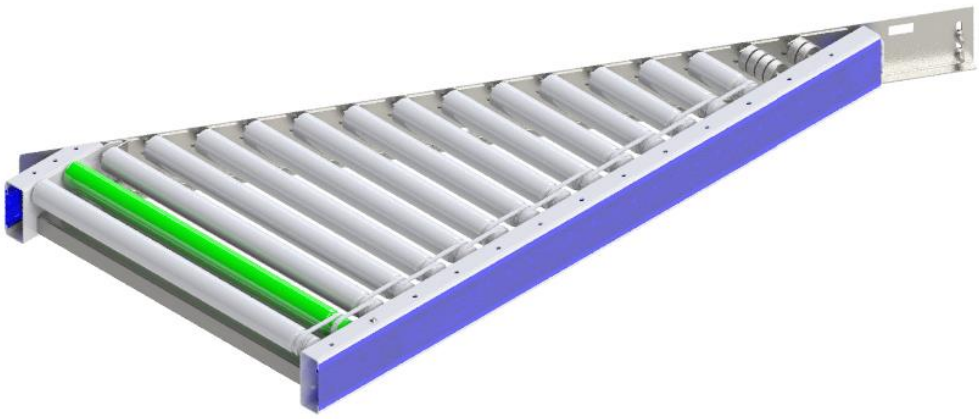

Installation and Maintenance Manual

Model: RLSDC

Effective October 2019

Rev.A1

Bastian SOLUTIONS

a TOYOTA ADVANCED LOGISTICS company

Contributions

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10/17/2019	A1	Initial Document Creation	Brady Miller

Term and Acronym Definition List

TERM/ACRONYM	DEFINITION
Carton or Case	Term for conveyable items generally contained in cardboard boxes.
CB	Carriage bolt
DC Card	A control card used to power and control the logic used when operating a MDR in DC conveyor applications.
Discharge	The point where cartons, cases, or totes exit a conveyor or similar unit used in a material handling system.
Guide Rail	Mechanism used to maintain the desired position of conveyable cartons, cases, or totes on their respective conveying surface.
Infeed	The point where cartons, cases, or totes enter a conveyor or similar unit used in a material handling system.
Live	A zone of conveyor runs "live" when it runs whenever energized. It is for this reason that live zones of conveyor do not have or need any photoeyes or reflectors.
LOTO	Lockout Tagout
Mark Number	A numeric or alphanumeric term used to uniquely identify a conveyor bed or collection of beds (of similar model type) within a material handling system.
Match	A mark made on mating conveyor assemblies to assist in identifying orientation and placement within a system.
MDR	Motorized drive roller; DC powered conveyor roller with an internally mounted motor which may be controlled via internal or external commutation.
OAW	Overall width of any given conveyor bed.
Poly-V	A band or roller hub format with longitudinal ribs used for power transmission in DC conveyor applications.
RLSDC	Roller Live Spur Direct Current; DC roller conveyor powered by live MDRs and configured as a spur.
Roller	Powered or unpowered cylindrically-shaped material handling component used for mechanical power transmission, a conveying surface, and/or support for a belted conveying surface.
Side Cover	A PVC cover used to conceal and protect electrical components and wiring from foreign debris and moving obstacles.
Side Frame	Structural member used to support rotating components needed for conveyor beds.
Skatewheel	Small unpowered wheels used to replicate nearly frictionless guidance or support of conveyable cartons, cases, or totes.
Spur	A format of DC conveyor used to create linear transitions into intersecting lines of conveyor positioned at a non-perpendicular angle. Typically includes 30deg and 22deg configurations.
Wiz Nut	A serrated flange nut used to cut into the surface of the component it is tightened against.
Zone	Any section of DC conveyor driven by a single MDR.

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Reference Documents

Manufacturer	Manual
Interroll	9006 Hybrid Control for RollerDrive Manual
Interroll	ZoneControl User Manual
Interroll	DriveControl User Manual
Interroll	EC100/110 User Manual
Interroll	EC310 User Manual
Itoh Denki	HBM604 User Manual
Itoh Denki	IBE User Manual
Itoh Denki	HB510 User Manual
Itoh Denki	CBM105 User Manual
Itoh Denki	Product Catalog
ZiPline Conveyor	Side Cover and Guiderail Installation Manual
ZiPline Conveyor	Support Installation Manual

1 Introduction

Thank you for choosing ZiPline Conveyor. The following manual serves as a guide for installation, part replacement, and general maintenance for your material handling equipment. It is important to read the manual and follow any instructions as it provides important safety information for personnel and will maximize the longevity of the conveyor.

The information contained in this manual applies only to the products described. Uses, activities, or processes related to installing or maintaining the equipment that are not explicitly described in this manual are considered out of scope. Please contact Bastian Solutions ZiPline Conveyor for any questions or support that is not clearly addressed in this document. ZiPline Conveyor is not responsible for misuse of the equipment described in this manual or misuse of information in this manual. If you have any questions, contact ZiPline Conveyor Customer Service or Support at ZiPlineSupport@BastianSolutions.com.

2 OSHA and Safety

ZiPline Conveyor is not responsible for ensuring that conveyors used in a system abide by OSHA standards. Safety is of primary importance to our company, but as a product distributor we ask that system integrators and end users conform with all applicable OSHA standards. We encourage that all warnings in this manual are followed to avoid unnecessary risk.

3 Model: RLSDC

The Roller Live Spur DC Conveyor (RLSDC) is used to create linear transitions into intersecting lines of conveyor positioned at a non-perpendicular angle. RLSDC is designed with a brushless 24V DC motor called an MDR. The MDR is placed near the widest end of the spur and drives non-powered rollers that are connected by Poly-V bands. The rollers are "live" meaning that they run continuously whenever the MDR is energized. The RLSDC is optimal for cartons and totes. The model shown in Figure 1 serves as a reference to become familiar with the components and terminology used in this manual. These terms will be used throughout the manual and are common among many of the other ZiPline Conveyor product lines.

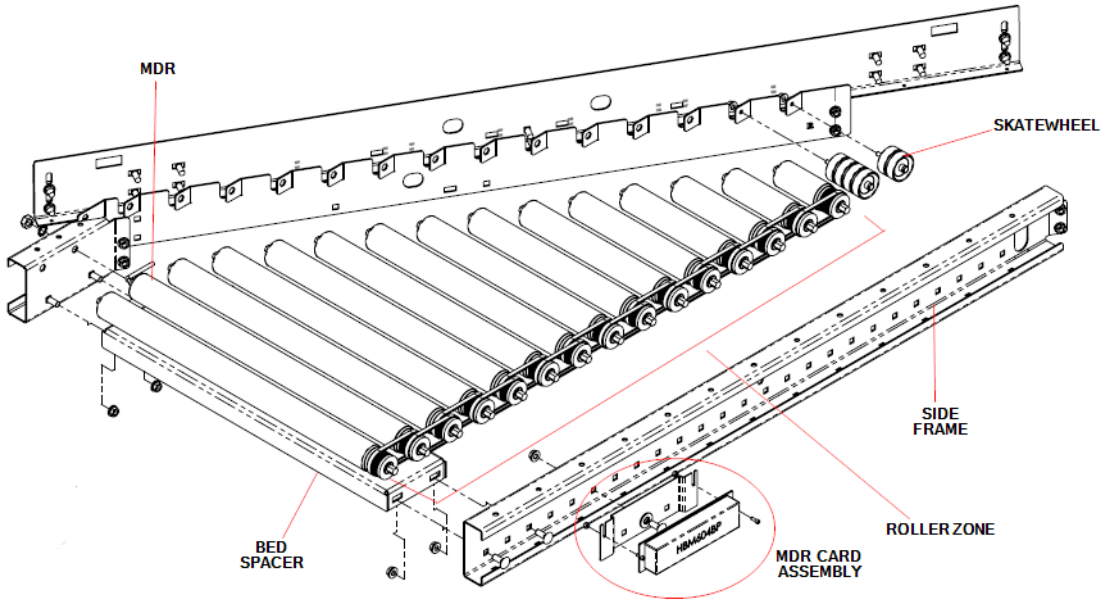

Figure 1: General Arrangement Exploded View of RLSDC

The model in Figure 1 is a 30" overall width (OAW) RLSDC bed section with 3" roller centers and has (1) zone. The zone is made up of (14) rollers, (6) skate wheels and (1) MDR. All rollers (powered and non-powered) are designed to be connected by Poly-V bands that distribute the torque generated by the MDR to the rest of the spur.

4 Receiving

Upon delivery of any ZiPline Conveyor, please review and check the following:

- The quantity of items received against the Bill of Lading.
- Complete a visual inspection of equipment to determine any damage that may have occurred during shipping. If damage is present, document with pictures.
- Review Mark Number information and layout locations. More information can be found in subsection 4.1.

If there are any missing or damaged components contact your ZiPline Conveyor representative with as much detail as possible. If you are unsure of your ZiPline Conveyor representative, please contact Customer Service at ZiPlineSupport@BastianSolutions.com.

4.1 Mark Numbers

A mark number is a specific number given to a piece of equipment. A mark number is usually made up of a single product line (RZPDC, RLVDC, BZPDC, etc.) but can contain many bed section lengths. They can range from two inches to hundreds of feet. The mark number is used to help identify where the piece of equipment will go within the system layout.

Every bed section of conveyor will have (2) stickers. One sticker on the infeed end of the bed, and one sticker on the discharge end of the bed. Each sticker will contain the following information:

- ZiPline Project Number and Name
- Model Type
- Mark Number
- Match
- Piece
- Flow

Figure 2 shows stickers that would appear on an RZPDC that has two bed sections.

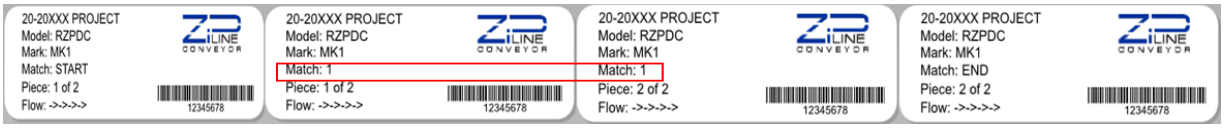

Figure 2: Mark Number Stickers

The Match field on the stickers is used to indicate if two bed sections are to be spliced to one another. As shown in Figure 2, the stickers where the two beds splice together both contain “Match: 1”.

The piece field defines the bed section number within the mark. The flow refers to the direction of product flow along the conveyor system.

4.2 Skid Contents

Skids will contain varying combinations of conveyor sections, support structures, accessories, and pertinent hardware. For protection of product integrity during shipping, accessories and supports may be delivered on separate but labeled skids.

4.3 Skid Documentation

All shipments will contain a Bill of Lading for the delivery company, a skid label, and a skid manifest. Skid labels have the contents of each shipped item located on the skid. *Figure 3* shows a sample of a skid label. These stickers are placed on the surface of each skid.

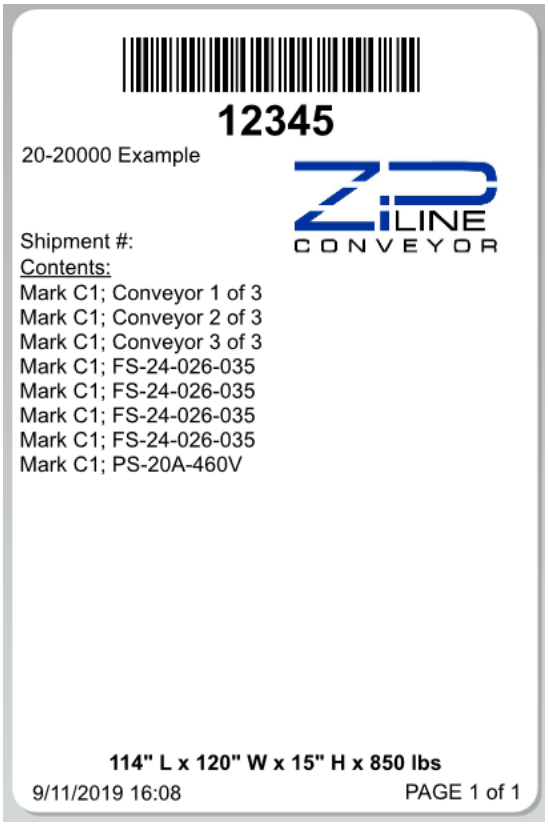

Figure 3: Skid Sticker

5 Installation

The installation supervisor should have elevation and layout prints with detailed information regarding the placement of conveyor sections and support structures. This information is not the responsibility of Zipline Conveyor to provide unless otherwise specified.

1. Clear the workspace around the portion of the layout selected for installation.
2. Measure out from a constrained origin to start placement of supports. It is recommended that snap chalk lines are used, or other methods of keeping a consistent line.
3. Use elevation layouts to determine the conveyor's top of conveying surface.
4. Place the support type that the layout designates. Each support type has a corresponding mark sticker.
5. Check the flow direction on the mark stickers to ensure that conveyors are mounted properly.
6. Place the conveyor onto the support structure and fasten it securely using the 3/8"-16 carriage bolts and wiz nuts provided as shown in Figure 4 (floor support shown as an example support structure). The recommended torque specification is 26ft-lbs.

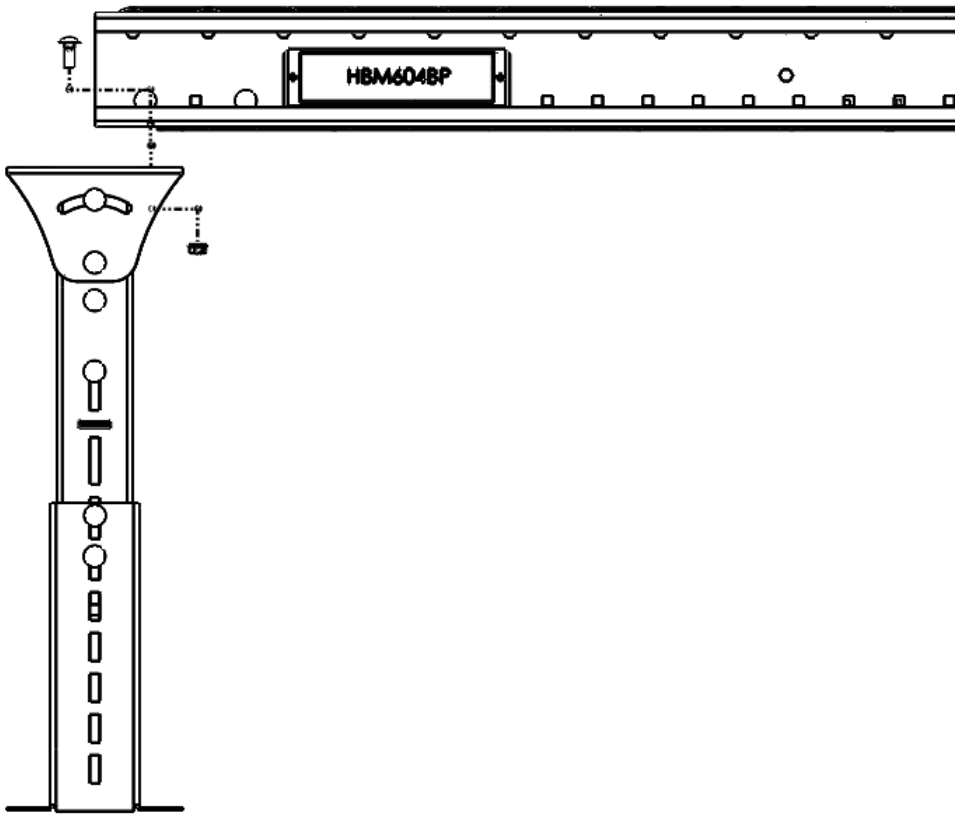

Figure 4: Fastening RLSDC to Floor Support

7. Attach Spur to adjacent conveyor using two mounting plates as shown in Figure 5. The mounting plates fit inside the side frame of the adjacent conveyor and clamp to spur using 3/8”-16 carriage bolts and wiz nuts. Torque bolts to 26 ft-lbs.

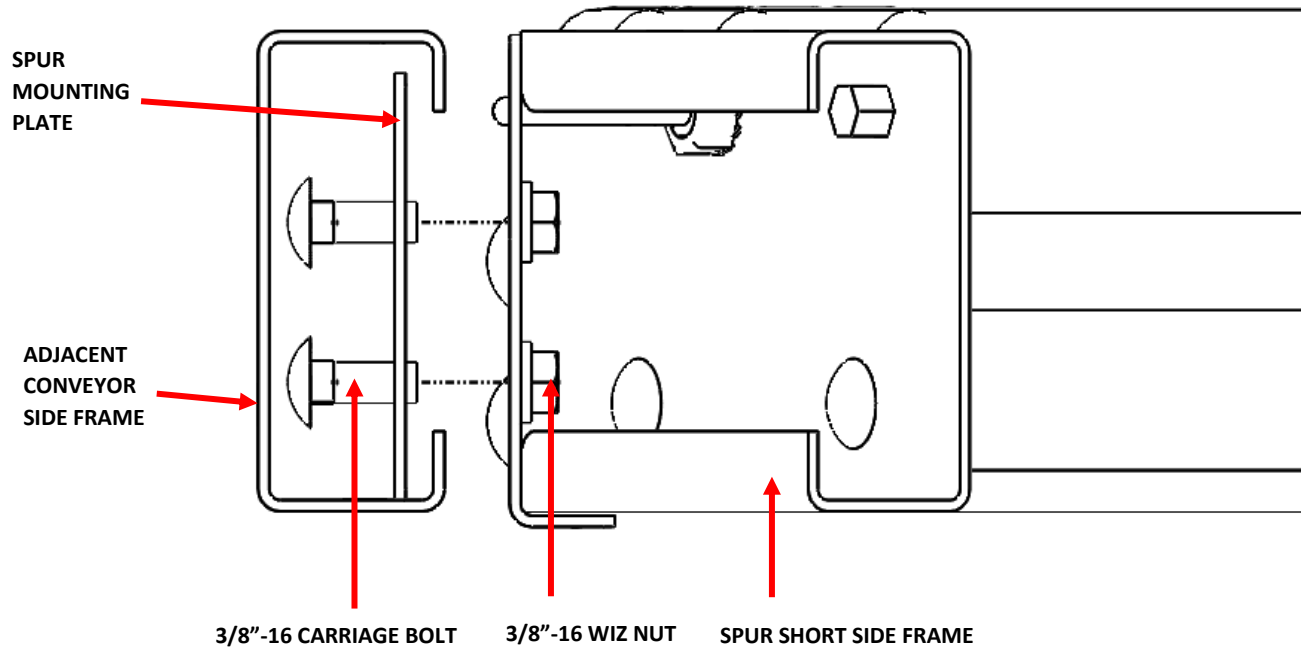

Figure 5: Mounting Spur to Adjacent Conveyor

8. Attach any guiderail or miscellaneous accessories. For information on guiderail installation, please reference the “ZiPline Side Cover and Guiderail Installation Manual”
9. Check that the height of the infeed and discharge ends are correct per the system layout.
10. Lag the supports to the floor (or other permanent fixture).

Refer to the “ZiPline Conveyor Support Installation Manual” for more information on installing conveyor.

6 Maintenance and Operation

The longevity and proper functionality of ZiPline Conveyor is based upon standard operating practices and general maintenance of equipment. Setting up a regular maintenance schedule will help to ensure that products comply with the equipment’s warranty. **Lockout/Tagout** procedures should be implemented before performing any maintenance.

6.1 Safety During Operation

The list below explains a series of recommended precautions that should be taken when personnel are near the equipment. This list is not intended to be the only precautions taken, but it serves as a guide of important steps to follow.

- Only fully trained employees should operate or perform maintenance on the conveyors. Proper training should include the detailed description of fail-safes, stopping devices, or other emergency regulations put in place.
- WARNING stickers should be replaced if worn or damaged.
- All personnel in the area should be alerted prior to starting any conveyor at all times. This process may vary depending on the conditions and layout of the site, but it should use audible and visual cues and all personnel should be made aware of the protocol.
- Operators should inspect the conveyor for damage, foreign objects, and verify all personnel is clear of the equipment prior to engaging drive.
- Ensure that all areas are clear of objects prior to loading and unloading.
- No personnel should ever ride, climb, step, sit on, or otherwise put body weight on the conveyor. Doing so puts both personnel and equipment at risk.
- Maintenance should be performed at regular intervals to assure the safety of operators and the longest life of components. Should a component break during operation or prior to operation, then lockout/tagout instructions should be performed immediately to prevent exposure to hazards.

6.2 Maintenance Schedule

To prolong the life of the material handling equipment and reduce the risk of potential safety hazards, it is vital that a preventative maintenance program be set in place and followed. The following instructions will help identify key areas requiring maintenance.

6.2.1 Mechanical Service

- An auditory inspection of the equipment should be performed to identify any unusual noise that may indicate that there is a problem with the equipment.
- Check all nuts and bolts to ensure bolts remain tight. MDR nuts should be torqued using a torque wrench to each MDR's torque specs. Please reference Table 1 for a list of common MDRs and their torque requirements.
- Bands should be inspected for excessive wear, stretching or slip and replaced as necessary.
- The recommended interval for maintenance is at least once every 6 months.

Table 1: MDR Nut Torque Specifications

MDR	MDR Nut Torque Specs
Interroll EC100/110	30 ft-lbs
Interroll EC310	50 ft-lbs
Itoh PM486FE/FP	23 ft-lbs

6.2.2 Electrical Service

- All ZiPline Conveyor DC products operate at either 24V or 48V, nominally.

When performing electrical work on ZiPline Conveyor, ensure adherence to all applicable OSHA standards.

- If adjustment of control card settings is required, refer to the respective technical manual listed in Reference Documents, or contact ZiPline Support at ZiPlineSupport@BastianSolutions.com.
- If there is a need to replace a DC control card, perform the following:
    - De-energize associated power supply and remove respective side cover (if applicable)
    - Adjust settings of replacement control card to match those of the existing control card.
    - Remove the existing control card from the side frame for ease of cable disconnection:
        - If the existing control card has a mounting plate, remove wiz nut securing control card mounting plate to side frame.
        - If the existing control card is secured to the conveyor side frame with anything other than a mounting plate, install new securing material on the new control card and re-use the securing material on the side frame.
    - One at a time, remove all cables and connectors and plug them into the same respective connection port on the new control card.
    - If the control card in question has a mounting plate, remove the mounting plate secured to the existing control card, and install it on the new control card (if the new control card does not already have a mounting plate installed on it).
    - Install the new control card on the conveyor side frame
    - Re-energize associated power supply, check the lane for proper system functionality, and reinstall respective side cover (if applicable).

Never “hot swap” control cards (i.e. disconnect and reconnect power connector on control cards without de-energizing respective power supply). When doing this, there is an increased risk of damaging the new control card.

There is always a possibility that control card errors are being caused by faulty communication cables (RJ45, CAT5, or CAT6), or problems with adjacent cards connected via the communication cables.

- If cards or card fuses are blowing:
    - Ensure there are no shorts in system power wiring
    - Ensure all conveyor side frames are electrically bonded and provided a direct connection to earth ground
    - Ensure control card DIP switch settings match those needed for zone MDR (if applicable)
    - If associated conveyor zone has powered brake roller, ensure it is electrically connected
    - If problems persist, refer to the respective technical manual listed in the Reference Documents section of this document.
- If experiencing any other electrical problems with ZiPline DC conveyor, contact ZiPline Support at ZiPlineSupport@BastianSolutions.com.

6.2.3 Replacing Rollers

Poly-V bands are not easily stretched by hand. Therefore, when replacing rollers, it is advised to start at one end of the spur and remove each roller one by one until the roller needing replacement has been reached.

For standard rollers:

1. Follow the lockout/tagout procedure in place to ensure safety.
2. Remove the side cover from the intended work area.
3. Apply pressure on the end of the hex shaft on the band side with a small diameter punch or similar tool until the shaft clears the frame. Be careful NOT to apply a side load to the hex shaft. (Refer to Figure 7)
4. Provide upward force on the roller body until the hex is sitting above the side frame. Refer to Figure 8. (A putty knife or other flat surface tool is recommended to be placed between the hex shaft and the inside of the frame. This will help protect the paint on the side frame.)
5. Remove the hex shaft from the opposite hex hole.
6. Pull the roller away from the bands until the roller is completely free of the side frames and bands.

Keep Poly-V bands to use for re-installation of rollers.

7. Repeat steps 3-6 to each subsequent roller until roller needing replacement has been removed.
8. Slide the new roller through the band of the adjacent roller that has not been removed.

Ensure that Poly-V bands alternate positions on the inside and outside of the hub as shown in Figure 9.

9. Once the new roller is through both bands, guide the hex shaft into the hex hole.
10. After the hex shaft is in the hex hole, the opposite side shaft can be inserted into the appropriate hex hole. Use the roller's length as leverage to aid in this step. Use a putty knife or other flat surface tool to guide the hex shaft into the opposite hex hole.
11. Repeat steps 8-10 for each roller until all rollers have been re-installed.
12. Track Poly-V bands as described in 6.2.5.
13. Replace the side cover.

For motor driven rollers (MDRs):

1. Follow the lockout/tagout procedure in place to ensure safety.
2. Remove the side cover from the intended work area.
3. Loosen the MDR nut located on the cable side of the roller.
4. Pull the MDR bracket away from the frame. (Refer to Figure 6)
5. Remove rollers starting at one end until the MDR is reached. Refer to steps 3-6 of 6.2.3 for standard rollers.

6. Once MDR has been reached, apply pressure on the end of the hex shaft opposite the MDR cable using a small diameter punch or similar tool until the shaft clears the frame. Be careful NOT to apply a side load to the hex shaft. (Refer to Figure 7)

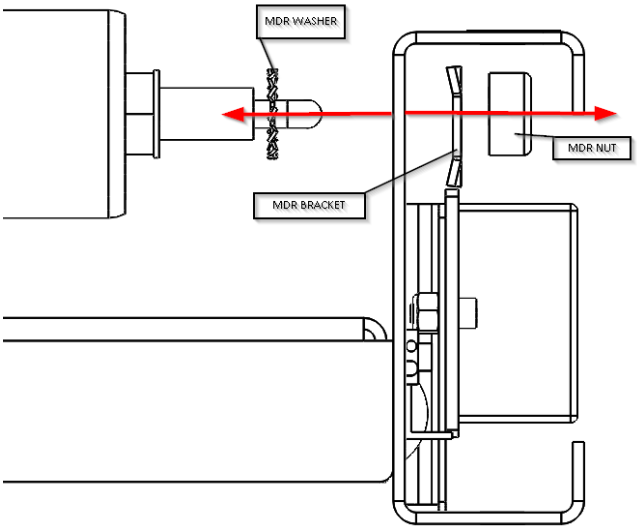

Figure 6: MDR Removal-1

7. Provide upward force on the roller body until the hex is sitting above the side frame. Refer to Figure 8. (A putty knife or other flat surface tool is recommended to be placed between the hex shaft and the inside of the frame. This will help protect the paint on the side frame.)

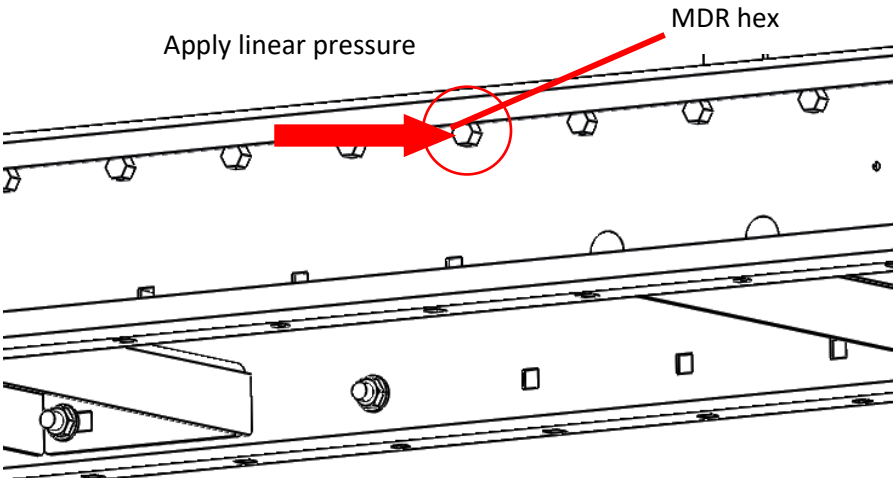

Figure 7: MDR Removal-2

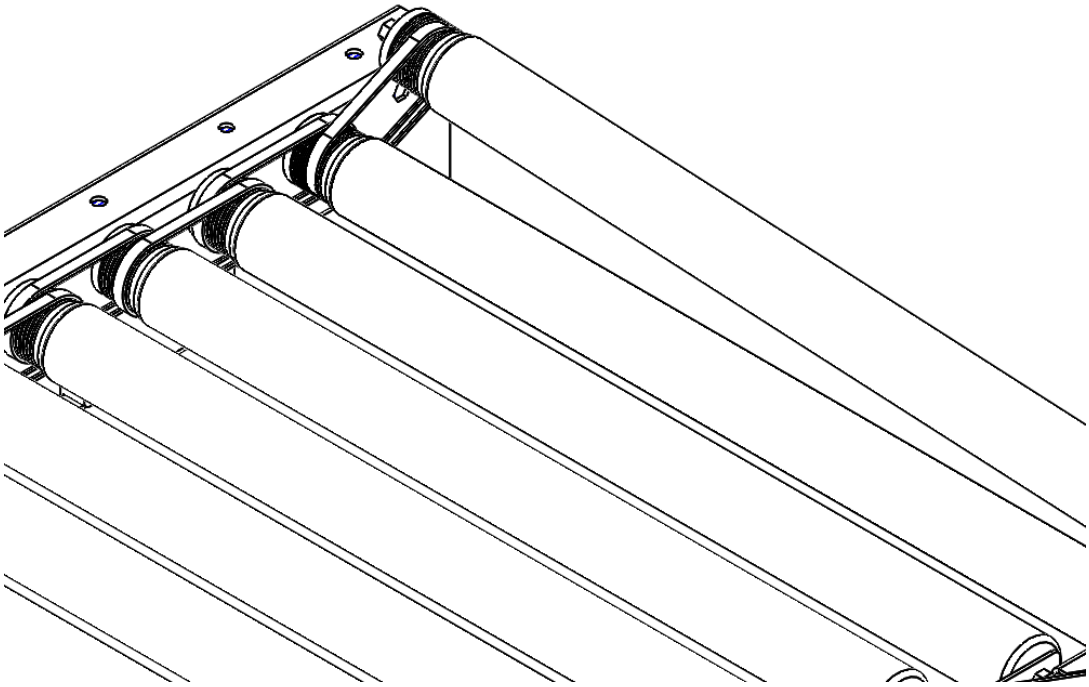

Figure 8: MDR Removal-3

8. Pull the threaded shaft out of the side frame.
9. Pull the MDR away from the bands until the MDR is completely free of the side frames and bands.
10. Slide the new MDR cable through the MDR washer and guide it through the hex hole.
11. Place the MDR bracket back onto the threaded shaft.
12. Guide the MDR back through the existing bands to attach to an adjacent roller that has not been removed.

Ensure that Poly-V bands alternate positions on the inside and outside of the hub as shown in Figure 9.

13. Use a putty knife or other flat surface tool to guide the hex shaft into the hex hole.
14. Fasten the MDR nut using a torque wrench to the appropriate value given in Table 1.
15. Plug the MDR into the card.
16. Repeat steps 8-10 of 6.2.3 for standard rollers until all rollers have been re-installed.
17. Track Poly-V bands as described in 6.2.5.
18. Replace the side cover.

6.2.4 Replacing Bands

Poly-V bands are not easily stretched by hand. Therefore, when replacing bands, it is advised to start at one end of the spur and remove each roller one by one until the band needing replacement has been reached.

1. Follow the lockout/tagout procedure in place to ensure safety
2. Remove the side cover from the intended work area.
3. Repeat steps 3-6 of 6.2.3 for standards rollers until band needing replacement has been removed.
4. Install replacement band onto the hub of the Poly-V roller.

Ensure that Poly-V bands alternate positions on the inside and outside of the hub as shown in Figure 9.

5. Repeat steps 8-10 of 6.2.3 for standard rollers until all rollers have been re-installed.
6. Track Poly-V bands as described in 6.2.5.
7. Replace side cover.

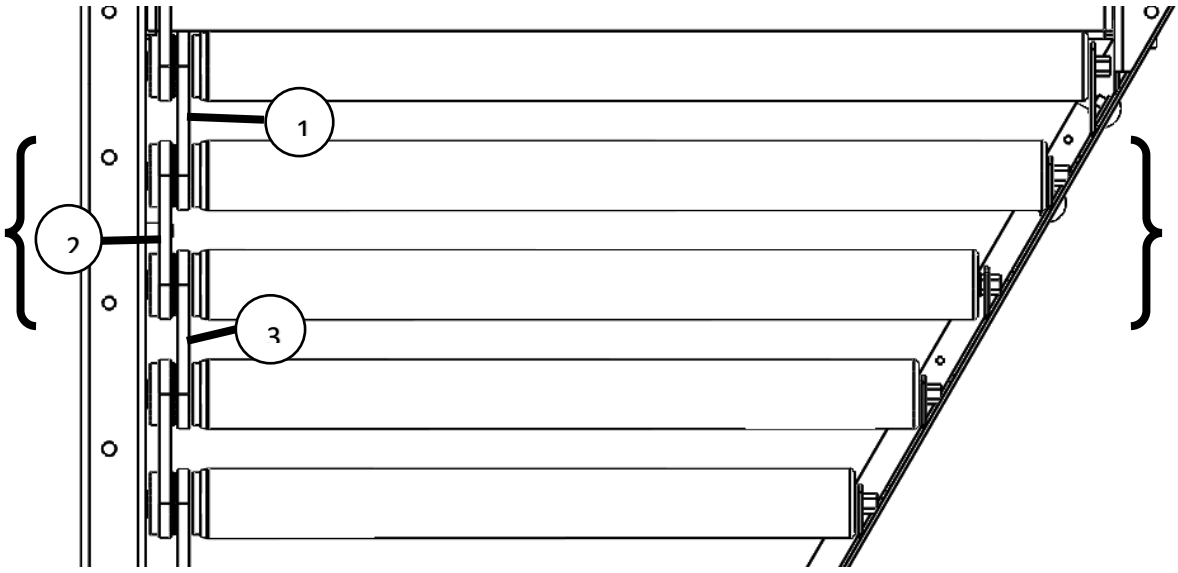

Figure 9: Band Replacement

6.2.5 Tracking Poly-V Bands

Poly-V bands should be tracked to prevent excessive wear and extend the life of the bands.

1. Follow the lockout/tagout procedure in place to ensure safety.
2. Turn the roller that is attached to the band needing tracking.
3. Apply a liner force to the side of the band near the hub of the roller while simultaneously turning the roller.
4. Repeat until all bands are free from contacting each other, within grooves of hub and are parallel with the side frame.

7 Troubleshooting and Repair

Many issues that may arise with Zipline Conveyor can be corrected with minimal field repairs. ZiPline encourages using the following troubleshooting techniques before contacting a ZiPline representative as these are the same techniques used by our field service engineers. To assist in data collection, ZiPline asks that any issues that arise be recorded in a log, with the mark number, a description of the issue, and the steps taken to resolve the issue.

Table 2: Troubleshooting Card Issues

ERROR	CAUSE	ACTION
Conveyor flow direction, speed, or acceleration is incorrect	Incorrect DIP switch settings	Check card manufacturer's literature to verify proper switch configuration.
Zone not operating	No power supply	Check that the power supply is on and wired to the card
	Fuse is blown	Check LED lights and replace the fuse if confirmed short
	Incorrect DIP switch setting	Check card manufacturer's literature to verify proper switch configuration
System reverses or jogs without prompting	Fuse is blown	Check the fuses of all cards in the immediate system
	Incorrect DIP switch setting	Check card manufacturer's literature to verify proper switch configuration
	Communication cable incorrectly connected or faults	Check com cables and replace if faulty.
System turns off when several zones are in use at the same time	Power supply insufficient	Check the number of zones per power supply
		Check that the power supply and AC voltage source are working properly and installed correctly

8 Standard Spare Parts

Table 3: RLSDC Standard Spare Parts Table

REF. NO.	DESCRIPTION	COMMON CONFIGURATIONS
1	SKATEWHEELS	N/A
2	ROLLERS	POLY-V
3	BANDS	POLY-V- 2IN ROLLER SPACING POLY-V- 3IN ROLLER SPACING
4	CONTROL CARD	9006 Hybrid Control ZoneControl DriveControl HBM604 IBE HB510 CBM105
5	MOTOR DRIVEN ROLLERS (MDRS)	POLY-V – INTERROLL EC100 POLY-V – INTERROLL EC110 POLY-V – INTERROLL EC310 POLY-V – ITOH PM486FE POLY-V – ITOH PM486FP

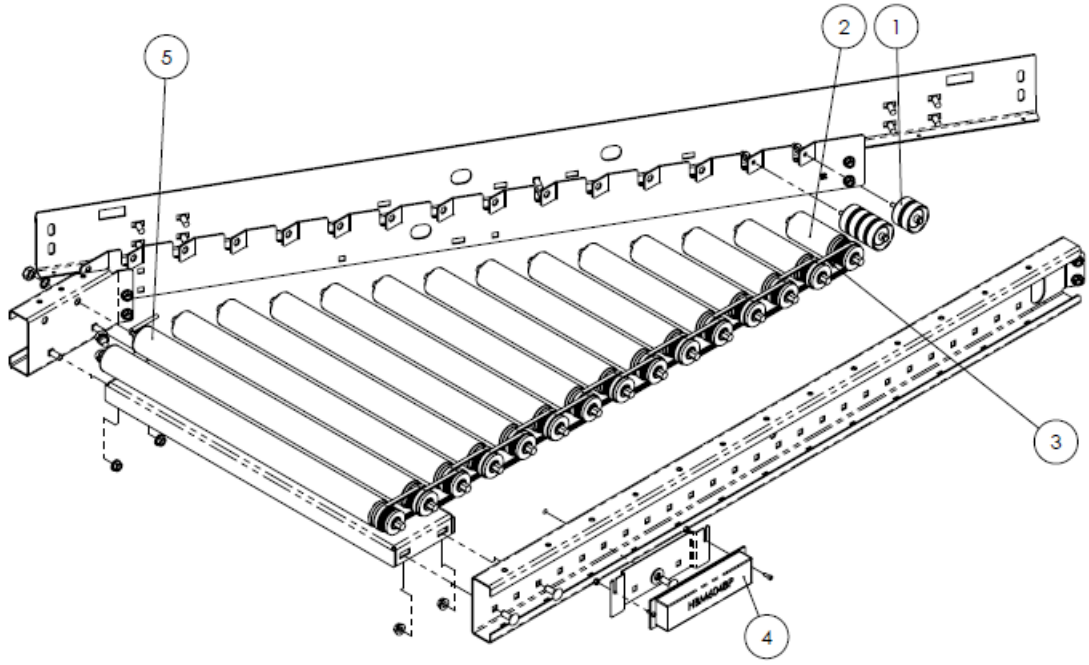

Figure 10: RLSDC Spare Parts Exploded View

ZiPline Conveyor Installation and Maintenance Manual
Model: ZiPline RLSDC

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