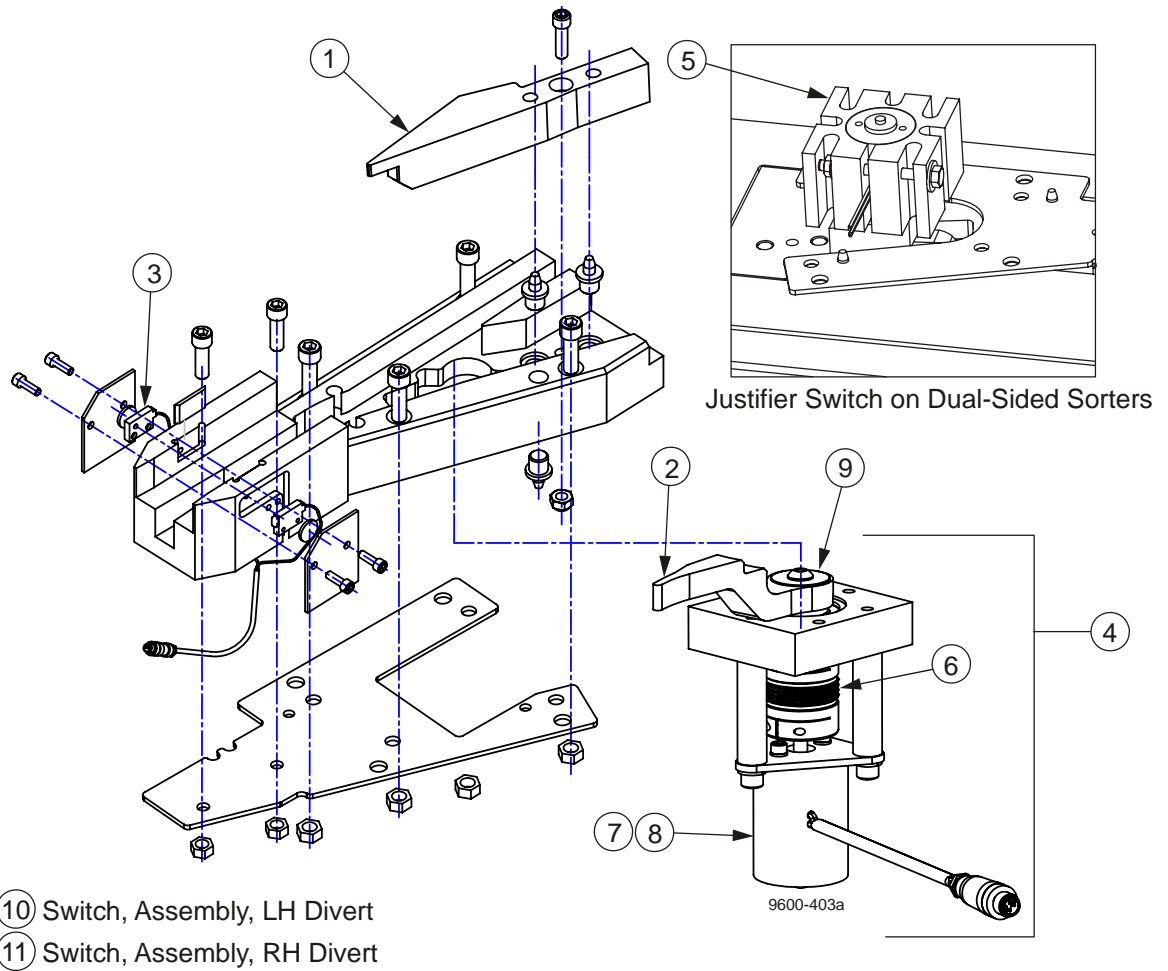


Figure I - 14 Divert Switches - Detail

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**Divert Control Module - Part Listing**

<b>Key</b>	<b>Description</b>	<b>Part Number</b>
1	Panel Box	7028212
2	Sub Panel	7028214
3	Divert Board, EBS, Select Program	7087302
	Fuse (3A, 250V, Little, Slo Blow)	7861487
4	Terminal Ring	7086958
5	10" AWG Green Wire with Yellow Strip	7086959
Divert Control Module (DCM) Assembly, EBS. Select Program		7087303
Divert Control Module Mounting Bracket (not shown)		7004861



Divert Control Module - Detail

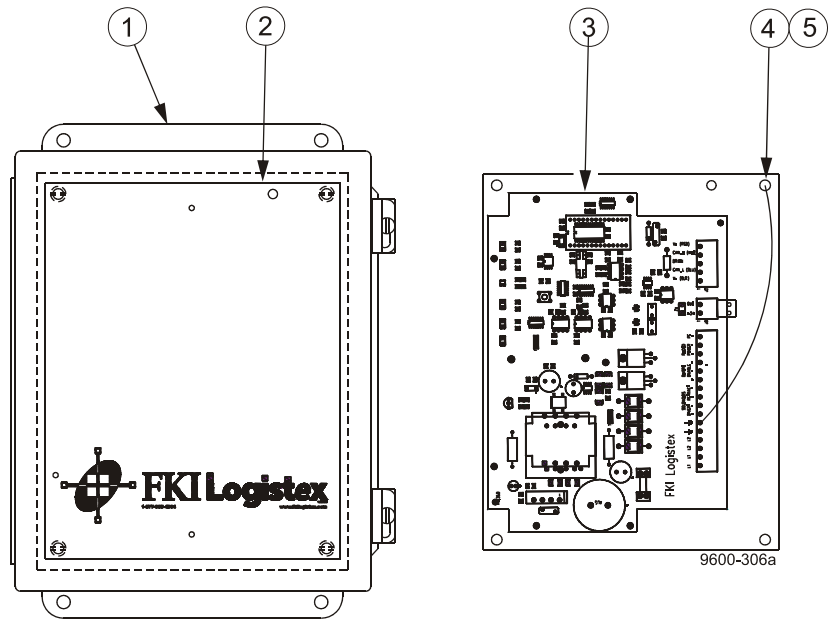


Figure I - 15 Divert Control Module - Detail

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**Internal Jam Detector - Part Listing**

<b>Key</b>	<b>Description</b>	<b>Part Number</b>
1	Flipper Blade (42.5" BF)	7001856
	Flipper Blade (48.5" BF)	7001857
	Flipper Blade (54.5" BF)	7001858
	Shaft (42.5" BF)	7001848
	Shaft (48.5" BF)	7001849
	Shaft (54.5" BF)	7001850
2	Bearing, Flange	7145018
3	Arm, Trip	7001802
4	Bumper, Rubber	7885294
5	Switch, Limit	7115947
6	Spring	7030486
7	Lever Arm	7001806

### Internal Jam Detector - Detail

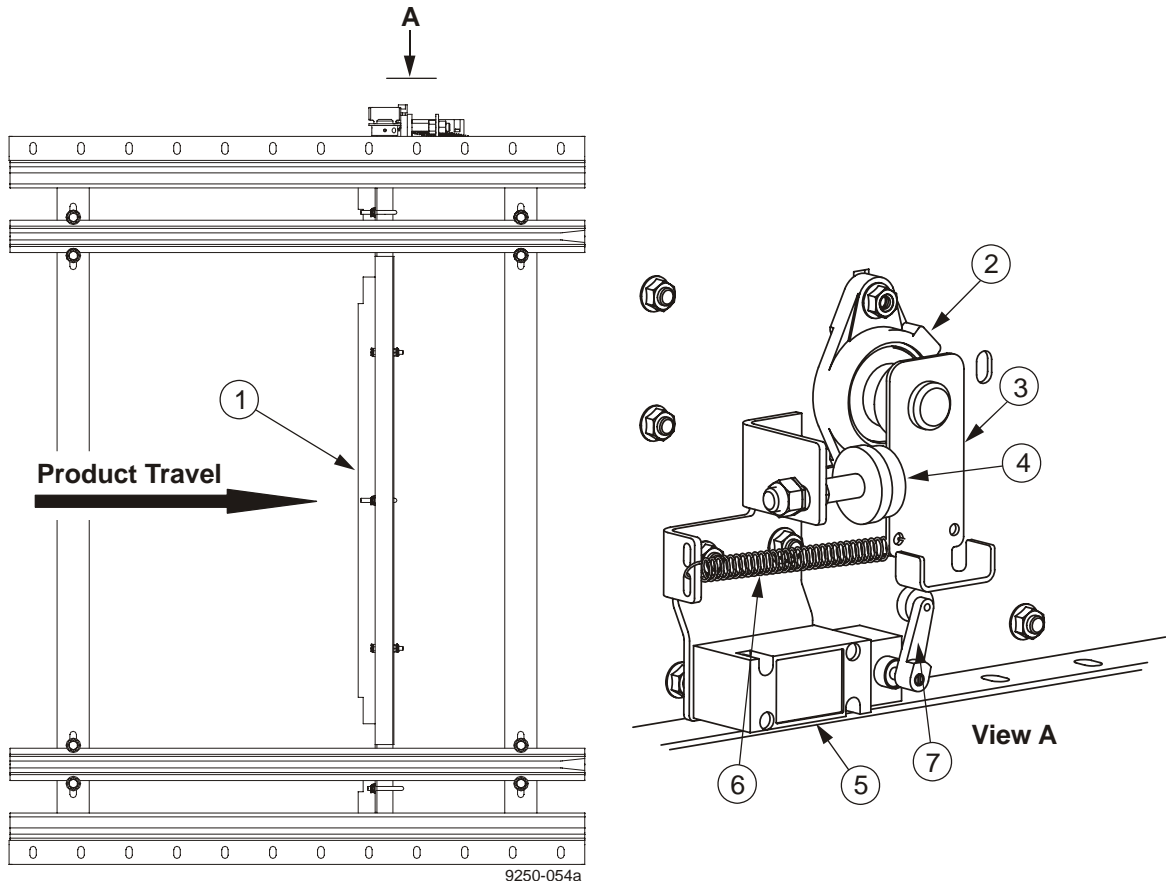


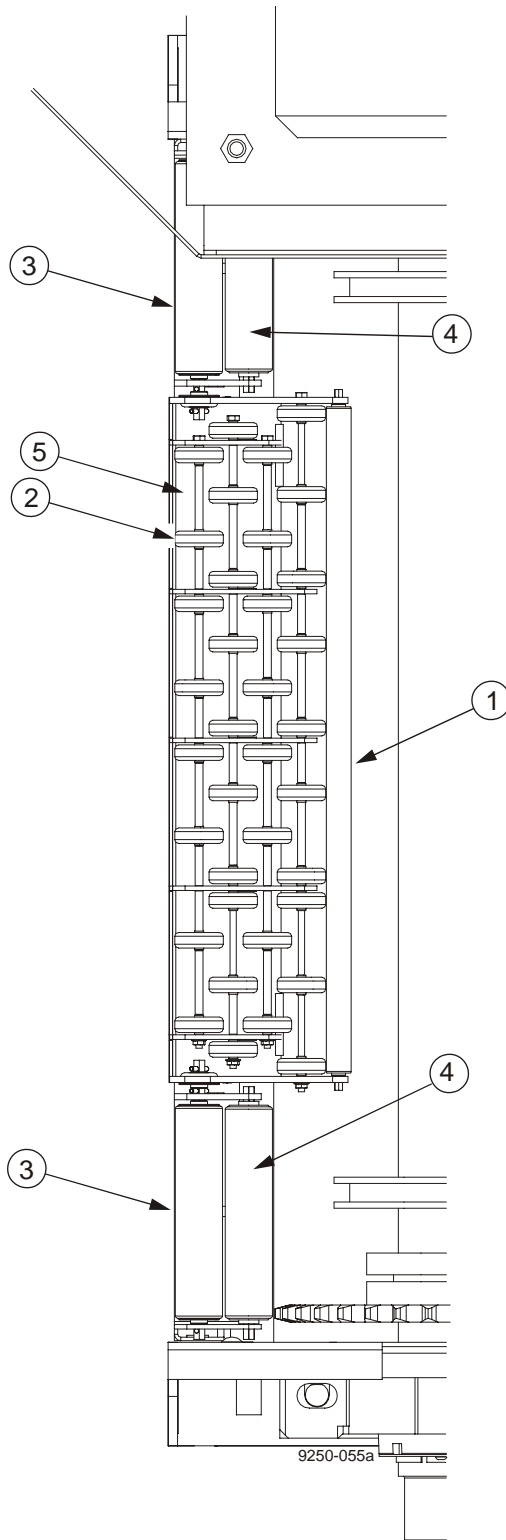
Figure I - 16 Internal Jam Detector - Detail

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**Dual Sided - Transfer Assembly - Part Listing**

<b>Key</b>	<b>Description</b>	<b>Part Number</b>
	Transfer Assembly - Complete (42.5" BF)	7003698
	Transfer Assembly - Complete (48.5" BF)	7001998
	Transfer Assembly - Complete (54.5" BF)	7004430
1	Roller (42.5" BF)	7016034
	Roller (48.5" BF)	7013251
	Roller (54.5" BF)	7013252
2	Wheel, Skate	7221901
3	Roller	7039123
4	Roller w/Axle	7495074
5	Switch, Proximity (Not Shown)	7035232

**Dual Sided - Transfer Assembly - Detail**

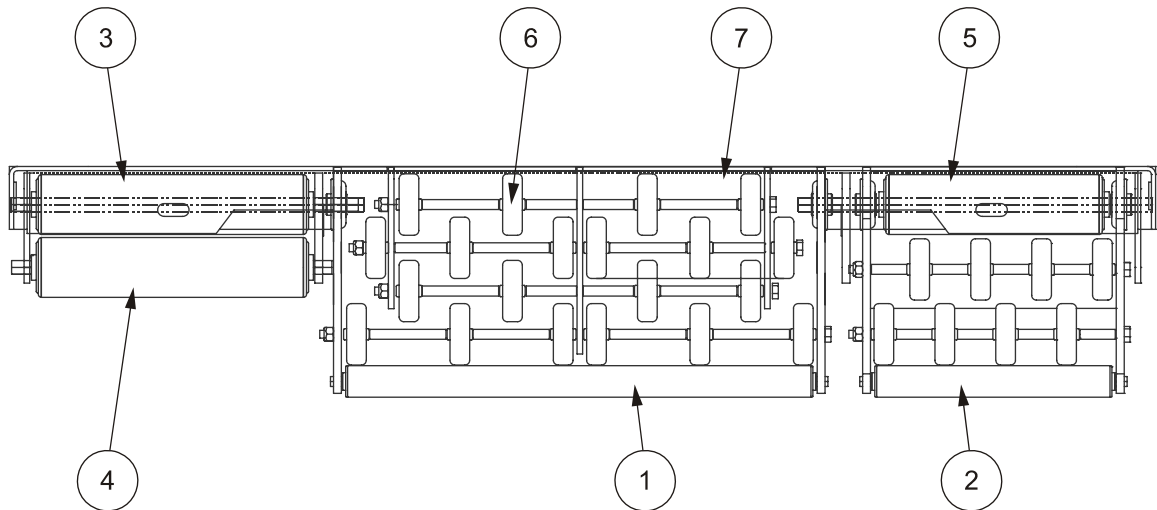


Note: Some guards or covers removed for clarity.

Figure I - 17 Transfer Assembly - Detail

### Single Sided - Transfer Assembly - Part Listing

Key	Description	Part Number	
		RH Sorter	LH Sorter
	Transfer Assembly Complete (36.5" BF)	7086504	7086507
	Transfer Assembly Complete (42.5" BF)	7003696	7003697
	Transfer Assembly Complete (48.5" BF)	7001888	7001889
	Transfer Assembly Complete (54.5" BF)	7001663	7001664
1	Roller (36.5" BF)	7012479	
	Roller (42.5" BF)	7016034	
	Roller (48.5" BF)	7013251	
	Roller (54.5" BF)	7013252	
2	Roller	7003526	
3	Roller	7039123	
4	Roller	7495074	
5	Roller	7039122	
6	Wheel, Skate	7221901	
7	Switch, Proximity	7035232	



9250-205a

Figure I - 18 Single Sided Transfer Assembly - Detail - (Right Hand Sorter Shown)

**Chain Oiler (Trabon) - Part Listing**

Key	Description	Part Number
1	Tubing, Nylon, 1/4 OD, Oil Supply Line (40' long)	7004573
	Tubing, Nylon, 1/4 OD, Oil Distributor Lines (25' long)	7004569
2	Oiler Brushes	7774892
3	Chain Oiler Assembly, Trabon - PC/PLC Control	7836032
	Chain Oiler Assembly, Trabon - Timer Control	7004567
4	Valve, Pressure Relief	7004437
	Oil, Mobil, DTE Heavey-Med, ISO-68	7098825
5	Valve Divider	7774890

**Chain Oiler (Trabon) - Detail**

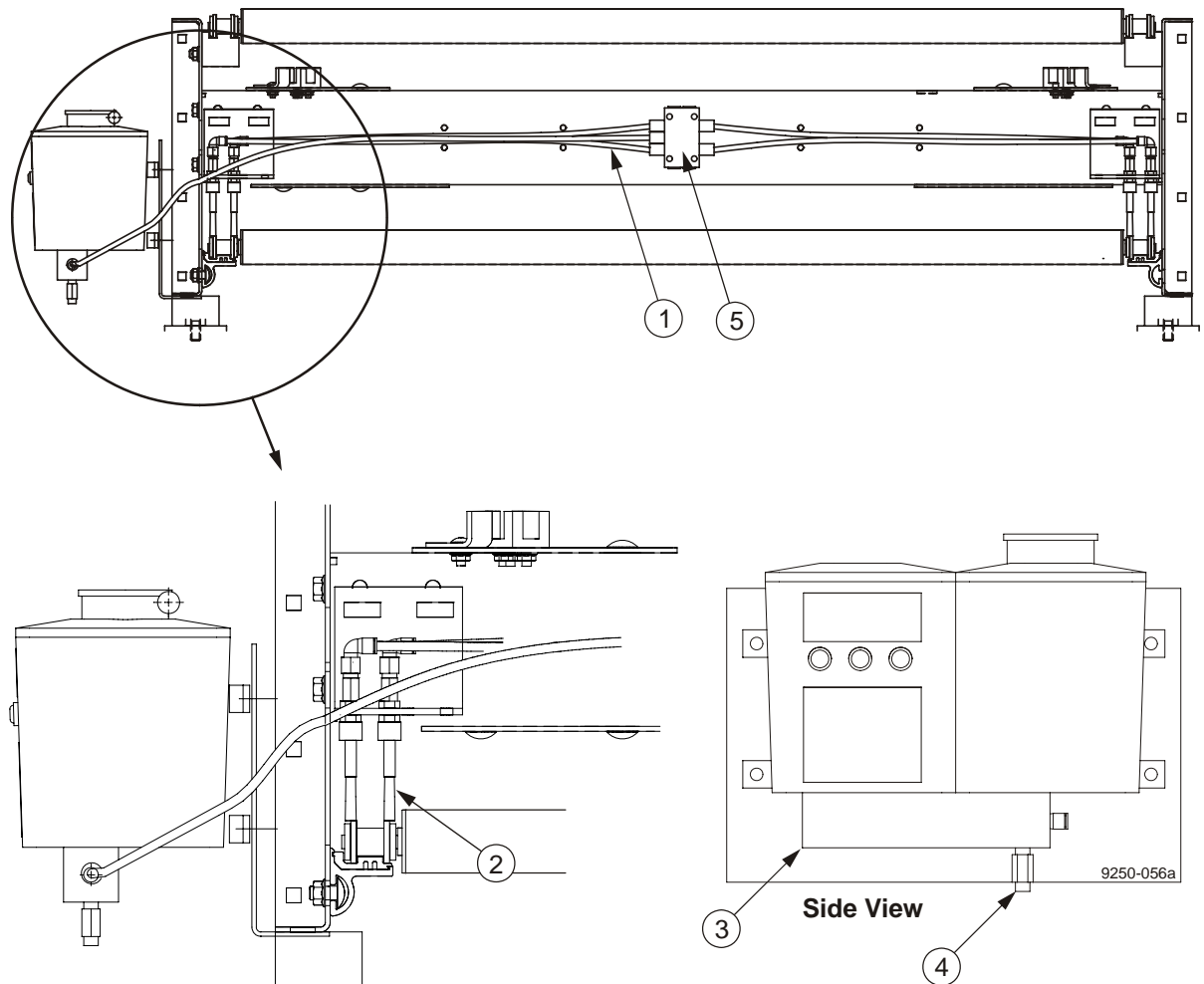


Figure I - 19 Chain Oiler (Trabon) - Detail

