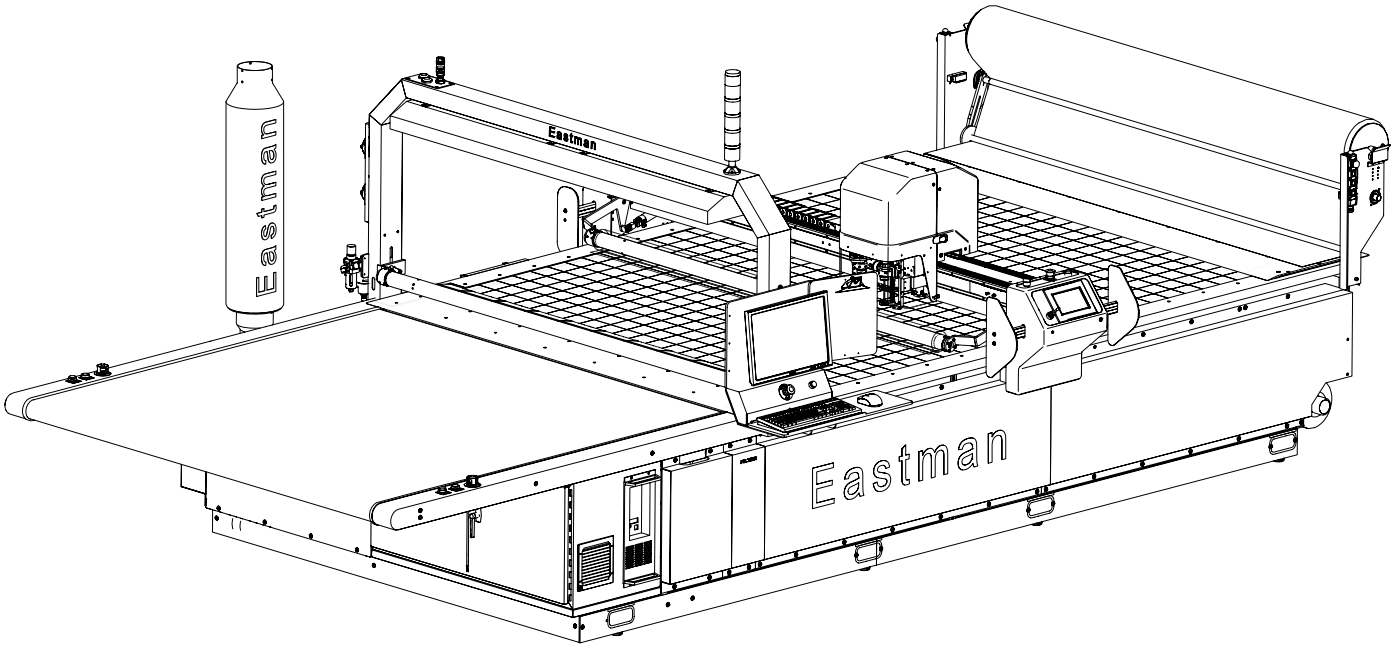
Eastman®

THE EASTMAN®
Raptor

Service Manual

Please read completely before attempting
to operate your new **Raptor.**



⚠WARNING
This machine is equipped with a very sharp knife. Keep hands, arms, and hair away from the knife area at all times.
Misuse of this machine or failure to follow all safety instructions on this machine and in the instruction manual may result in serious personal injuries.

Technical Support:
1-800-872-5595

Eastman®
Over a Century of Cutting Expertise
779 Washington St., Buffalo, N.Y. 14203-1396 U.S.A. • (716)856-2200 • Fax (716)856-1140 or (716)856-2068
Manufacturers of Eastman Cloth Cutting and Cloth Spreading Machines
www.EastmanCuts.com

Form E-564

Congratulations

Congratulations in selecting the **Raptor**. With over 125 years of experience in the cutting room, Eastman is a world leader in cutting equipment. Every Eastman employee takes pride in each machine we build and back it with unprecedented support. Our Technical Service department is made up of a dedicated staff of professionals with years of experience installing, troubleshooting and servicing the **Raptor**. Each technician is familiar with all aspects of the machine including mechanical, electrical and software.

Eastman Machine Company provides technical support and on-site service as required. We offer several affordable Extended Warranty plans that allow you to continue the superior technical support well after the machines warranty. If you require on-site technical support or would like to schedule a preventive maintenance visit or need additional training, please call our headquarters in Buffalo, NY.

Technical Support

Eastman Machine Company
779 Washington Street
Buffalo, NY 14203
Phone: 716-856-2200
Fax: 716-856-2068

Limited Warranty. Eastman warrants to the buyer that the equipment shall be free from defects in materials or workmanship for a period of 180 days commencing on the date of invoice. Any goods or parts claimed by the buyer to be defective must be returned to Eastman, freight charges prepaid, within the 180 day warranty period. If Eastman determines that the goods or parts are defective in materials or workmanship, Eastman's sole obligation under this warranty shall be, at Eastman's sole option, to repair or replace the defective goods or parts or to provide the buyer credit equal to the portion of the purchase price allocable to the defective goods or parts. This warranty should not apply if defects are caused by product misuse or neglect, if the machine has been altered or modified by the buyer or if other than genuine Eastman parts are used in the machine. THIS WARRANTY IS APPLICABLE TO THIS PURCHASE ONLY. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Liability. Eastman's liability to the buyer, and the buyer's remedies from Eastman whether in contract, negligence, under any warranty or otherwise, shall be limited to the remedies provided in the foregoing Limited Warranty. In no event shall Eastman have any responsibility or liability to the buyer for (a) any special, indirect, incidental, or consequential damages, including, but not limited to, loss of use, revenue, or profit even if Eastman has been advised of the possibility of such damages, or (b) any claim against the buyer by any third party. The price stated for the product sold is a consideration for limiting Eastman's liability.

⚠ IMPORTANT

The purchaser must instruct all operators on the proper use of this equipment. All standard industrial safety measures and equipment should be provided to protect the operator. Operators must be cautioned that improper or careless use of this equipment may cause personal injury. If you do not have qualified operators to instruct new persons, contact your EASTMAN sales representative or EASTMAN factory direct.

Electrical connections and servicing to this equipment should be made by a qualified electrician who is familiar with applicable codes and regulations. Disconnect this equipment from electrical power source before proceeding with any disassembly for adjustment or repair.

Your Eastman ***Raptor*** is designed to operate at a high rate speed. All personnel should be instructed to wear safety glasses and stand well clear of the ***Raptor*** when in operation.

Table of Contents

⚠ IMPORTANT

The purchaser must instruct all operators on the proper use of the equipment. All standard industrial safety measures and equipment should be provided to protect the operator. Operators must be cautioned that improper or careless use of this equipment may cause personal injury. If you do not have qualified operators to instruct new persons, contact your Eastman sales representative or Eastman factory direct.

Disconnect electrical power source before proceeding with any installation, adjustment or repair of the Automated Cutting System.

Eastman®

Over a Century of Cutting Expertise

Safety Information

Throughout this manual, safety information is presented by the use of the terms WARNING, CAUTION, ELECTRICAL HAZARD, and NOTE. These terms have the following meanings:

⚠ WARNING

A warning contains critical information regarding potential safety hazards that can occur during proper use or misuse of the machine. Failure to follow these procedures may result in serious personal injury to the user.

⚠ CAUTION

A caution contains instructions for the use or maintenance of the machine. Failure to follow these procedures may result in damage to the machine.

⚠ ELECTRICAL HAZARD

An electrical hazard calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond an Electrical Hazard.

Safety and Indemnification

During the life of the machine, the purchaser agrees to provide to all machine users (including its own employees and independent contractors) all relevant safety information, including warning labels and instruction manuals. The purchaser also agrees to maintain the safety features and working condition of the machine, and to adequately train all users in the safe use and maintenance of the machine. The purchaser agrees to defend, protect, indemnify, and hold Eastman Machine Company and its subsidiaries harmless from and against all claims, losses, expenses, damages, and liabilities to the extent that they have been caused by the purchaser's failure to comply with the terms and instructions of this manual.

General Safety Precautions

⚠ WARNING

- This machine is equipped with very sharp and dangerous tools. Keep hands, arms, and hair away from the cutting area and drive system at all times. Safety gloves, glasses, and appropriate clothing may prevent serious personal injuries.
- Disconnect the power supply to the machine when it is not in use or during routine maintenance, including cleaning and lubrication.
- The purchaser must instruct all operators in the proper use of the machine according to the instructions in this manual. This training must include instruction on the potential safety hazards arising from the use or misuse of the machine. In addition to such training, the purchaser should provide written work instructions as necessary to ensure correct use of the machine for specific cutting and spreading applications.
- Do not modify this machine or disable safety features. Unauthorized modification may result in serious personal injuries to the user. Electrical connections to this machine must be made by a qualified electrician familiar with applicable codes and regulations.
- Safety labels must be kept clean and legible at all times. Call the Eastman Machine factory to order replacement labels.

Maintenance

⚠CAUTION

It is important to perform regular maintenance on the equipment. A daily, bi-weekly, monthly and yearly schedule should be maintained. Failure to do so can result in more frequent breakdowns damage to equipment and/or injury.

Proper Maintenance will help to ensure the reliable operation of your Raptor. You should allow 5 to 10 minutes for daily inspection, 30 minute weekly inspection and one hour monthly inspection. Time invested on these tasks will minimize downtime. Eastman Machine Company is not liable for damage as a result of poor maintenance and any resulting damage would be repaired at user's expense. All maintenance should be performed by qualified personnel, following all safety procedures. The following is the recommended maintenance schedule:

Daily Maintenance

- At the start of each shift, carefully inspect the machine and cutting surface. Look for any debris, loose cables or any other obstruction that may interfere with machine movement or cutting. Vacuum bristle surface as required to remove dust and dirt which may clog perforations.
- Check crank and crank bearings for abnormal wear. Check blade edges for damage and replace as required. Ensure that the knife is securely fastened to the coupler.
- Power up the **Raptor** and listen for any abnormal sounds. If abnormal sounds exist, diagnose and fix the problem to prevent serious damage to the machine.
- After the **Raptor** is powered up, check both the X and Y axes for backlash. If the backlash is excessive on either axis, adjust as needed.
- At the end of each work day make sure the computer is off. Clean-up debris from table and remove any CD or Disks from the disk drives.
- At the end of the day disconnect power to the machine.
- Using dry compressed air blow off any loose dust and debris found on the knife guide assembly and within the sharpening assembly. Using soft bristle brush clean all accessible surfaces and knife guide assemblies. Blow off any loose dust and debris found after cleaning with bristle brush.
- Using a soft cloth, wipe off the entire machine.
- Check crank bearing for wear. Replace as required.
- Check ball joint for wear or excessive movement. Replace as needed.

Bi-Weekly or every 100 hours

CAUTION

Before performing the bi-weekly tasks make sure the Raptor and computer are turned off at the electrical disconnect and locked out.

- Lubricate Table, Gantry and Tool Head linear guides with Eastman lubricant 67-26325 (Mobil: SEA 10 Non-detergent Vactra No. 1) See Lubrication Chart.
- Lubricate Reciprocating Spline with Eastman lubricant 67-26325 (Mobil: SEA 10 Non-detergent Vactra No. 1) See Lubrication Chart.
- Remove the tool head cover from the Y-car. Inspect the cutting head assembly. Look for any wires or air hoses rubbing or wearing.
- Using compressed air, clean dust and debris from inside of Y-car.
- Use clean cloth to wipe down Y-axis rails and lubricate.
- Tighten any loose fasteners on the Y-car.
- Rotate presser foot assembly by hand, it should rotate freely and be without any play relative to tool head base plate.
- Check belt deflection both in reciprocating drive belt and theta drive belt. Excessive deflection will need belt adjustment or replacement as needed.
- Check bristle blocks for damage. Replace as needed.
- Inspect all hardware on gantry, base and take off conveyor. Secure as required.

First Working Day of Month

CAUTION

Before performing the monthly tasks make sure the Raptor and computer are turned off at the electrical disconnect and locked out.

- Remove gantry covers and inspect all electrical wiring connections for nicks or abrasions. Repair or replace as needed.
- Inspect all 24 VDC power supply connectors for any discoloration or signs of heating.

First Working Day of Month (cont.)

- Check all belts for signs of wear such as cuts, frays or missing teeth. Replace if needed.
- Check belt tension. Belt should be tight enough to prevent backlash between drive pulley and driven pulley.
- Check for wear on spur gears. Replace as needed.
- Check all shafts and pulleys. Pulleys need to be seated tightly on the shaft.
- Check all electrical plugs and connectors to ensure they are securely fastened.
- Check all decals and labels for damage replace as needed.
- Check and clean air filters. Replace as required.
- Check the take-off belt and take-off drive motor belt for signs of wear. Replace as needed.
- Check fingers in the bristle conveyor for signs of wear or damage. Replace as needed.
- Check E-chain and cables for signs of wear.
- Check resealer for signs of wear. Ensure that it is working properly and all the hardware is secure.
- Inside of bristle conveyor to be cleaned ever 6 months.

Yearly or every 2000 hours

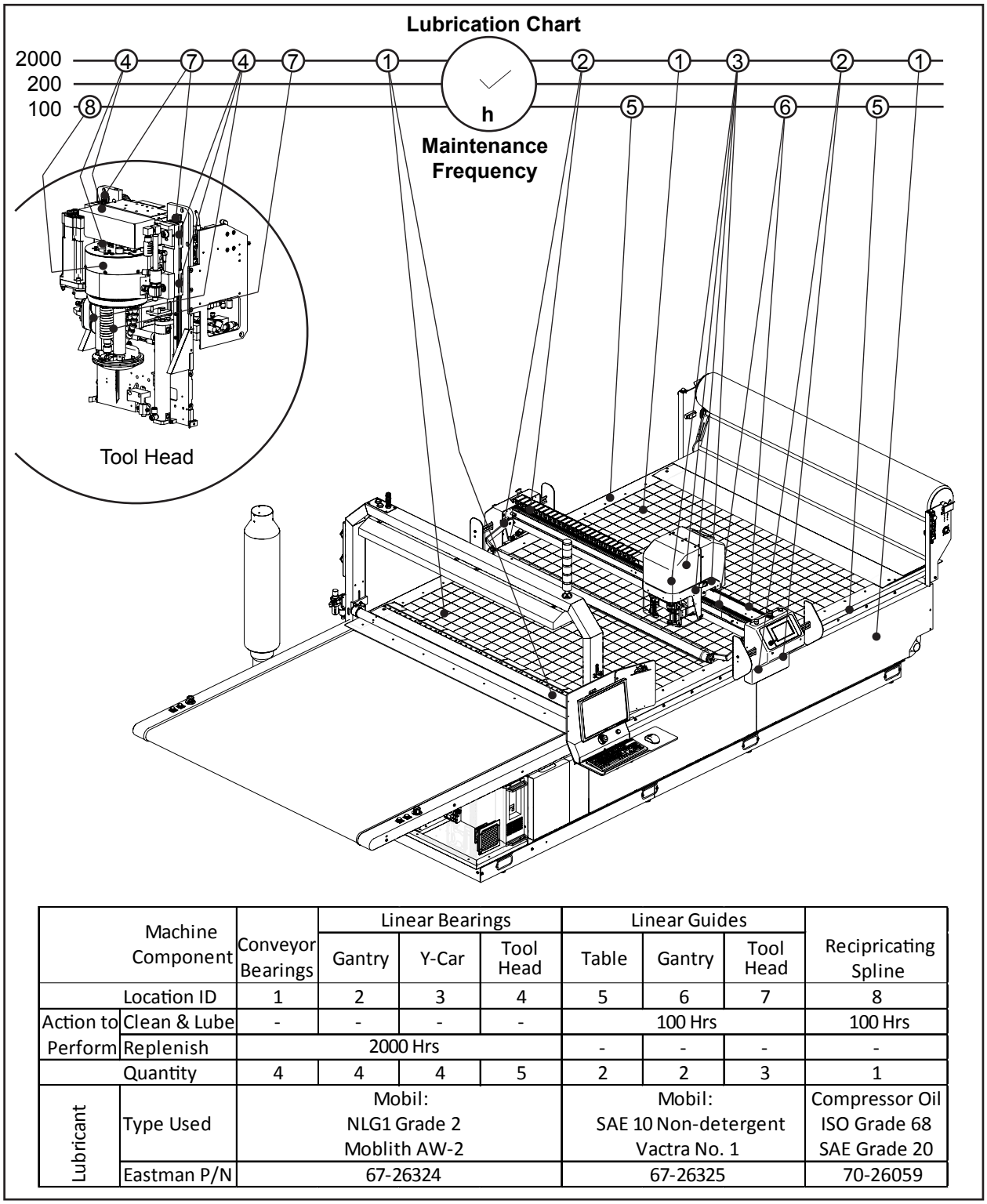
CAUTION

Before performing the yearly tasks make sure the Raptor and computer are turned off at the electrical disconnect and locked out.

- Lubricate Gantry, Y-Car and Tool Head linear bearings with Eastman lubricant 67-26324 (Mobil: NLG1 Grade 2 Mobil AW-2) See Lubrication Chart.
- Lubricate Conveyor bearings with Eastman Lubricant 67-26324 (Mobil: NLG1 Grade 2 Mobil AW-2).
- Inspect inside conveyor base for loose screws or abnormal wear. Secure or replace as needed.

Lubrication Chart

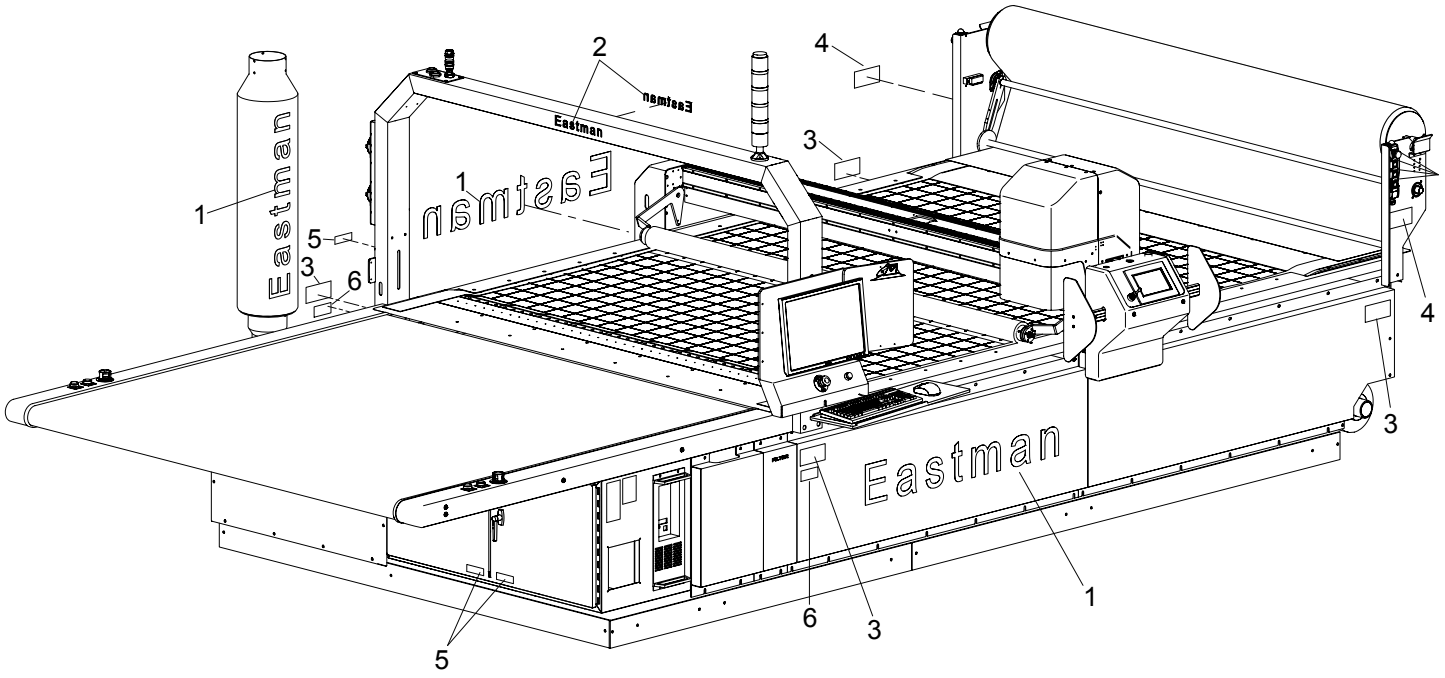
Below are the lubrication points for the Raptor.



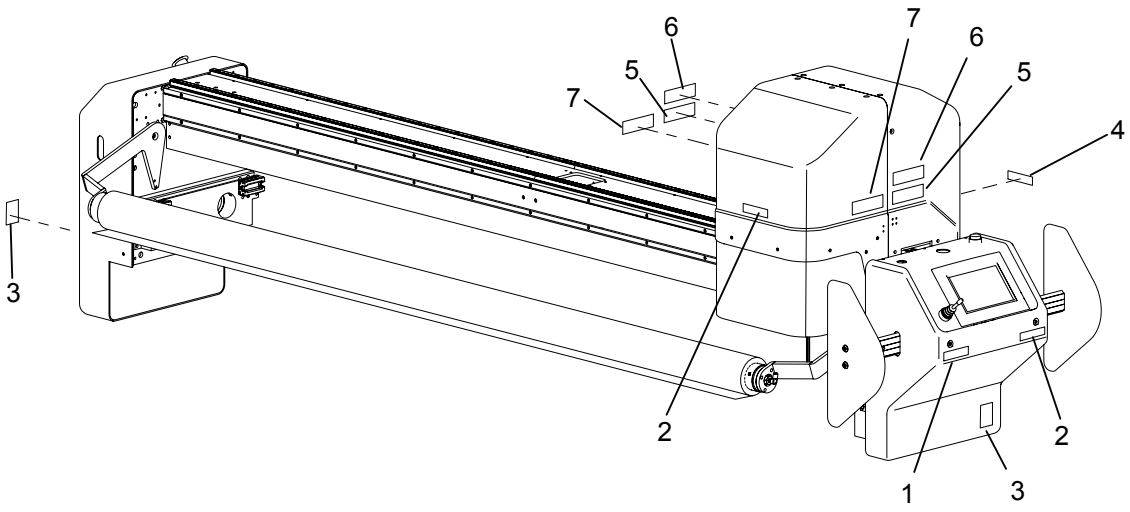
	Machine Component	Conveyor Bearings	Linear Bearings			Linear Guides			Reciprocating Spline
			Gantry	Y-Car	Tool Head	Table	Gantry	Tool Head	
	Location ID	1	2	3	4	5	6	7	8
Action to	Clean & Lube	-	-	-	-	100 Hrs			100 Hrs
Perform	Replenish	2000 Hrs				-	-	-	-
	Quantity	4	4	4	5	2	2	3	1
Lubricant	Type Used	Mobil: NLG1 Grade 2 Moblith AW-2				Mobil: SAE 10 Non-detergent Vactra No. 1			Compressor Oil ISO Grade 68 SAE Grade 20
	Eastman P/N	67-26324				67-26325			70-26059

Raptor
Label Locations

ITEM	PART NO.	DESCRIPTION	QTY.
1	91-26004	Decal, Large Eastman	3
2	91-26003	Decal, Medium Eastman	2
3	91-26073-6	Decal, Gaurd Removal Large	4
4	91-26073-11	Decal, Entanglement Hazard	2
5	91-26073-2	Decal, Hazard Voltage	3
6	91-26073-9	Decal, Moving Parts	2
7	91-26117	Decal Sheet, Plastic Overlay	2



Raptor Gantry
Label Locations



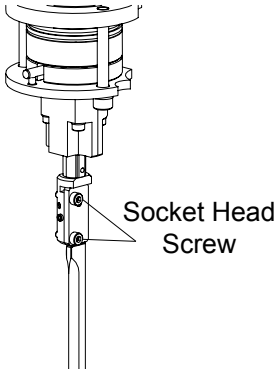
ITEM	PART NO.	DESCRIPTION	QTY.
1	91-26002	Decal, Small Eastman	1
2	91-26099	Decal, Raptor Logo (Blue)	2
3	91-26073-5	Decal, Guard Removal Med.	2
4	91-26073-2	Decal, Hazard Voltage	1
5	91-26073-10	Decal, Pinch Point	2
6	91-26073-3	Decal, Blade Hazard	2
7	91-26073-4	Decal, Guard Removal Sm.	2

Aligning, Cleaning and Replacing Consumable Parts

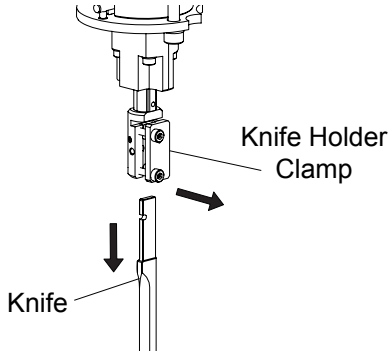
Knife Replacement

Removing the Knife

1. Turn the Power off to the Raptor, use lockout/ tagout if required.
2. Loosen the two Socket Head Screws,



3. Slide the Knife and Knife Holder Clamp to the right.
4. Carefully remove the knife from the bottom.



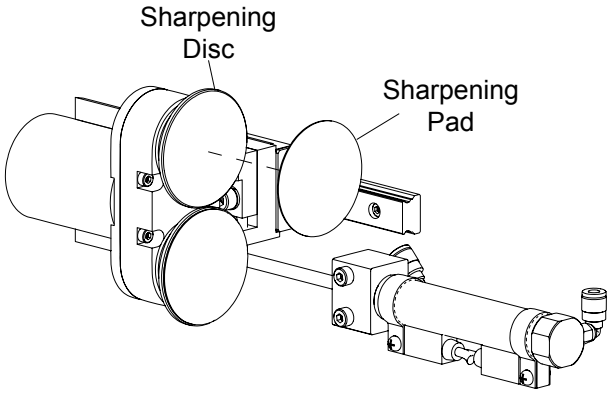
Replacement Knife Chart	
54-28440	Blade, Raptor
54-28440-HD	Blade, Raptor, Heavy Duty

5. Replace Knife and make sure Knife is flush.

   Reassemble in reverse order.

NOTE: Knife must be seated properly in knife holder clamp.

Sharpening Pad Replacement



Removing the Sharpening Pads

1. Turn the Power off to the Gantry, use lockout/ tagout if required.
2. Remove knife using Knife Replacement procedure.
3. Peel Sharpening Pad from Disc. Remove any excess adhesive that may be left on disc.

   NOTE: Sharpening Pad is applied using a adhesive back.
4. Apply new Sharpening Pad to Disc.

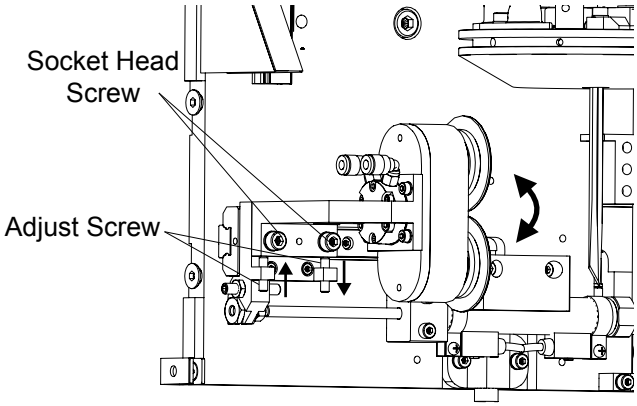
Replacement Sharpening Pads	
54-28778-45-150	Fine Sharpening Pads, 50 Pack
54-28778-45-100	Medium Sharpening Pads, 50 Pack
54-28778-45-080	Coarse Sharpening Pads, 50 Pack
54-28778-45-060	Rough Sharpening Pads, 50 Pack

⚠WARNING

Always handle knives with care. Safely dispose of used knives.

Sharpener Angle Adjustment

1. Loosen the two Socket Head Screws.



2. Adjust both Adjust Screws so the sharpener pads are parallel with the knife.

NOTE: Set Screws must be adjusted in opposite direction. (Directions shown will rotate the sharpener pads clock-wise). For counter clock-wise rotation, adjust Set Screws in opposite directions.

3. When desired position is achieved, re-tighten the two Socket head Screws.

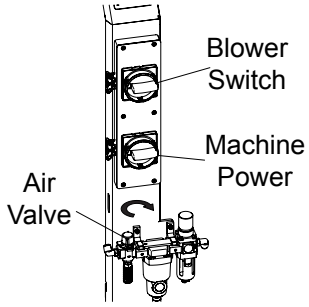
⚠WARNING

Sharp Knife is exposed. When handling the Sharpener, use caution.

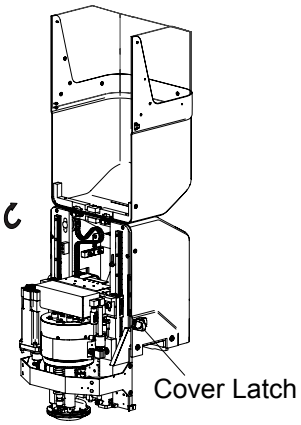
Sharpener Adjustment

NOTE: Check Alignment First. Adjust as follows

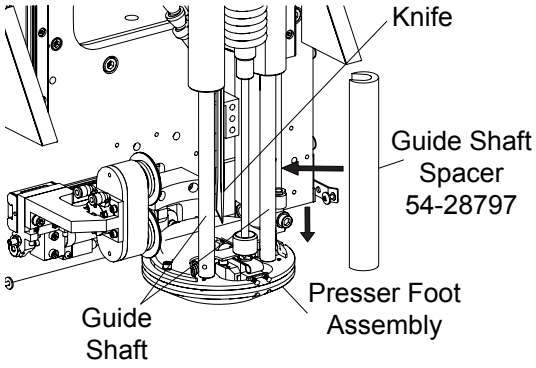
1. Turn off the Machine Power, Blower and release the air to disable the machine.



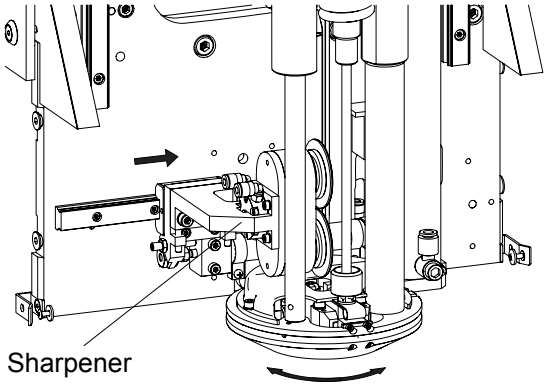
2. Unclip Cover Latches on each side and rotate the front cover upwards.



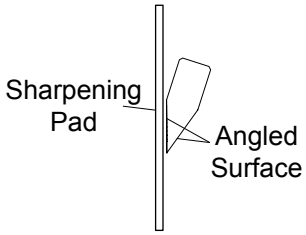
3. Manually push the Presser Foot down and slide the Guide Shaft Spacer to the Guide Shaft.



4. Slide the Sharpener to the right as far as it will go without bending the blade.



5. Rotate the Presser Foot so the Angled surface on the Knife is parallel with the sharpening pads.

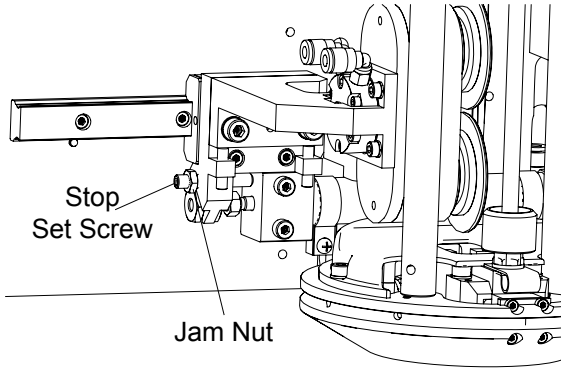


KNIFE BOTTOM VIEW

⚠WARNING

Sharp Knife is exposed. When handling the Presser Foot, use caution.

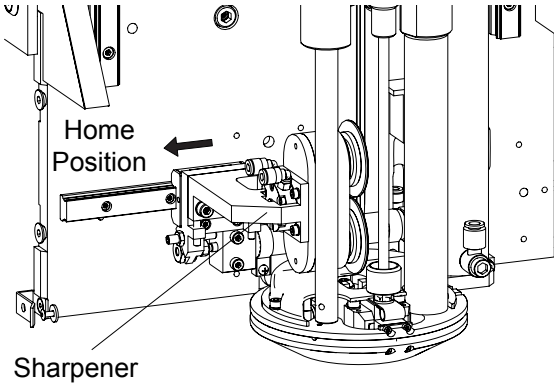
6. Loosen the Jam Nut and adjust the Stop Set Screw to get the desired position.



NOTE: Sharpening Pads should make contact with the angled surface on the knife. Should not deflect blade.

7. After adjusting position with the Stop Set Screw, tighten the Jam Nut to lock the stop position of the Sharpener.

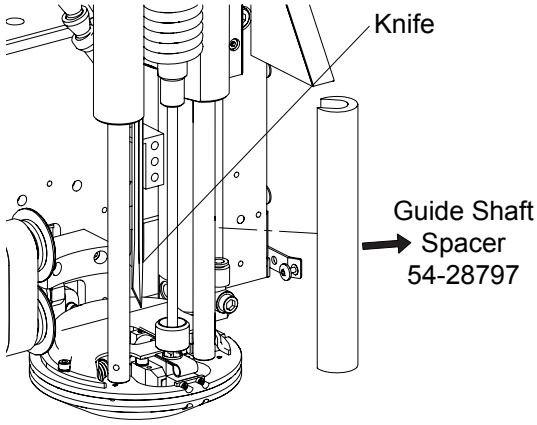
8. Slide the Sharpener back to the left.



⚠WARNING

Sharp Knife is exposed. When handling the Presser Foot, use caution.

9. Push down on the Presser Foot Assembly to remove the Guide Shaft Spacer.



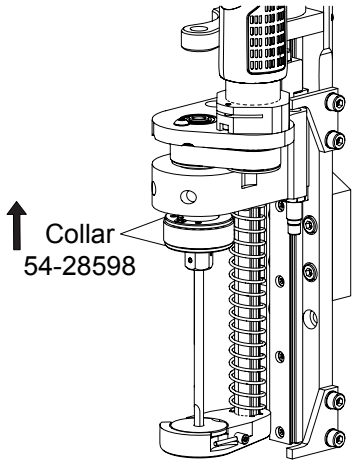
10. Close the front tool head cover and Turn the Machine Power, Blower and Air back on for operation.

Drill Bit Replacement

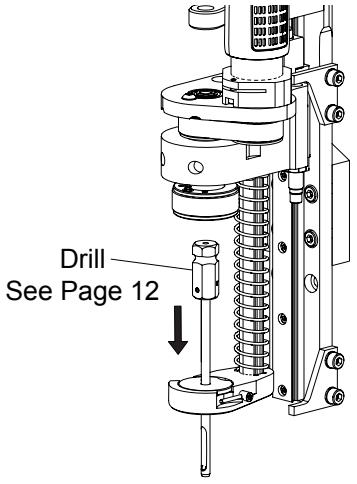
Removing the Drill Bit

1. Turn the Power off to the Raptor, use lockout/ tagout if required.
2. Lift the Collar up to Release the Drill Bit.

NOTE: Collar will only move approximately 5mm.



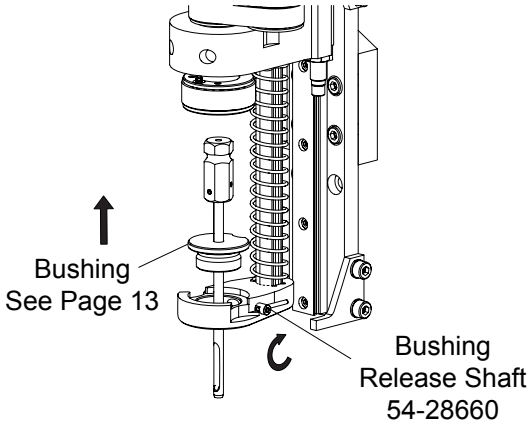
3. Lower the Drill Bit.



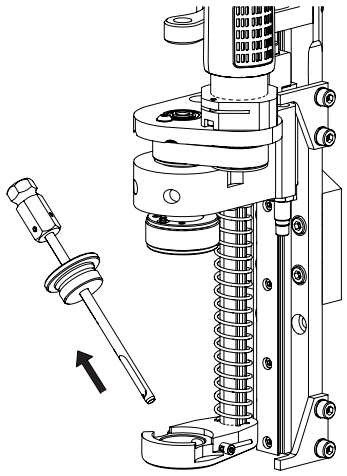
⚠WARNING

Handle drill bit with care. Failure to do so may result in serious personal injury.

4. Rotate Bushing Release Shaft 180 degrees.
5. Lift the Bushing up.

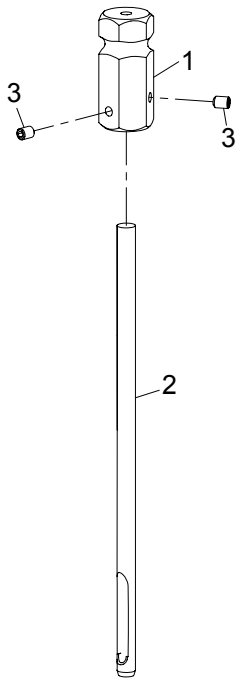


6. Tip the drill bit and the Bushing and lift away from machine.



7. Replace and reassemble in reverse order.

Drill Sizes
54-28629-X

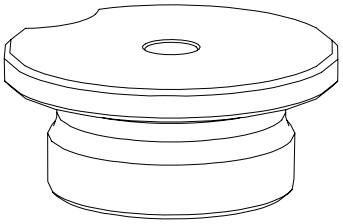


Item	Part No.	Description	Qty.
1	See Chart	Drill Adapter	1
2	See Chart	Drill	1
3	342-M3-4	Screw,Skt.Set M3-.5 X 4 Flat	2

Hole Size	Drill no.(2)	Description	Adapter no.(1)	Assembly no.
3/32"(.094")	54-28631-093	3/32" Closed End Drill Ass'y	54-28636-093	54-28629-H093
1/8"(.125")	54-28631-125	1/8" Closed End Drill Ass'y	54-28636-125	54-28629-H125
5/32"(.156")	54-28631-156	5/32" Closed End Drill Ass'y	54-28636-156	54-28629-H156
3/16"(.187")	54-28631-187	3/16" Closed End Drill Ass'y	54-28636-187	54-28629-H187
1/4"(.250")	54-28631-250	1/4" Closed End Drill Ass'y	54-28636-250	54-28629-H250
5/16"(.312")	54-28631-312	5/16" Closed End Drill Ass'y	54-28636-312	54-28629-H312
3/8"(.375")	54-28631-375	3/8" Closed End Drill Ass'y	54-28636-375	54-28629-H375
3/64"(.047")	54-28630-055	3/64" Solid Drill Ass'y	54-28636-055	54-28629-S055
5/64"(.078")	54-28630-070	5/64" Solid Drill Ass'y	54-28636-070	54-28629-S070
3/32"(.094")	54-28630-093	3/32" Solid Drill Ass'y	54-28636-093	54-28629-S093
1/8"(.125")	54-28630-125	1/8" Solid Drill Ass'y	54-28636-125	54-28629-S125
1mm(.039")	54-28630-M1	1mm Solid Drill Ass'y	54-28636-M1	54-28629-S1
2mm(.078")	54-28630-M2	2mm Solid Drill Ass'y	54-28636-M2	54-28629-S2
3mm(.118")	54-28630-M3	3mm Solid Drill Ass'y	54-28636-M3	54-28629-S3
4mm(.157")	54-28630-M4	4mm Solid Drill Ass'y	54-28636-M4	54-28629-S4
5mm(.196")	54-28630-M5	5mm Solid Drill Ass'y	54-28636-M5	54-28629-S5

Note: Actual hole size in material will vary depending on material being drilled. Consult factory for test drilling of your material for exact size specifications.

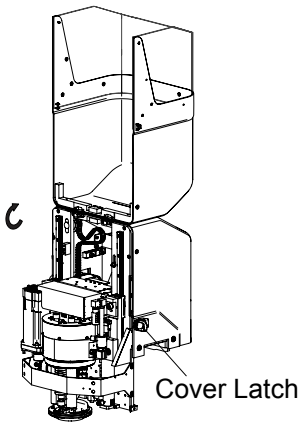
Drill Bushing Sizes
54-28569-X



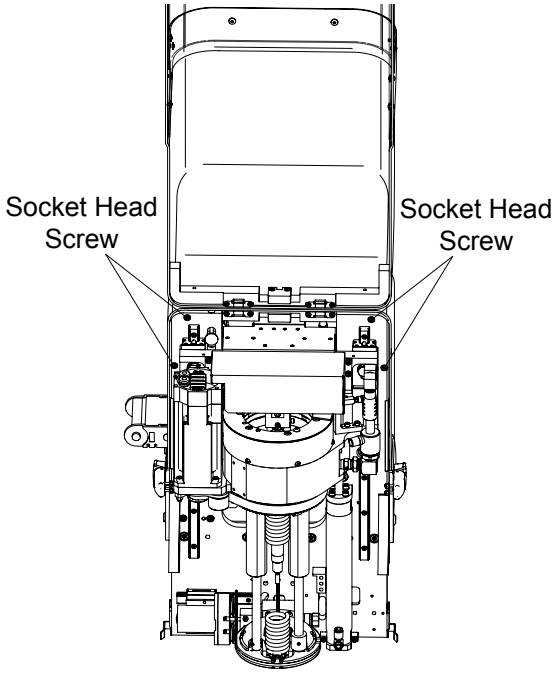
Hole Size	Part no.	Description
.055"	54-28569-055	Drill Bushing, .055"
.070"	54-28569-070	Drill Bushing, .070"
.093"	54-28569-093	Drill Bushing, .093"
.125"	54-28569-125	Drill Bushing, .125"
.156"	54-28569-156	Drill Bushing, .156"
.187"	54-28569-187	Drill Bushing, .187"
.250"	54-28569-250	Drill Bushing, .250"
.312"	54-28569-312	Drill Bushing, .312"
.375"	54-28569-375	Drill Bushing, .375"
1mm	54-28569-1	Drill Bushing, Ø1.0mm
2mm	54-28569-2	Drill Bushing, Ø2.0mm
3mm	54-28569-3	Drill Bushing, Ø3.0mm
4mm	54-28569-4	Drill Bushing, Ø4.0mm
5mm	54-28569-5	Drill Bushing, Ø5.0mm
6mm	54-28569-6	Drill Bushing, Ø6.0mm
7mm	54-28569-7	Drill Bushing, Ø7.0mm
8mm	54-28569-8	Drill Bushing, Ø8.0mm
9mm	54-28569-9	Drill Bushing, Ø9.0mm
10mm	54-28569-10	Drill Bushing, Ø10.0mm
11mm	54-28569-11	Drill Bushing, Ø11.0mm
12mm	54-28569-12	Drill Bushing, Ø12.0mm
13mm	54-28569-13	Drill Bushing, Ø13.0mm
14mm	54-28569-14	Drill Bushing, Ø14.0mm
15mm	54-28569-15	Drill Bushing, Ø15.0mm
16mm	54-28569-16	Drill Bushing, Ø16.0mm
17mm	54-28569-17	Drill Bushing, Ø17.0mm
18mm	54-28569-18	Drill Bushing, Ø18.0mm

Serpentine Belt Replacement

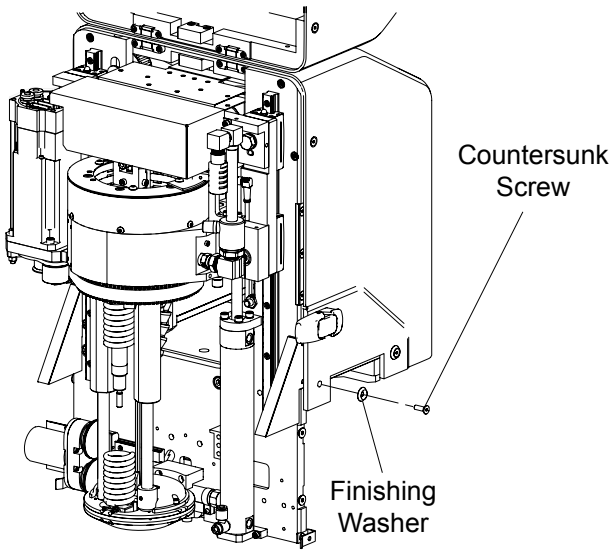
1. Turn the Power off to the Raptor, use lockout/tagout if required
2. Unclip Cover Latches on each side and rotate the front cover upwards.



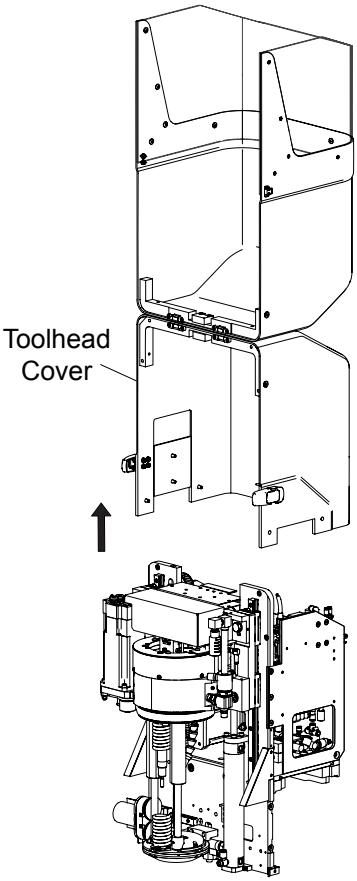
3. Remove (4) Socket Head Screws.



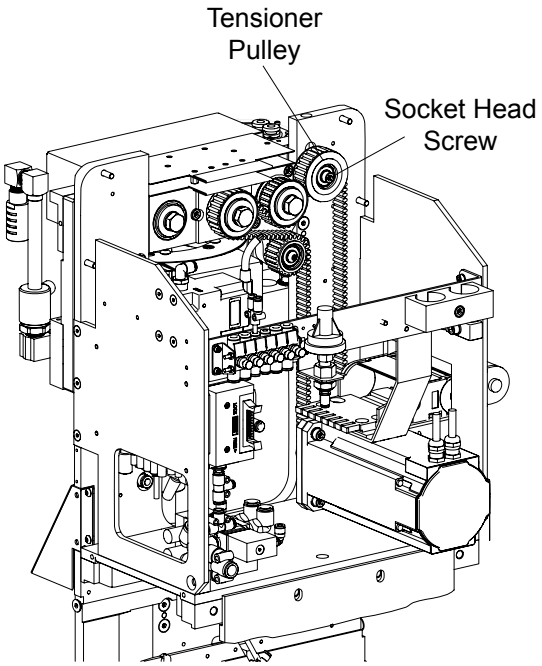
4. Remove (4) Countersunk Screws and Finishing Washers.



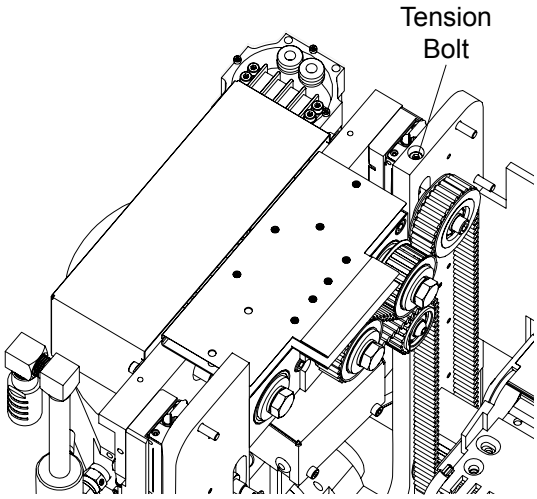
5. Remove Toolhead Cover.



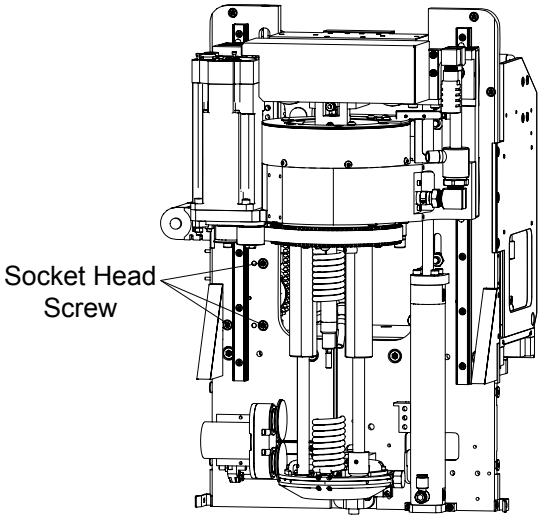
6. Loosen Socket Head Screw on the Tensioner Pulley.



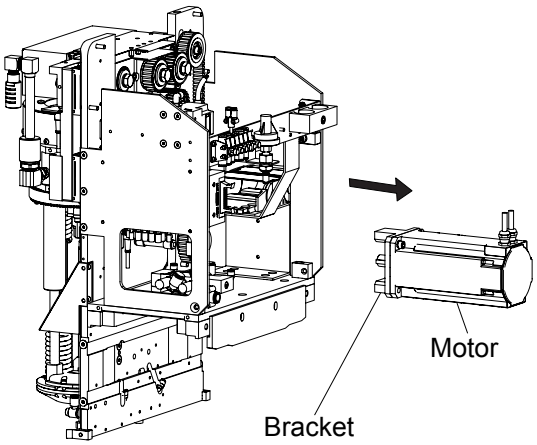
7. Loosen Top Tension Bolt.



8. Remove (3) Socket Head Screws.

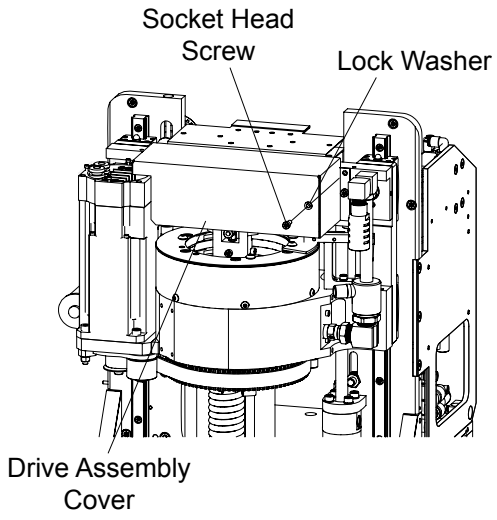


9. Pull Motor and Bracket approximately 20mm or 1" to remove the belt.

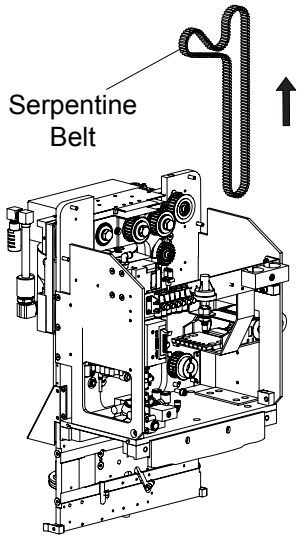


NOTE: Motor is connected to cables. Handle with care.

10. Remove (4) Socket Head Screws and Lock Washers to remove the Drive Assembly Cover.

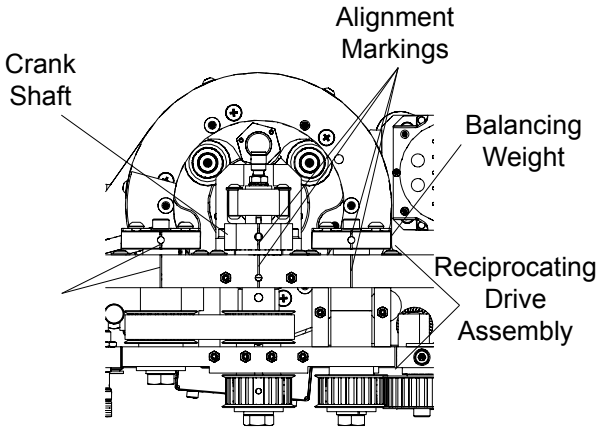


11. Remove Serpentine Belt.



12. When installing new Serpentine belt, be sure to line up the (2) sets of markings. The markings are located on the top of the Reciprocating Drive Assembly.

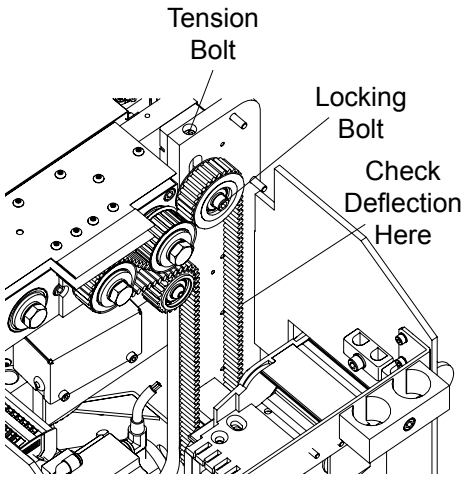
NOTE: Rotating the crank shaft and counterweight may be required.



TOP VIEW

13. Reassemble in reverse order.

NOTE: Adjust belt tension to a deflection of 1/4" or 6mm.

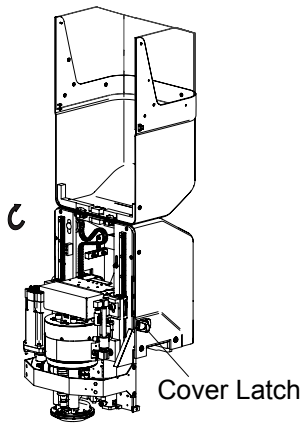


⚠WARNING

Loose tension can cause excessive vibration and belt teeth breaking off. Over tensioning can cause belt to break and premature wear on bearings.

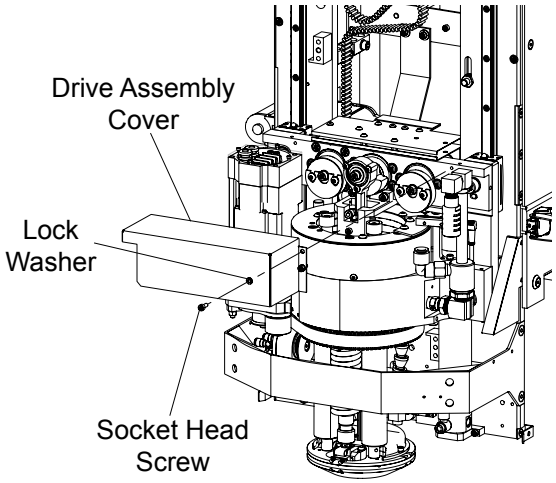
Crank Bearing and Ball Joint Replacement

1. Turn the Power off to the Raptor, use lockout/tagout if required
2. Unclip Cover Latches on each side and rotate the front cover upwards.

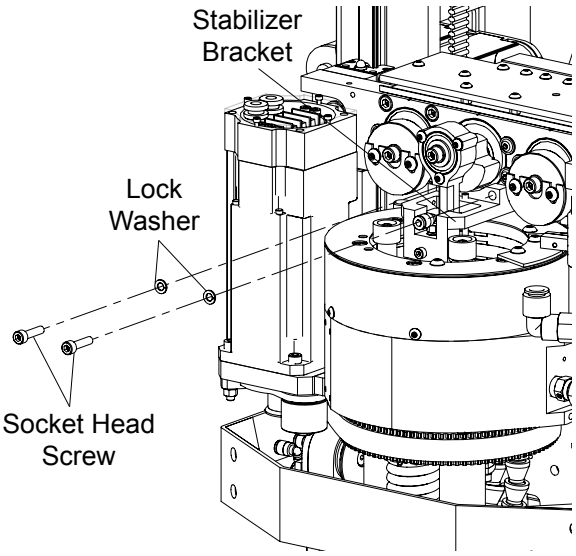


3. Remove Knife See page 8.

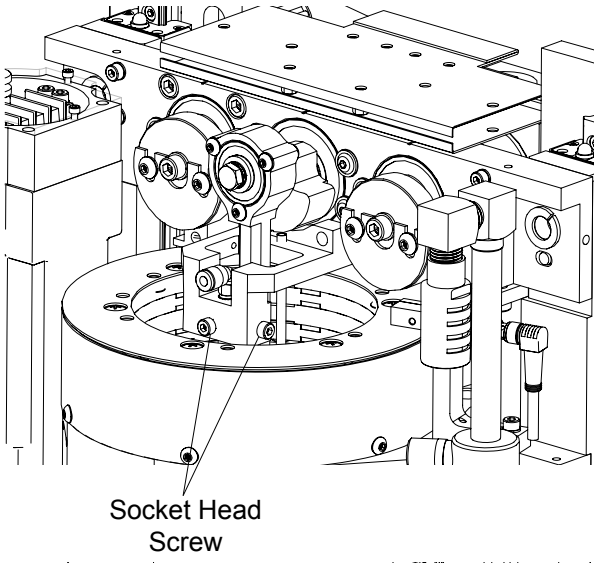
4. Remove the (4) Socket Head Screws and Lock Washers that hold the Drive Assembly Cover.



5. Remove the (2) Socket Head Screws and Lock Washers that secure the Stabilizer Bracket.

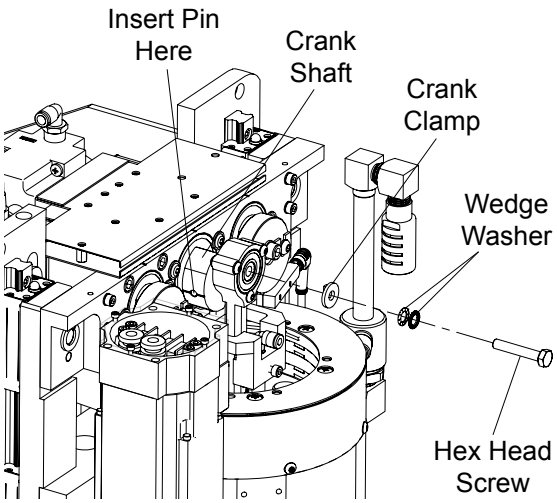


6. Loosen (2) Socket Head Screws

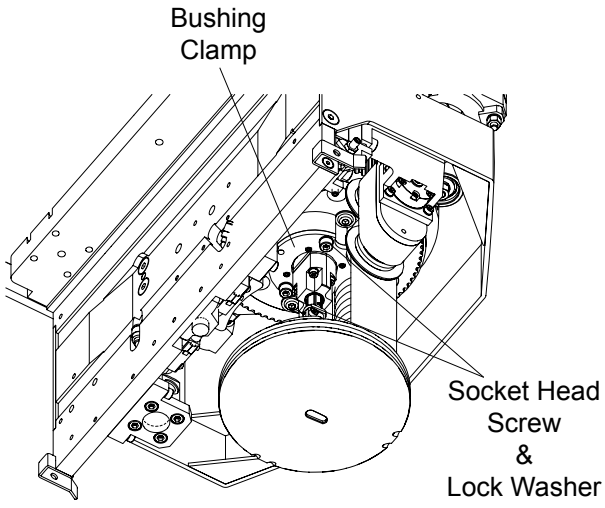


7. Remove Socket Head Screw from top of the Crank. Hold the Crank Shaft by inserting a pin in the bottom of the Crank Shaft to prevent spinning.

NOTE: Rotate the Crank Shaft by hand to access the pin hole if necessary.



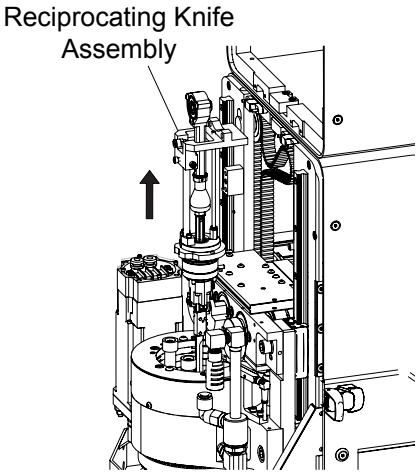
8. From bottom, remove (2) Socket Head Screws and Lock Washers to remove the Bushing Clamp.



⚠WARNING

Reciprocating Knife Assembly contains sharp knife. Handle with care. Failure to do so may result in serious personal injury.

9. Push up from the bottom and pull the Reciprocating Knife assembly out from the top.

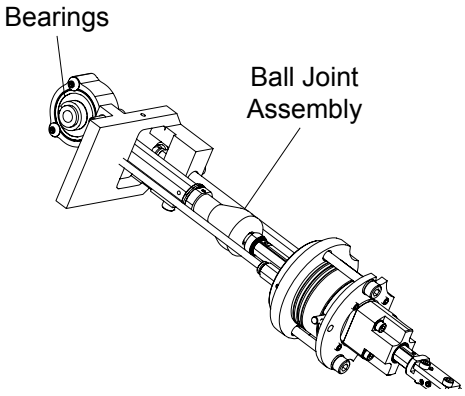


⚠CAUTION

Handle Reciprocating Knife Assembly with care. Excessive force may cause damage.

10. Completely remove the Reciprocating Knife Assembly from the tool head.

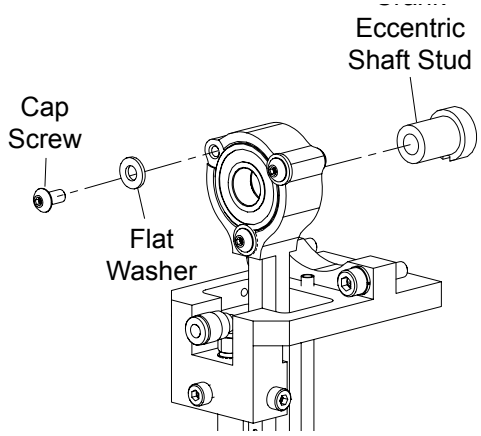
11. Place on a flat surface to continue to replace the Crank Bearings and the Ball Joint Assembly .



NOTE: Loctite pin used during Installation.

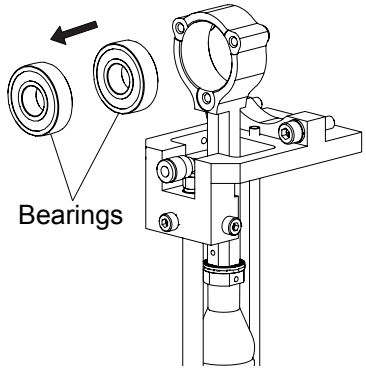
Crank Bearing Removing

1. Remove the Crank Eccentric Shaft Stud, the (3) Cap Screws and the (3) Flat Washers.



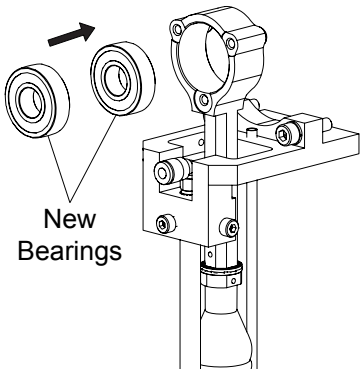
2. Remove Bearings.

NOTE: Bearings must be pressed out.

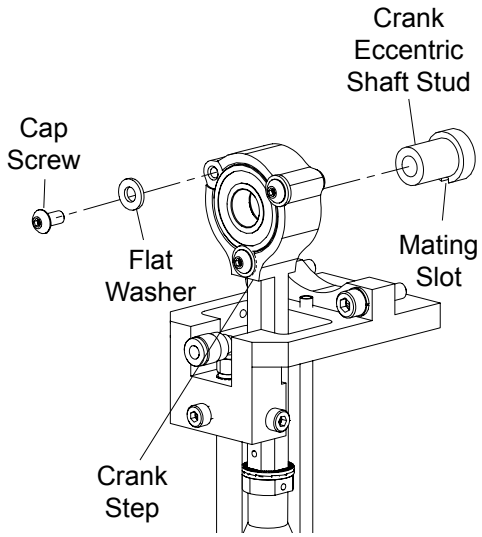


3. Install new Bearings.

NOTE: Bearings must be pressed in flush to the Crank surface.

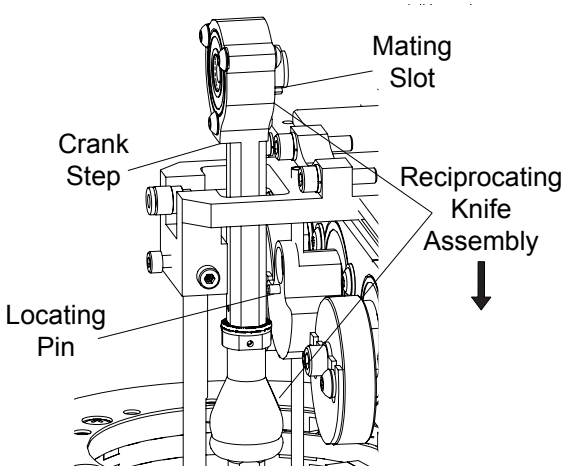


4. Replace the Crank Eccentric Shaft Stud, Washers and Cap Screws.



NOTE: Crank step located on same side as washers.

5. Reciprocating Knife Assembly is ready to be re-installed.



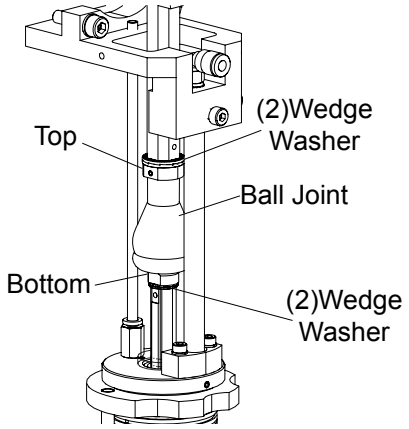
6. Assemble in reverse order.

NOTE: 1. Crank Step must face outward.
2. Locating Pin Must slide through mating slot.

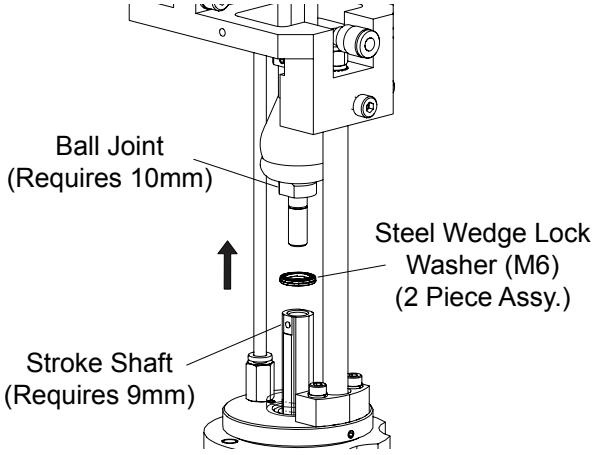
Ball Joint Removal

1. The Ball Joint is threaded at the Top and the Bottom. Specific wrench sizes must be used to loosen the Ball Joint.

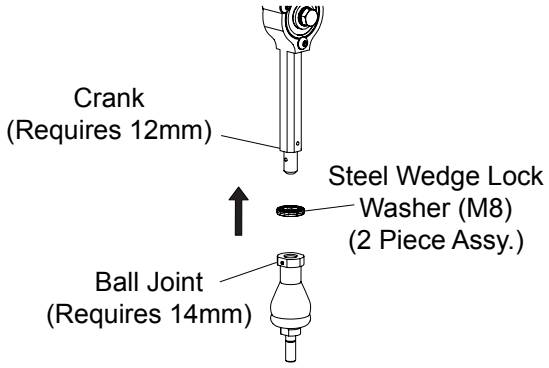
NOTE: Loctite 243 (Blue) is used. Heat may be required to assist in loosening the Ball Joint.



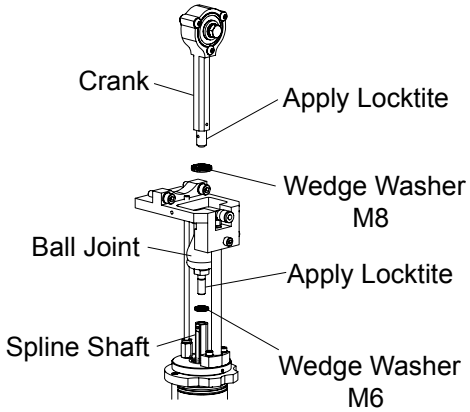
2. The bottom of the Ball Joint requires a 10mm wrench and the Stroke shaft requires a 9mm wrench. The Wedge Washer must be replaced anytime disassembled.



3. The top of the Ball Joint requires a 14mm wrench and the Crank requires a 12mm wrench. The Wedge Washer must be replaced anytime disassembled.



4. Replace Ball Joint and Wedge Washers.



5. Reciprocating Knife Assembly is ready to be re-installed.

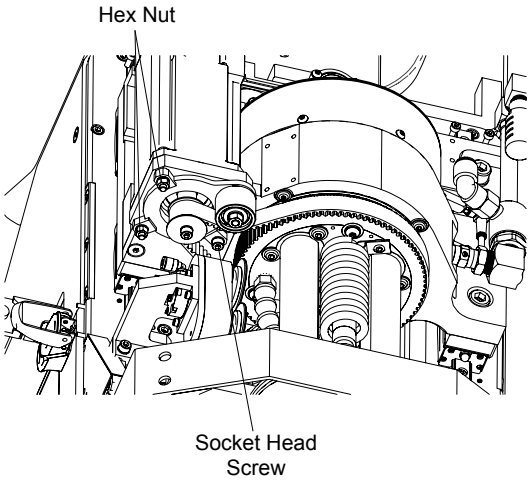
NOTE: 1. Crank Step must face outward.
2. Locating Pin Must slide through mating slot.

⚠CAUTION

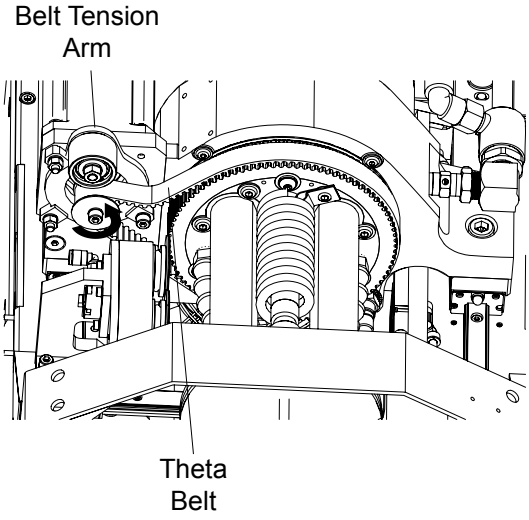
Do not use adjustable wrench. Failure to comply can result in damage.

Theta Belt Replacement

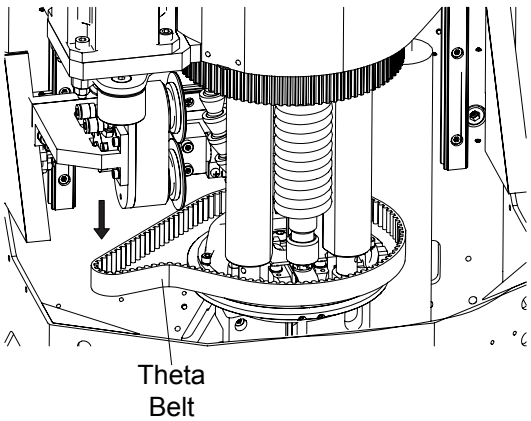
1. Turn the Power off to the Raptor, use lockout/tagout if required.
2. Remove knife using knife removal procedure.
3. Loosen the (2) Hex Nuts and the single Socket Head Screw. As Shown



3. Rotate the Belt Tension Arm with Idler Pulley counter-clockwise to release the tension on the Theta belt.



4. Remove the old Theta Belt and discard.
5. Inspect motor pulley teeth and large pulley for wear or damage. Replace if required.



6. Replace Theta Belt and reassemble in reverse order.

Air Filter Replacement

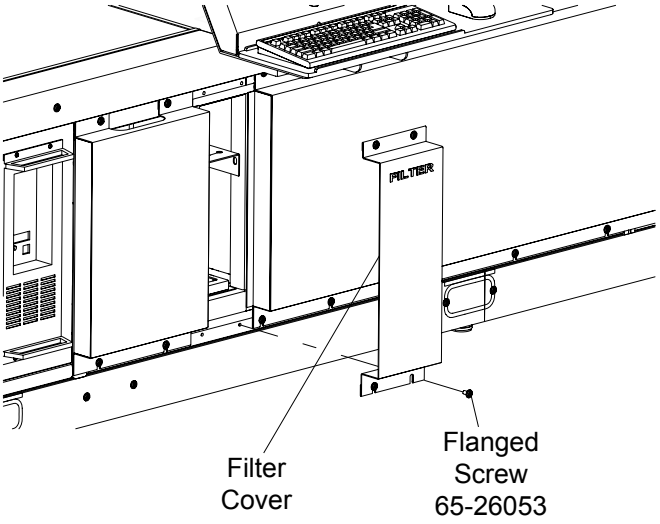
Removing the Air Filter

1. Turn the Power off to the Raptor, use lockout/tagout if required.

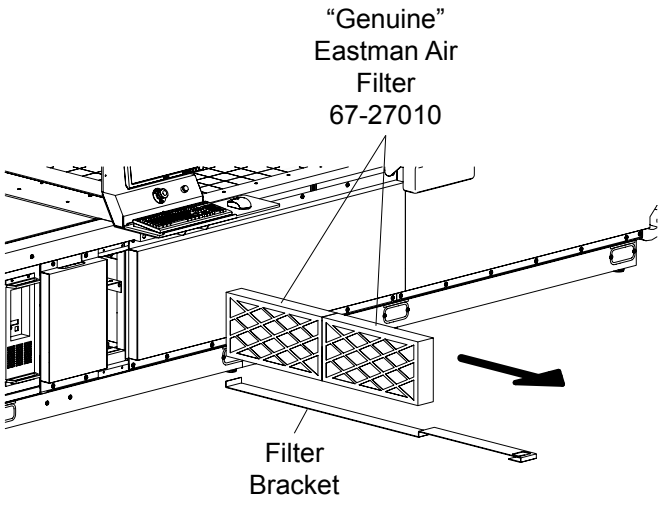
2. Remove (4) Flanged Screws to remove the Filter Cover. As Shown

3. Slide out the Filter Bracket and Air Filters.

4. Replace with "Genuine" Eastman Filters. Reassemble in reverse order.



NOTE: Use only "Genuine" Eastman Air Filters. Failure may result in loss of vacuum pressure, damage to your machine and void your warranty.



⚠CAUTION

The Filter area and the bracket must be free of debris and dust. Vacuuming or cleaning may be necessary. Failure to do so may result in damage to the machine.

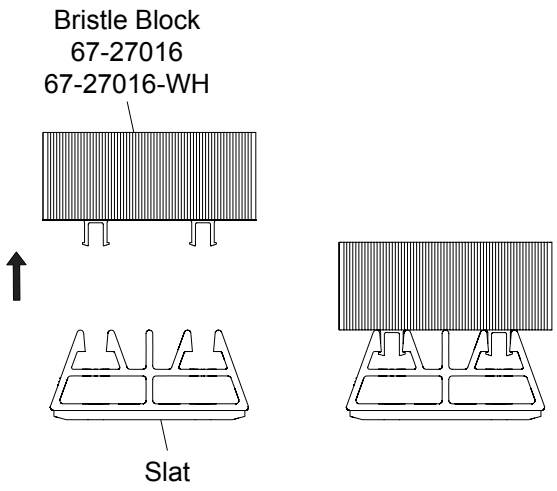
Bristle Block Replacement

Removing the Bristle Block

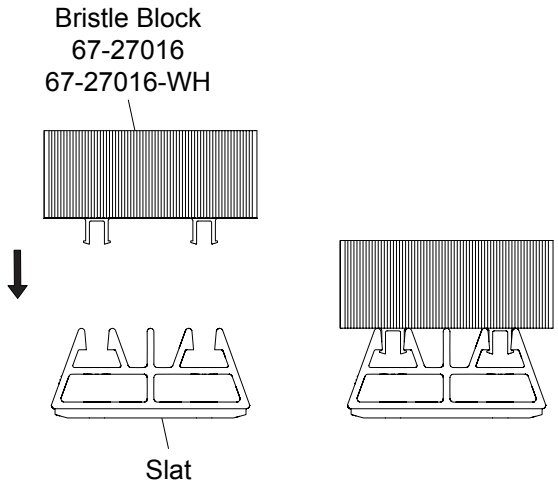
1. Advance the conveyor to expose damaged bristle.
2. Apply E-stop to prevent the conveyor and gantry movement for safely.
3. Using a pair of pliers grab the bristle of the bristle block to be removed and pull up and out of Bristle Bed.

Replacing the Bristle Block

1. Install bristle block by ensuring the tab alignment is proper according to the slat arrangement. As Shown
2. Apply even pressure on the surface of bristle block so that the mounting tabs snap into the slat. As Shown.
3. Release the E-stop allowing conveyor and gantry movement and advance conveyor. Inspect the remaining bristle block and replace damaged bristles as required.



Bristle Block Removal



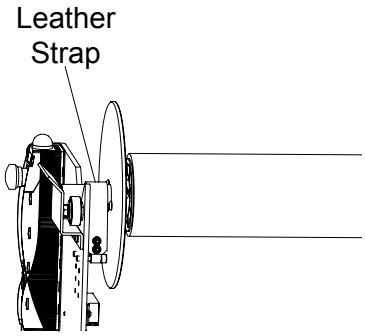
Bristle Block Installation

NOTE: Use only "Genuine" Eastman Bristle Blocks. Failure may result in machine damage and void your warranty.

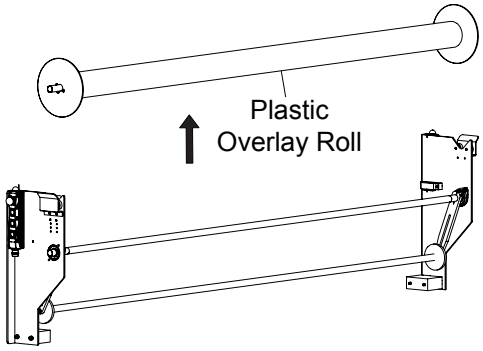
Plastic Overlay Replacement

NOTE: 1. Plastic Overlay Roll weigh Approximately 150lbs.
2. Two people are required for Plastic Overlay replacement.

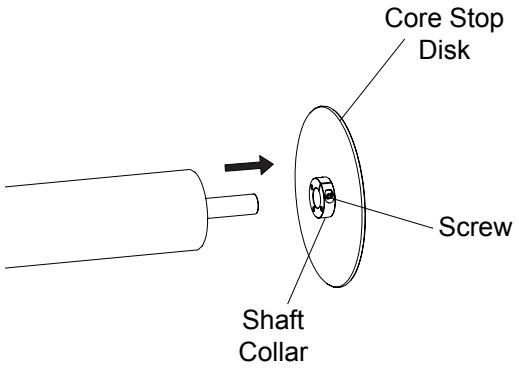
1. Unhook leather strap.



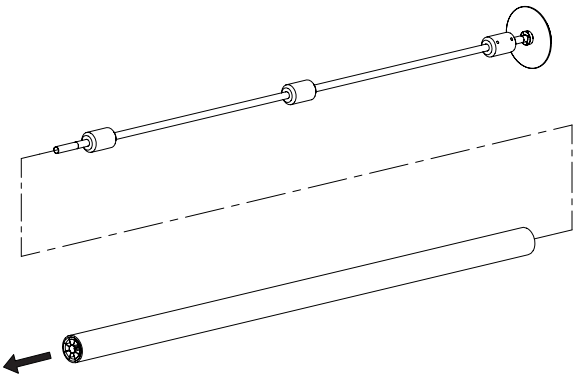
2. With one person on each side of the machine, lift up the overlay bar and empty plastic overlay core and set it on flat surface.



3. Loosen the Shaft Collar Screw and remove large core stop disk.



4. Remove the empty core and discard.



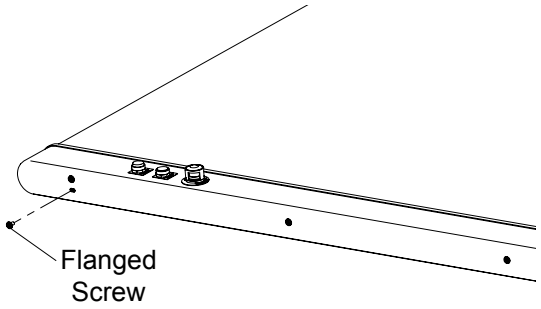
5. Place bar into new Roll and reassemble in reverse order.

⚠WARNING

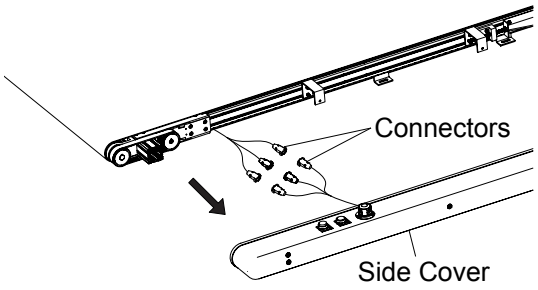
Failure to follow procedure may result in serious personal injury.

Take-Off Drive Conveyor Belt Replacement

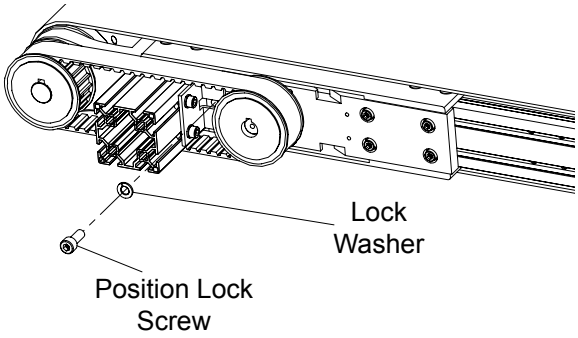
1. Turn the Power off to the Raptor, use lockout/tagout if required
2. The Drive belt is located on the operator side of the take off conveyor. Begin by Removing (4) Flanged Screws.



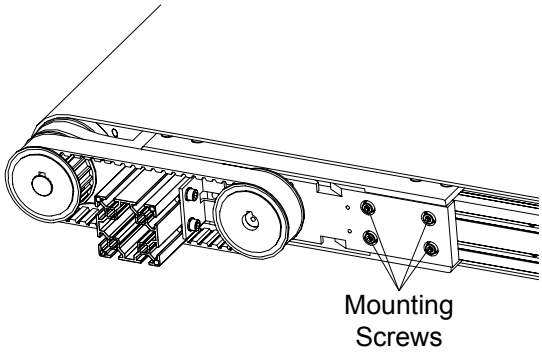
3. Remove Side Cover and disconnect the three connectors.



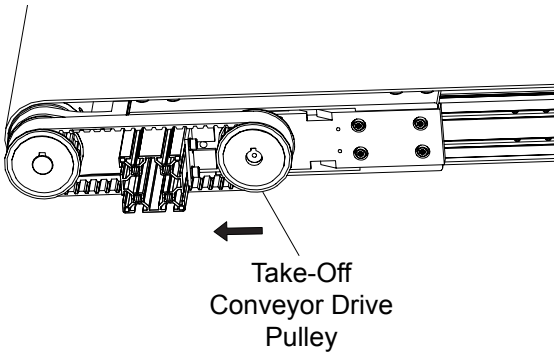
4. Remove the Position Lock Screw and Lock Washer as shown.



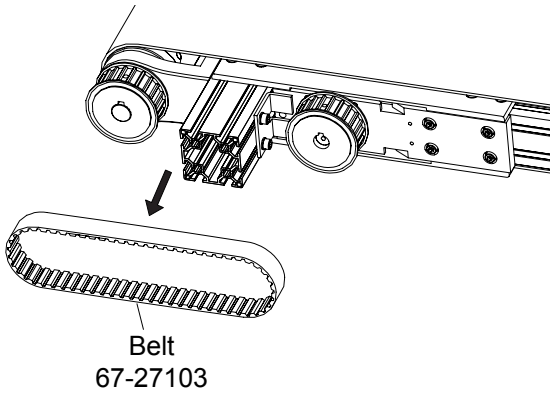
5. Loosen (4) mounting Screws as shown.



6. Slide the Take-Off Conveyor Drive pulley to the left to release the tension on the belt.



7. Remove the Belt and discard.



8. Reassemble in reverse order.
9. Tension the belt so the deflection is 1/8" or 3mm.

Eastman®

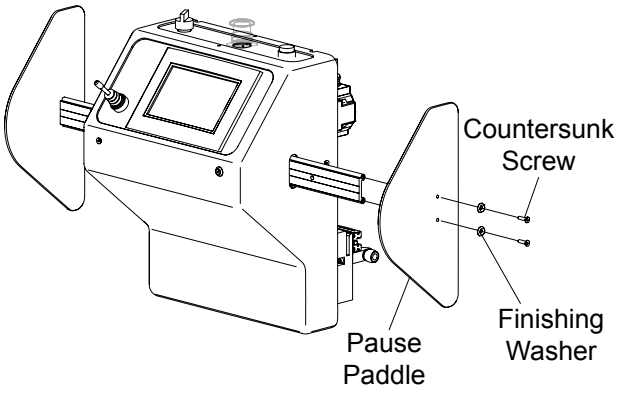
Over a Century of Cutting Expertise

X-Motor Belt Replacement

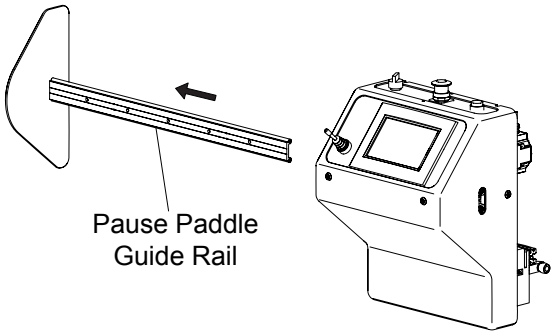
NOTE: Use same procedure for both Operator Side and Non-Operator Side. Operator side is shown.

1. Turn the Power off to the Raptor, use lockout/tagout if required.

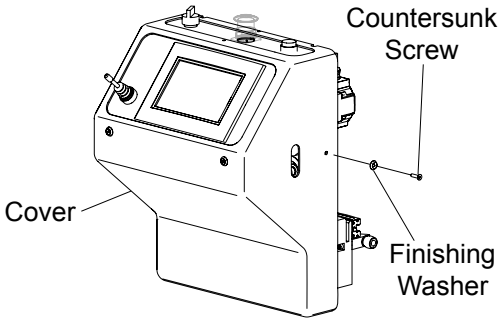
2. Remove (2) Countersunk Screws and (2) Finishing Washers to remove the pause paddle.



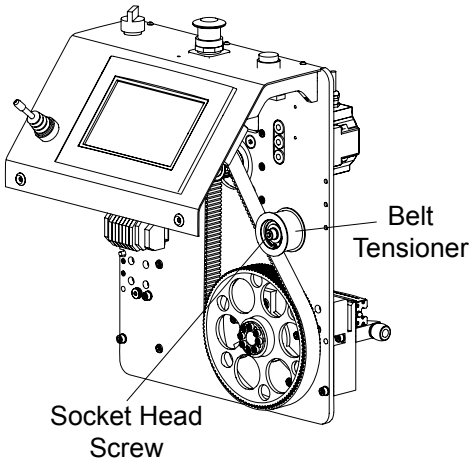
3. Slide the Pause Paddle Guide Rail out as shown.



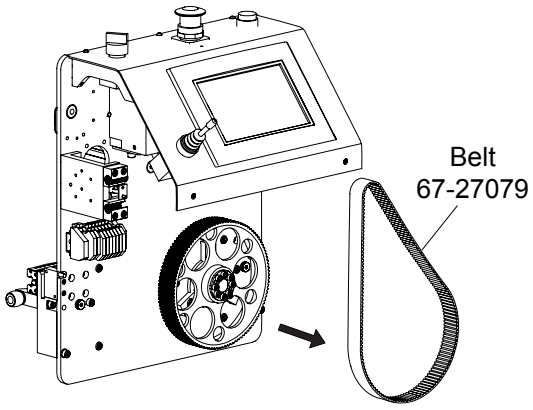
4. Remove the (4) Countersunk Screws and (4) Finishing Washers. Remove the cover.



5. Loosen Socket Head Screw to release the belt tension.



6. Remove Belt.



7. Replace the drive belt and reassemble in reverse order.

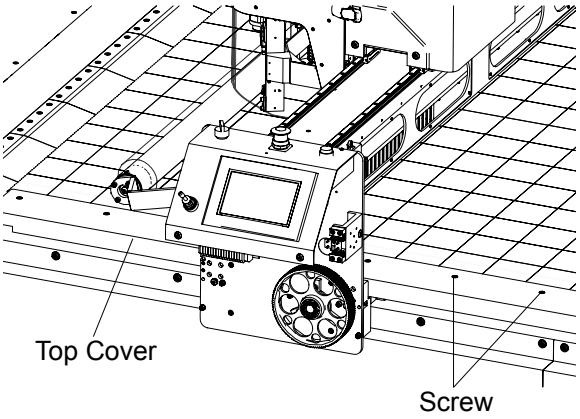
8. When tensioning the belt, set the tensioner pulley so the maximum tension is applied to the belt.

Replacement of X-Car Drive Gear

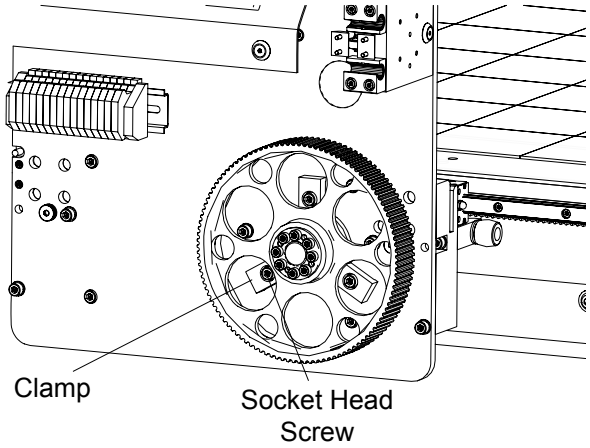
Removing the Operator Side

1. Remove X-Motor belt. See page 28.

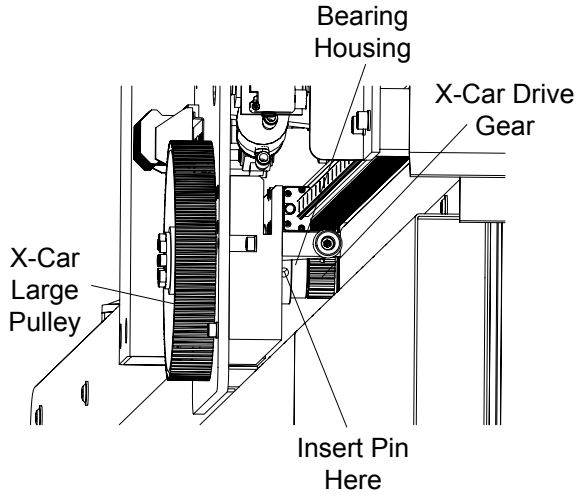
2. Remove the (13) Philip Screws to remove the Top Cover.



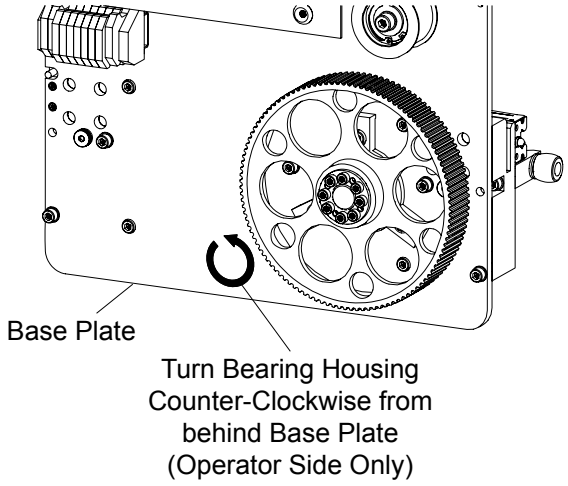
3. Remove (3) Socket Head Screws to remove the (3) Clamps.



4. Loosen the Bearing Housing by inserting a large pin in one of the three holes and turning counter-clockwise while holding the X-Car Large Pulley in place.

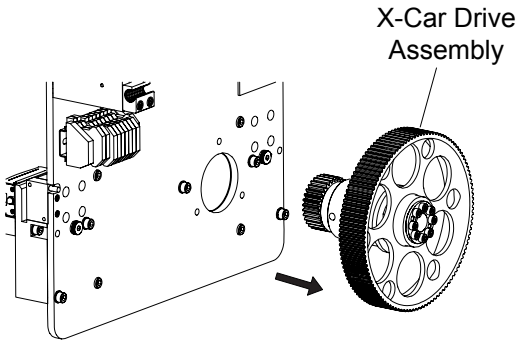


NOTE: For Non-Operator side, the X-Car Large Pulley must be removed by removing the eight Socket Head Screws in the middle.

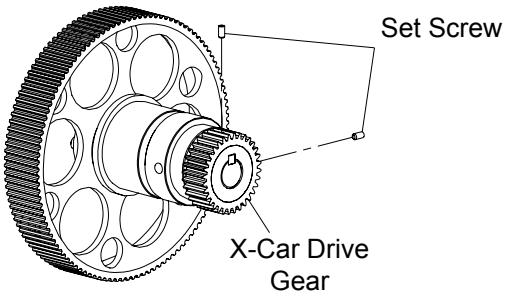


NOTE: This replacement is for the Operator Side. The Non-Operator Side follows the same steps but requires the Bearing Housing to be turned "Clockwise" instead of Counter-Clockwise.

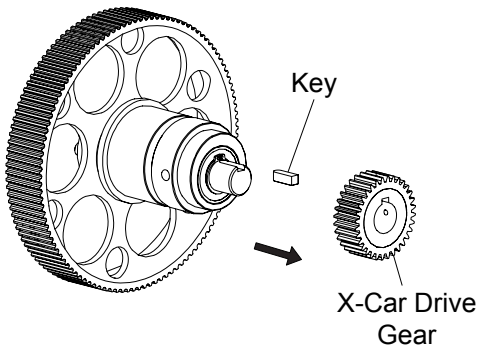
5. Remove X-Car Drive Assembly.



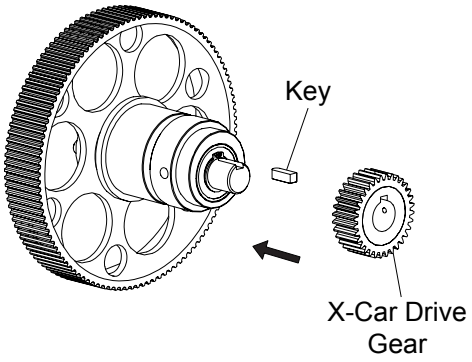
6. Remove (2) Set Screws from X-Car Drive Gear.



7. Remove the X-Car Drive Gear and the Key.

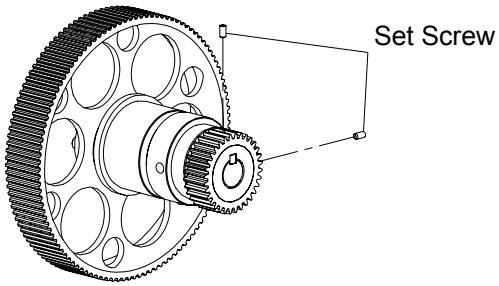


8. Re-install New X-Car Drive Pulley and Key.



NOTE: Use Loctite 680 (Green) on shaft when installing X-Car Drive Gear.

9. Re-install the Set Screws for X-Car Drive Gear.



NOTE: Use Loctite 222MS set screws.

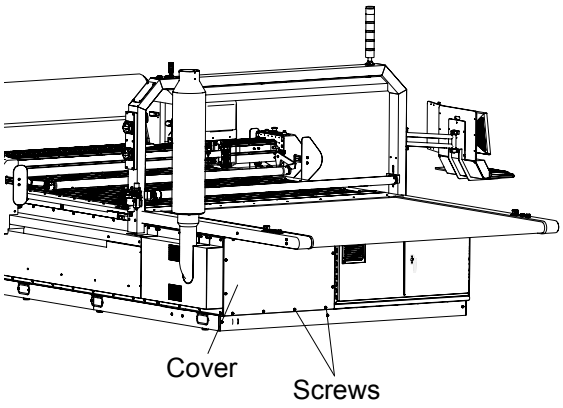
10. Reassemble the X-Car Drive Assembly in reverse order. See page 28 for replacement of X Motor belts.

Blower Belt Replacement

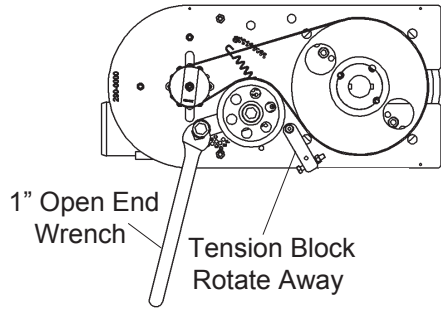
NOTE: Use same procedure for both 30HP and 40HP Blower.

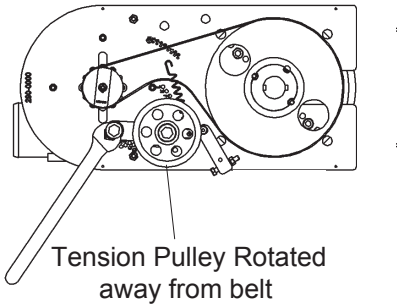
1. Turn the Power off to the Raptor, use lockout/tagout if required.

2. Remove (10) Screws to remove Cover.

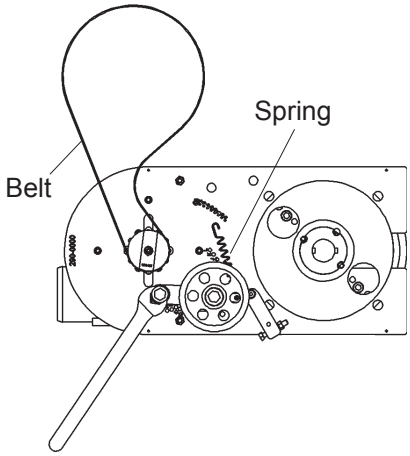


3. Using a 1" open-end wrench, rotate the Tension Arm Assembly clockwise (CW) and remove the belt.



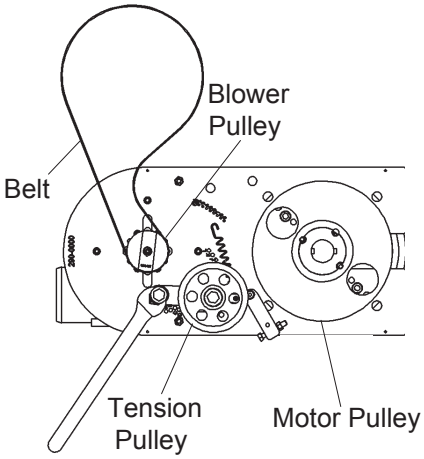


4. You may release the pressure on the wrench and allow the Tension Arm to swing back into position once the belt is removed.



5. The Tension Pulley Spring must be replaced when belt is replaced. With pliers, remove and replace.

6. Using a 1” open-end wrench, rotate the Tension Arm Assembly clockwise (CW). Wrap the new or replacement Belt around the Blower Pulley and then onto the Motor Pulley.



7. Once the Belt is in place and the wrench is removed, verify that the Belt is seated into all the grooves on both pulleys by manually rotating the Motor Pulley (large pulley), and checking the alignment of the Belt on the groves.

5. Re-install the cover.

Replacing Multi Axis Controller Card and Loading Configuration Files

The Raptor uses one Z Controller card located inside the Computer. The Z controller card communicates over the purple network cables with all of the Motor Amplifiers and the Slice Input/ Output (IO) cards. This communication results in coordinated motion between the Gantry Cutting Tools and the Conveyor System insuring the most accurate cutting possible. The Configuration Files contain parameters for each node on the network (Controller Card, Amp, Slice IO, etc.).

In the rare case that a Controller Card needs replacement, the loading of the proper Configuration Files should be done with the help of Eastman's Technical Service Department. If the Raptor Machine's Computer is hooked up to the internet, Eastman's Technical Service Department has the capability of remotely accessing your machine through the internet and loading the proper files for you. If not, technical service can be provided over the phone.

⚠CAUTION

Do not attempt to load the files yourself. Improper parameters can result in unpredictable machine operation. This may cause damage to your machine or injury to a operator.

Amplifier Error Codes

When a fault occurs, the drive fault relay is opened, the output stage is switched off (motor loses all torque), or the load is dynamically braked. The specific drive behavior depends on the type of fault. The LED display on the front panel of the drive shows the number of the fault that occurred. If a warning is issued prior to the fault, the warning is shown on the LED and has the same number as the associated fault. Warnings do not trip the power stage of the drive or fault relay output.

Fault	Message/Warning	Cause	Remedy
--	--	24V Control Power input voltage dip. or Auxilary encoder 5V (X9-9) shorted	Insure adequate 24V supply current capacity for the system. or check and fix X9 wiring.
E0082	SD card is not inserted.	No SD card inserted or SD card inserted with wrong orientation.	Insert SD card with correct orientation.
E0083	SD card is write protected.	SD card protection clip in wrong position.	Remove with protection from SD card.
E0084	SD card hardware not installed.	No I/O option boad installed or SD card device is faulty.	--
E0095	File not found on SD card.	SD card damaged or file name has been changed manually or deleted.	--
E0096	File error trying to access the SD card.	File on SD card can't be read.	--
E0097	File system error accessing the SD card.	File system on SD card can't be read.	Use supported SD cards only.
E0098	A parameter count not be set in the drive.	--	--
E0099	There was an error writing to a file on the SD card.	--	--
E0100	SD card read/write in progress.	--	Wait until read/write process is done.
F0	--	Reserved.	--

Fault	Message/Warning	Cause	Remedy
F101	Firmware type mismatch.	Installed firmware is not compatible with the drive hardware.	Load compatible firmware into drive.
n101	The FPGA is a lab FPGA.	The FPGA is a lab version FPGA.	Load the released FPGA version that is compatible with the operational firmware.
F102	Resident firmware failed.	Software failure detected.	Restart drive. If issue persists, contact technical support.
n102	Operational FPGA is not a default FPGA.	The FPGA minor version is larger than the operational firmware default FPGA minor version.	Load the released FPGA version that is compatible with the operational firmware.
F103	Resident FPGA failed.	Software failure detected. Load resident FPGA failure occurred (several cases according to flow-chart, including compatible image to FPGA type and fieldbus type)	Restart drive. If issue persists, contact technical support.
F104	Operational FPga failed.	Software failure detected. Load operational FPGA failure occurred (several cases according to flowchart).	Restart drive. If issue persists, contact technical support.
F105	volatile memory stamp invalid.	Non-volatile memory stamp is corrupted or invalid.	Reset the drive to default memory values.
F106	Non- volatile memory data.	Non-volatile memory data is corrupted or invalid. When this fault occurs after a firmware download, it is not an indication of a problem (clear the fault and perform a "save" to the drive).	Reset the drive to default memory values.
n107	Positive switch limit.	Positive software position limit is exceeded.	Move the load away from the limits.
n108	Negative switch limit.	Negative software position limit is exceeded.	Move the load away from the limits.
F121	Homing error.	Drive did not finish homing sequence.	Check homing sensor, homing mode, and homing configuration.
F123 n123	Invalid motion task.	Invalid motion task.	Check motion tasks settings and parameters to make sure that the values entered will produce a valid motion task.
F125 n125	Synchronization lost.	The fieldbus lost synchronization.	Check fieldbus connection (X5 and X6 if you are using EtherCAT; X12 and X13 if you are using CANopen) or the settings of your WtherCAT or CANopenmaster.
F126 n126	Too much movement.	Too much movement wa created during a Bode plot. Motor is unstable and is not following drive instructions.	Check that the system is closed loop stable. Refer to the system tuning guide.

Fault	Message/Warning	Cause	Remedy
F127	Incomplete emergency.	Incomplete emergency stop procedure (problem with emergency stop).	Disconnect power from drive and check emergency stop procedure.
F128	MPOLES/FPOLES not an integer.	Ratio of motor poles to feedback poles must be a whole number.	Change to a compatible feedback device.
F129	Heartbeat lost.	Heartbeat lost.	Check CANopen cableing. Reduce bus load or increase the heartbeat.
F130	Secondary feedback supply over current.	5V poser supply was shorted out on X9.	Check X9 connection.
F131	Secondary feedback A/B line.	Problem in secondary feedback detected.	Check secondary feedback (X9 connection).
F132	Secondary feedback Z line break.	Problem in secondary feedback detected.	Check secondary feedback (X9 connection).
F133	Fault number has changed to F138.	--	--
F134	Secondary feedback illegal state.	Feedback signals were detected in an illegal combination.	Check X9 connection.
F135 n135	Homing is needed.	Attempt to issue motion task before the axis is homed.	Change opmode or home axis.
F136	Firmware and FPGA versions.	The FPGA version does not match the firmware FPGA version constrant	Load the FPGA version that is compatible with the firmware.
n137	Homing and feedback mismatch	The configured homing mode is not supported by the motor feedback type used.	Change homing mode.
F138	Instability during autotune.	Drive current (IL.CMD) or velocity feedback (VL.FB) exceeds allowable limit (BODE.IFLIMIT or BODE. VFLIMIT). Occures in BODE.MODE 5, when complex mechanics, belts, and complaint loads are present.	Change BODE.MODE if apporpriate. If BODE.MODE 5 is appropriate and the fault occurs at the end of an Autotunin, then the motor is not robustly stable. Manual tuning may be required to make the motor stable.
F139	Target position Overshot due to invalid Motion task activation.	The drive cannot decelerate from its current speed to reach the end point of the second motion task without moving past it.	Increase the deceleration rate in the move or trigger the move earlier. Clear fault with DRV.CLRFAULTS. Or change the value of FAULT139. ACTION=1 to ignore this condition.
n140	VBUS.HALFVOLT has changed. Save the parameters and reboot the drive.	The user has changed the numerical value of VBUS.HALFVOLY. This change only takes effect after a DRV.NVSAVE command and after rebooting the drive.	Save the parameters in the non-volatile memory via a DRV.NVSAVE command and turn off/on the 24V power supply in order to reboot the drive or restore the original setting of VBUS.HALFVOLT.

Fault	Message/Warning	Cause	Remedy
n151	Not enough distance to move; motion exception.	For trapezoidal and customer table motion tasks: The target velocity specified in the motion task cannot be reached via using the selected acceleration and deceleration since the distance to travel is not sufficient. For a 1:1 profile: The selected acceleration and deceleration will be extended since there is too much distance to travel and the motion task would exceed its maximum allowed velocity.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check motion task settings and parameters to make sure that the values entered will produce a valid motion task.
n152	Not enough distance to move; following motion exception.	A new motion task activated, when one motion task is already active and the target position specified in the motion task parameters cannot be reached with specified target velocity, acceleration and deceleration parameters.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check motion task target velocity settings and parameters to make sure that the values entered will produce a valid motion task.
n153	Velocity limit violation, exceeding max limit.	A new target velocity calculated internally due to an exception, and is being limited due to user velocity limit.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check motion task target velocity settings and parameters to make sure that the values entered will not exceed the VL.LIMITP and VL.LIMITN setting.
n154	Following motion failed; check motion parameters.	Activation of the following motion task failed due to incompatible parameters, or motion task does not exist.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check the following motion task settings and parameters to make sure that the values entered will produce valid.
n156	Target position crossed due to stop command.	The motion crosses the target position after triggering a DRV.STOP command. This situation can happen when processing a change-on-the-fly motion task and triggering a DRV. STOP command close to the target position of the currently running motion task.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.
n157	Homing index pulse not found.	A homing mode with index detection of activated, and index pulse is not detected while moving across the range determined by the hardware limit switches.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.

Fault	Message/Warning	Cause	Remedy
n158	Homing refereance switch not found.	A homingmode with reference switch detection is activated and the reference switch is not detected whilemoving across the range determined by the hardware limit switches.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.
n159	Failed to set motion task parameters.	Invalid motion task parameters assignment. This warning can appear upon anMT.SET command.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check motion task settings and parameters.
n160	Motion task activation failed.	Activation of the motion task failed due to incompatible parameters, or motion task does not exist. This warning can appear upon anMT. MOVE command.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning. Check motion task settings and parameters to make sure that the values entered will produce a valid motion task.
n161	Homing procedure failed.	Homing error observed during the operation of homing procedure.	Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.
n163	MT.NUM exceeds limit.	Appears with n160, when you try to trigger amotion task > 128 (such as MT.MOVE 130).	Trigger only motion task between 0 and 128. Activation of any new motion or using of DRVCLR-FAULTS will clear the warning.
n164	Motion task is not initialized.	Appears with n160, when you try to trigger a non-initialized motion task.	Initialize themotion task first before starting the task.Activation of any new motion or using of DRV.CLR-FAULTS will clear the warning.
n165	Motion task target position is out.	Appears with n160, when you try to trigger amotion task with an absolute target position outside of the selected module range (see alsoMT. CNTL).	Move the absolute target position of themotion task within the modulo range.Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.
n168	Invalid bit combination in the motion task control word.	Appears with n160, when you try to trigger amotion task with an invalid bit combination in the motion task control word (see alsoMT.CNTL).	Correct theMT.CNTL setting for the specific motion task. Activation of any new motion or using of DRV. CLRFAULTS will clear the warning.
n169	1:1 profile cannot be triggered on the fly.	Appears with n160, when you try to trigger a 1:1 profile table motion task while another motion task is currently running.	1:1 profile tablemotion tasks should be started from velocity 0. Activation of any new motion or using of DRV. CLRFAULTS will clear the warning.

Fault	Message/Warning	Cause	Remedy
n170	Customer profile table is not initialized.	Appears with n160, when you Appears with n160, when you uses a customer profile table for generating the velocity profile and when the selected profile table is empty (seeMT. CNTL and MT.TNUM.	Change theMT.TNUM parameter for this specific motion task in order to use an initialized profile table. Activation of any new motion or using of DRV.CLRFAULTS will clear the warning.
F201	Internal RAM failed.	Hardware failure detected.	Restart drive. If issue persists, contact technical support.
F202	External Ram failed.	Hardware failure detected.	Restart drive. If issue persists, contact technical support.
F203	Code integrity failed.	Software failure detected. FPGA register access failure occurred	Restart drive. If issue persists, contact technical support.
F204 to F232	EEPROM failure detected.	EEPROM failure detected	Restart drive. If issue persists, exchange drive.
F234 to F237 n234 to n237	Temperature sensor high.	High temperature limit reached.	Check cabinet ventilation system.
F240 to F243 n240 to n243	Temperature sensor low.	Low temperature limit reached.	Check cabinet ventilation system.
F245	External fault.	This fault is user generated and is caused by user settings.	Users can configure a digital input to trigger this fault (DINx.MODE = 10). The fault occurs according to this input setting. Clear the input
F247	Bus voltage exceed allowed thresholds.	Hardware problem in bus measurement.	Troubleshoot and repair hardware problem.
F248	Option board EEPROM.	EEPROM failure detected.	Restart drive. If problem persists, exchange drive.
F249	Option board down stream checksum.	Communications with the I/O on the option board failed.	DRV.CLRFAULTS. If issue persists, contact technical support.
F250	Option board upstream checksum.	Communications with the I/O on the option board failed.	DRV.CLRFAULTS. If issue persists, contact technical support.
F251	Option board watchdog.	Communications with the I/O on the option board failed.	DRV.CLRFAULTS. If issue persists, contact technical support.
F252	Firmware and option board FPGA types are not compatible.	The option board FPGA is not compatible with this hardware.	Download the correct firmware file for this drive.
F253	Firmware and option board FPGA versions are not compatible.	The version of the option board FPGA is not compatible with this firmware.	Download the correct firmware file for this drive.
F301 n301	Motor over heated.	Motor overheated.	Check ambient temperature. Check motor mounting heat sink capacity.
F302	Over Speed.	Motor exceeded VL.THRESH value.	Increase VL.THRESH or lower velocity command.

Fault	Message/Warning	Cause	Remedy
F303	Runaway	Motor did not follow command values.	Current command to the motor is too high for too long. Reduce servo gains, or reduce command trajectory aggressiveness.
F304 n304	Motor foldback.	Maximum motor power has been exceeded; the power has been limited to protect the motor.	Motion is requiring too much power. Change move profile to reduce load onmotor. Check for load jamming or sticking. Check that current limits are set.
F305	Brake open circuit.	Motor brake open circuit. Fault threshold is 200mA.	Check cabling and general functionality.
F306	Brake Short circuit.	Motor brake short circuit.	Check cabling and general functionality.
F307	Brake closed during enable.	Motor brake closed unexpectedly.	Check cabling and general functionality.
F308	Voltage exceeds motor rating.	Drive bus voltage exceeds the motor's defined voltage rating.	Make sure that the motor fits the driving rating.
F309	Motor I2t load.	Motor I2t load (IL.MI2T) has exceeded the warning threshold IL.MI2TWTHRESH. Can only be generated if IL.MIMODE has been set to 1.	Reduce the load of the drive by adjusting lower acceleration / deceleration ramps.
F312	Brake released when it should be applied.	Brake disengaged unexpectedly.	Check cabling and general functionality.
F401	Failed to set feedback.	Feedback is not connected or wrong feedback type selected.	Check primary feedback (X10).
F402	Analog signal amplitude fault.	Analog signal amplitude is too low. Analog fault (resolver signal amplitude or sin/cos amplitude)	Check primary feedback (X10), resolver and sine/cos encoder only.
F403	EnDat communication.	General communication problem with feedback.	Check primary feedback (X10), EnDat only
F404	Hall error.	Hall sensor returns invalid Hall state (111, 000); either all Hall sensors are on or off. Can be caused by a broken connection in any one of the Hall signals.	Check the feedback wiring; check all feedback connectors to ensure all pins are positioned correctly.
F405	BiSS watchdog fault.	Bad communication with the feedback device.	Check primary feedback (X10) BiSS only
F406	BiSS multi-cycle fault.	Bad communication with the feedback device.	Check primary feedback (X10) BiSS only
F407	BiSS sensor fault.	Bad communication with the feedback device.	Check primary feedback (X10) BiSS only
F408 to F416	SFD feedback fault.	Bad communication with the SFD device.	Check primary feedback (X10). If fault persists, internal feedback failure. Return to manufacturer for refund.

Fault	Message/Warning	Cause	Remedy
F417	"Broken wire in primary feedback."	"In primary feedback, a broken wire was detected (incremental encoder signal amplitude)."	Check feedback cable continuity.
F418	Primary feedback power supply.	"Power supply fault for primary feedback."	Check primary feedback (X10).
F419	"Encoder init procedure failed"	"Phase find procedure did not complete successfully."	"Check encoder wiring, reduce/ balance motor load prior to phase finding."
F420	"FB3 EnDat Communi- cations Fault."	"A communication error was detected with the EnDat 2.2 device connected to the X9 connector."	"Check pinout and FB3 configura- tion and reconnect feedback."
F421	SFD position sensor fault	"Sensor or sensor wiring failure inside motor"	Try resetting the fault. If it reappears return motor for repair.
F423	NV Failure, Multiturn- Overflow.	"The position saved in memory is corrupted."	"Home axis or disable multi-turn overflow. If the fault persists, send the drive for repair."
F424	Resolver amplitude low.	"Resolver signal amplitude is below minimum level."	Check primary feedback (X10).
F425	Resolver amplitude high.	"Resolver signal amplitude is above maximum level."	Check primary feedback (X10).
F426	Resolver error.	Resolver excitation fault.	Check primary feedback (X10).
F427	Analog low.	Analog signal amplitude low.	Check primary feedback (X10).
F428	Analog high.	Analog signal amplitude high.	Check primary feedback (X10).
F429	Incremental low.	Incremental encoder signal amplitude is below minimum level.	Check primary feedback (X10).
F430	Incremental high.	Incremental encoder signal amp- litude is above maximum level.	Check primary feedback (X10).
F432	Communication fault.	"General communication problem with secondary feedback."	Check secondary feedback (X10).
F436	EnDat overheated.	"EnDat feedback device is over temperature."	Check ambient temperature. Check motor mounting heat sink capability.
"F438 n438"	Following error (nu- meric)	"Motor did not follow command values. Motor exceeded maximum allowed position following error (numeric)."	"Check for increased load, jamming or sticking. Is position error set too low?"
"F439 n439"	Following error (user).	Motor did not follow command values. Motor exceeded maximum allowed position following error (numeric).	Check feedback commutation setup and tuning parameters.
F450	Following error (presen- tation).	Motor did not follow command values. Motor exceeded maximum allowed position following error (presentation).	Check feedback commutation setup and tuning parameters.

Fault	Message/Warning	Cause	Remedy
"F451 n451"	Tamagawa encoder: battery.	"The external battery voltage is too low. F451 fault is generated if the AKD is not powered. The n451 warning is generated if the AKD is powered. This fault can be inhibited with FAULT45-1.ACTION."	"It is necessary to check or replace the external battery."
F452	"Multiturn overflow not supported with this feedback."	Non-multiturn feedback is connected while FB1.PMTSAVEEN is active.	"Connect multiturn feedback to the drive or disablemultiturn overflow."
F453 to F459	Tamagawa encoder: communication.	"Bad communication with the feedback device."	"Cabling or shielding fault or internalfeedback failure. Check the cabling to the drive. If the problem persists then return the feedback to themanufacturer for repair."
F460	"Tamagawa encoder: over speed."	"When the drive was powered off and the feedback was powered by the external battery, this fault is generated if the shaft is rotated above a maximum speed that can be maintained when battery powered."	"Reset the fault on the drive with DRV.CLRFAULTS."
F461	"Tamagawa encoder: counting Error."	"When the feedback is powered on the position (within on revolution) was incorrect because of a problem with the feedback device."	"Reset the fault on the drive with DRV.CLRFAULTS, if the problem persists then return the feedback to the manufacturer for repair."
F462	Tamagawa encoder: counting overflow.	Multi-turn counter has overflowed.	"Reset the fault on the drive with DRV.CLRFAULTS."
F463	"Tamagawa encoder: overheat."	The temperature of the encoder substrate exceeds overheating detection temperature during main power-on."	"Reset the fault on the drive with DRV.CLRFAULTS after temperature of encoder is lowered."
F464	Tamagawa encoder: multiturn error.	Any bit-jump occurs in the multi-turn signal during main power-on.	"Return to the origin. Reset the fault on the drive with DRV.CLRFAULTS."
F473	"Wake and Shake. Insufficient movement"	"There was less movement than defined by WS.DISTMIN."	"IncreaseWS.IMAX and/orWS.T. Or try usingWS.MODE 1 or 2."
F475	"Wake and Shake. Excess movement."	"WS.DISTMAX has been exceeded inWS.MODE 0. Or more than 360 degrees was traveled inWS.MODE 2."	"IncreaseWS.DISTMAX value or reduceWS.IMAX orWS.T. Wake and Shake is not suported for vertical/overhung loads."
F476	"Wake and Shake. Fine-coarse delta too large."	"The angle difference between the coarse and fine calculation was larger than 72 deg."	"Modify WS.IMAX orWS.T and try again."
"F478 n478"	Wake and Shake. Overspeed.	WS.VTHRESH was exceeded.	"IncreaseWS.VTHRESH value or reduceWS.IMAX orWS.T."
"F479 n479"	Wake and Shake. Loop angle delta too large.	"The angle between complete loops was larger than 72 deg."	"Modify WS.IMAX orWS.T and try again."

Fault	Message/Warning	Cause	Remedy
F480	Fieldbus command velocity too high.	"Fieldbus command velocity exceeds VL.LIMITP."	"Lower fieldbus command trajectory, or increase the value of VL.LIMITP."
F481	Fieldbus command velocity too low.	"Fieldbus command velocity exceeds VL.LIMITN."	"Increase fieldbus command trajectory, or decrease the value of VL.LIMITN."
F482	Commutation not initialized.	"Themotor requires the commutation initialization (there are no encoder commutation tracks, Hall sensors, etc.) and no successful Wake and Shake sequence has been performed"	"Clear any faults, activate theWake and Shake procedure (WS.ARM) and enable the drive."
F483	Motor U phasemissing.	"No current was detected in the motor's U phase during Wake and Shake initialization (Mode 0 only)."	"Check themotor connections and WS.IMAX (very low current may produce this error)."
F484	Motor V phasemissing.	"No current was detected in the motor's V phase during Wake and Shake initialization (Mode 0 only)."	"Check the motor connections and WS.IMAX (very low current may produce this error)."
F485	MotorW phasemissing.	"No current was detected in the motor's W phase during Wake and Shake initialization (Mode 0 only)."	"Check the motor connections and WS.IMAX (very low current may produce this error)."
F486	"Motor velocity exceeds EMU-speed."	"Motor velocity exceeds themaximum speed the emulated encoder output can generate."	Reduce value of DRV.EMUEPULSEIDTH.
F487	Wake and Shake - Validating Positive Movement Failed.	After applying a positive current, motor moved in the wrong direction.	"Check motor phase wiring and motor encoder wiring is correct."
F489	Wake and Shake Validating Negative Movement Failed.	After applying a negative current, motormoved in the wrong direction.	"Check motor phase wiring and motor encoder wiring is correct."
F490	Wake and Shake - Validating Comm. angle timed out.	"During one of the W&S validation stages, the drive stopped responding to commands."	Contact customer support.
F491	"Wake and Shake -Validating Comm. angle moved too far - Bad Comm Angle."	"After applying a current, the motormoved too far (>15 electrical degrees)."	"This indicates a poor motor phase angle was found by Wake and Shake. Revise Wake and Shake parameters, and re-run Wake and Shake."
F492	"Wake and Shake - Validating Comm. angle required more than MOTOR.ICONT."	"A current larger than MOTOR. ICONT was used to excite the motor."	"This indicates one of the following: Phase angle is incorrect due to a bad wake and shake. Motor has very high friction requiring high current to break free. Motor power cable is disconnected or improperly wired."

Fault	Message/Warning	Cause	Remedy
F493	"Invalid commutation detected –motor accelerating in the wrong direction."	"A commutation error occured when current has another sign than accelaration and velocity over a defined time."	"Check the value of the motor phase."
"F501 n501"	Bus over voltage.	"Bus voltage too high. Usually, this problem is load related."	"Reduce load or change motion profile. Check system regen capacity; add capacity if needed. Check mains volt. "
F502	Bus under voltage. Warning issued prior to fault.	"Bus voltage below threshold value."	Check mains voltage.
"F503 n503"	Bus capacitor overload.	"Single phase AC input on a drive only rated for three-phase input or excessive single-phase power load."	Check mains voltage.
F504 to F518	Internal supply voltage fault	"Internal supply voltage fault detected"	"Check wiring for electromagnetic compatibility (EMC). If issue persists exchange drive."
F519	Regen short circuit.	Regen resistor short circuit.	"Regen IGBT short circuit. Contact technical support."
"F521 n521"	Regen over power.	"Too much power stored in regen resistor."	Either get larger regen resistor or use DC bus sharing to dissipate power.
F523	Bus over voltage FPGA	Bus over voltage hard fault.	"Check mains voltage and check system brake capacity."
"F524 n524"	Drive foldback.	"Maximum drive power has been exceeded. The power has been limited to protect the drive."	"Motion requires too much power. Change profile to reduce load ."
F525	Output over current.	Current exceeds drive peak.	Check for short or feedback faults.
F526	Current sensor short circuit.	Current sensor short circuit.	Restart drive. If issue persists, contact technical support.
F527	"Iu current AD converter stuck."	Hardware failure detected.	"Restart drive. If issue persists, contact technical support."
F528	"Iv current AD converter stuck.	Hardware failure detected.	Restart drive. If issue persists, contact technical support.
F529	"IU current offset limit exceeded."	Hardware failure detected.	Restart Drive. If issue persists, contact technical support.
F530	"IV current offset limit exceeded."	Hardware failure detected.	Restart Drive. If issue persists, contact technical support.
F531	Power stage fault.	Hardware failure detected.	Restart Drive. If issue persists, Replace Drive.

Fault	Message/Warning	Cause	Remedy
F532	Drive motor parameters setup incomplete.	Before a motor can be enabled, you must configure aminimum set of parameters. These parameters have not been configured.	Issue the command DRV.SETUPREQLIST to display the list of the parameters that youmust configure. Configure these parameters either manually or automatically. Parameters for BiSS analog, Endat, or SFD feedback, are set automatically when MOTOR.AUTOSET is set to 1 .
F534	Failed to read motor parameters from feedback device.	Motor either does not have motor feedback memory, or the motor feedback memory is not programmed properly so the parameters cannot be read.	Try to read parameters again by clicking the Disable and Clear Faults button. If this attempt is not successful, then set MOTOR. AUTOSET to 0 and program the parameters using the setup wizard ormanually. If the motor has motor memory (BiSS analog, Endat, and SFD), return the motor to the manufacturer to have the memory programmed.
F535	Power-board over-temperature fail.	The power-board temperature sensor indicates more than 85 °C.	Reduce the load of the drive or ensure better cooling.
F601	Modbus data rate is too high.	Modbus controller data rate is too high.	Reduce data rate.
F602	Safe torque off.	Safe torque off function has been triggered.	Reapply supply voltage to STO if safe to do so.
n603	OPMODE incompatible with CMDSOURCE	This warning is generated when the drive is enabled and the gearing command source is selected at the same time as torque or velocity opmode.	Select a different DRV.OPMODE andDRV.CMDSOURCE combination.
n604	EMUEMODE incompatible with DRV.HANDWHEELSRC.	Emulated encode mode is incompatible with the selected hand wheel source.	ISelect a compatible emulated encode mode or change handwheel source.
F701	Fieldbus runtime.	Runtime communication fault.	Check fieldbus connections (X11), settings, and control unit.
F702 n702	Fieldbus communication lost.	All fieldbus communication was lost.	Check fieldbus connections (X11), settings, and control unit.
F703	Emergency timeout occurred while axis should disable	Motor did not stop in the timeout defined.	Change timeout value, change stop parameters, improve tuning.

Fault	Description	Cause
F801	Divide by zero.	User Program attempted to divide by zero.
F802	Stack Overflow.	User Program contains an infinite recursion or incorrectly array.
F803	Insufficient Memory.	User program creates an excessive demand formemory.
F804	No interrupt handler defined.	User program is missing an interrupt service routine, but an interrupt is called.
F805	Interrupt error.	User program contains an error in an interrupt routine.
"F806 n702"	Max string length exceeded.	User program attempted to use a string exceeding 255 characters.
F807	String overflow.	User program has a exception causing excessive string usage.
F808	Array out of bounds.	User program exception caused an array to exceed its bounds.
F809	Feature not supported.	User program contains a feature that the current firmware version does not support.
F810	Internal irmware/ hardware error.	User program attempted to perform an action that causes a firmware or hardware error.
F812	Parameter not supported.	User program calls a parameter that is not supported by the firmware.
F813	Parameter access error.	User program contains a parameter access error.
F814	Data not found.	User program attempted writing an invalid recorder parameter.
F815	Data invalid.	User program attempted executing an invalid command.
F816	Data too high.	User program contains a parameter that is above the accepted range.
F817	Data too low.	User program contains a parameter that is below the accepted range.
F818	Param type out of range.	User program attempted to write a value which was out of a range.
F819	Data not divisible by 2.	User program executed a function that requires it to be divisible by two.
F820	Invalid position modulo setting.	User program contains an incorrectly configuredmodulo setting.
F821	Cannot read from command.	User program attempted to perform a read of parameter that is a command or statement.
F823	Enable Drive first.	User program is attempting to execute motion that requires the drive to be enabled.
F824	DRV.OPMODE must be 2 (position).	User program is attempting to execute motion that requires the drive to be in program mode.
F825	F825 DRV.CMDSOURCE must be 5 (program).	User program is attempting to execute motion that requires the drive to be in position mode.
F826	Cannot execute during a move.	User program is attempting an invalid execution during a move.
F827	Writing to read-only parameter.	User program attempted writing a read-only parameter.
F828	Disable Drive first.	User program is attempting to execute a function that requires the drive to be disabled.

Amplifier Error and Alarm Codes

Faults/Errors and Warnings/Alerts are displayed in the 7 segment displays of the drive:

To simplify handling, the error and alarm handling process is consistent, so you can always apply the same recovery steps. When an error or alarm occurs, it is displayed to the one digit display, you can identify the error in the table below and follow the recommendations to fix the problem, clear the display, and resume machine operation. Active errors and alarms can be cleared with the controller command ClearCtrlErrors, (Note: non-clearable errors will remain).

When an Error or Alarm occurs, always check the controller log messages. The log messages will provide more details about the failure and the history of events leading up to the failure. From the log messages, you can determine the specifics about the cause of the failure to correct the underlying problem.

Fault	Message/Warning	Cause	Remedy
E01	"Critical temperature exceeded. PDMM operation is stopped, CPU will be put to sleep."	"CPU temperature exceeded safe operating temperature limit."	Power-off. Check airflow and operating environment are within hardware specifications. Allow unit to cool before power-on.
E02	"Out of memory. KAS runtime is stopping."	"Memory leak, memory corrupted, or hardware memory failure."	"Power-off/on. If problem is recurrent, check release notes for firmware updates or return hardware for repair."
E03	Fan failure.	"CPU cooling fan was not able to operate properly."	"Check temperature and monitor for High temp alarm (see A01). Return hardware for fan replacement."
E10	Firmware is corrupted.	"Flash memory corrupted during firmware download or flash hardware failure."	Re-download firmware or boot into recovery mode, download. If the problem is recurrent, power-off/on. Check release notes for firmware updates. firmware, and power-off/on. If problem persists, return hardware for repair.
E11	"Flash is corrupted, no file system is available."	"At startup the file system could not be mounted on the flash."	"Reset to factory defaults. If problem persists, return hardware for repair."
E12	"Not enough flash memory available."	"Flash memory is full, unable to write to flash."	"Clean-up the flash memory by removing log files, application programs, recipes, or other data files."
E13	"Out of NVRAM space for retained variables."	NVRAM is full.	"Change application to reduce the amount of retained variables."

Fault	Message/Warning	Cause	Remedy
E14	"Reset to Factory Defaults failed."	Flash memory could not be formatted during a Reset to Factory Defaults procedure.	Try reset to factory defaults again from power-on. If problem persists, return hardware for repair.
E15	"Cannot read/write files from/to a SD card."	"SD card is not plugged-in or the file system is corrupt and cannot be mounted."	"Insert a valid SD card or re-format the SD card using Settings->SD card->Format button."
E16	"Not enough space available on the SD card."	SD card is full, unable to write to the SD card.	Clean-up SD card space by deleting files or re-format the card using Settings->SD card->Format button.
E20	"Runtime plug-in, process, thread or application failed to start."	"KAS run time or application code failed to auto-start at boot."	Power-off/on. Reset to factory defaults. If problem is recurrent, check release notes for firmware updates or download firmware.
E21	"Runtime plug-in, process, or thread failed to respond during operation."	"KAS runtime code failed during normal operation."	"Power-off/on. If problem is recurrent, check release notes for firmware updates."
E22	"Fatal error in PLC program, application stopped."	"Virtual machine failed to execute an instruction."	Re-compile application, download, and re-start.
E23	CPU is overloaded.	"Either the motion engine cycle did not complete or the PLC program did not complete within the timeout period due to excessive CPU loading."	Stop the application or power-off/on. Reduce the sample rate, simplify the application, or reduce the application cycles and re-start the application.
E24	"PLC application cannot be started"	"1. Maintenance operation is in progress. 2. Controller is in online configmode. 3. AKD Restore failed. 4. The IDE version of the compiled PLC code and controller runtime version do not match."	"1. Check controller web-server home page for any maintenance operation in-progress. Wait for the operation to finish. 2. Connect to the controller with the IDE and disable online configmode. 3. Check EtherCAT network topology by using the Scan network button in the web-server's Restore tab. Correct the physical topology and re-execute an AKDrestore. 4. IDE version (only major.minor.micro) should-match with runtime version. To correct, install the correct version of IDE or Runtime."
E30	"EtherCAT communication failure during operational mode."	"EtherCAT network operation failed due to a network communciation error."	"Check the EtherCAT network wiring and devicesstate. Re-start the application."
E31	"EtherCAT communication failure during preop mode."	"EtherCAT network operation failed due to a network communciation error."	"Check the EtherCAT network wiring and devices state. Re-start the application."
E32	"EtherCAT communication failure during bootstrap mode."	"EtherCAT network operation failed due to a network communciation error."	"Check the EtherCAT network wiring and devices state. Re-start the application."

Fault	Message/Warning	Cause	Remedy
E33	"EtherCAT failed to initialize into operational mode."	"EtherCAT network initialization failed due to a network communciation error."	Check the EtherCAT network wiring and devices state. Re-start the application.
E34	"EtherCAT failed to initialize into preop mode."	"EtherCAT network initialization failed due to a network communciation error."	Check the EtherCAT network wiring and devices state. Re-start the application.
E35	"EtherCAT failed to initialize into bootstrap mode."	"EtherCAT network initialization failed due to a network communciation error."	Check the EtherCAT network wiring and devices state. Re-start the application.
E36	"EtherCAT failed to discover the expected devices."	"EtherCAT network discovery failed due to a mismatch between the discovered and expected devices."	"Check the EtherCAT devices and wiring order. Correct the device order wiring or re-scan the network, re-compile, and download the updated application. Re-start the application."
E37	"EtherCAT failed to return to init state."	"EtherCAT network initialization failed due to a network communciation error."	Check the EtherCAT network wiring and devices state. Re-start the application.
E50	"Backup to SD card failed."	"An unrecoverable error occurred during the backup operation."	Repeat the backup to SD card operation. If it fails again, replace the SD card.
E51	"Restore from SD card failed."	"An unrecoverable error occurred during the restore operation."	Do NOT reboot the PDMM! Repeat the restore operation. If it fails again, reset the PDMM to factory defaults. If problem persists, return hardware for repair.
E52	"SD Backup files are missing or corrupt."	"The restore operation failed due to missing, incomplete, or corrupt files on the SD card."	Perform a backup operation before the restore or use an SD card with valid backup files.
E53	"AKD restore operation failed."	"The restore operation failed due to improper or incomplete AKD configuration."	"Check EtherCAT network topology by using the Scan network button in the web-server's Restore tab. Correct the physical topology and re-execute an AKD restore."

Alarms

Fault	Message/Warning	Cause	Remedy
A01	"High temperature exceeded"	"CPU temperature near the safe operating temperature limit."	"Check airflow and operating environment are within hardware specifications."
A02	Low on memory.	Memory leak or corruption.	"Power-off/on. If problem is recurrent, check release notes for firmware updates or return hardware for repair."
A04	Low input voltage	"24 volt input power is 19 volts or less."	"Check power supply voltage and connection to the PDMM."
A12	"Flash memory is low on free space."	Flash memory is almost full.	"Clean-up the flash memory by removing log files, application programs, recipes, or other data files. Reset to factory defaults."
A21	"Recoverable process or thread failed to respond during operation."	"KAS non-runtime code failed during normal operation and was automatically restarted."	"If problem is recurrent, power-off/on. Check release notes for firmware updates."
A23	CPU is overloaded		Reduce the sample rate, simplify the application, or reduce the application cycles.
A30	EtherCAT missed a send frame during operation mode."	"EtherCAT master was unable to send a frame for one or more cycles."	Reduce the controller CPU load.
A38	EtherCAT missed a receive frame during operation mode."	"EtherCAT master did not receive a frame for one ormore cycles."	"Check the EtherCAT network wiring and devices."
A40	"Local digital IO missed a cyclic update"	Local digital IO was not update during a cycle or the updates are no longer synchronous.	Reduce the sample rate, simplify the application, or reduce the application cycles.

Troubleshooting the Servo Motor Drives

Drive problems occur for a variety of reasons, depending on the conditions in your installation. The causes of faults in multi-axis systems can be especially complex. If you cannot resolve a fault or other issue using the trouble shooting guidance presented below, customer support can give you further assistance.

Problem	Possible Causes	Remedy
"HMI message: Communication fault"	1.wrong cable used, cable plugged into wrong position on drive or PC 2.wrong PC interface selected	1. plug cable into the correct sockets on the drive and PC 2. select correct interface
Motor does not rotate	1. drive not enabled 2. software enable not set 3. break in set point cable 4. motor phases swapped 5. brake not released 6. drive is mechanically blocked 7. motor pole no. set incorrectly 8. feedback set up incorrectly	1. apply ENABLE signal 2. set software enable 3. check setpoint cable 4. correct motor phase sequence 5. check brake control 6. check mechanism 7. set motor pole no. 8. set up feedback correctly
Motor oscillates	1. gain is too high (speed controller) 2. feedback cable shielding broken 3. AGND not wired up	1. reduce VL.KP (speed controller) 2. replace feedback cable 3. join AGND to CNC-GND
"Drive reports following error"	1. Irms or Ipeak set too low 2. current or velocity limits apply 3. accel/decel ramp is too long	1. verify motor/drive sizing 2. verify that IL.LIMITN/P,VL.LIMITN/P are not limiting the drive 3. reduce DRV.ACC/DRV.DEC
Motor overheating	"1. motor operating above its rating 2. motor current settings incorrect"	1. verify motor/drive sizing 2. verify motor continuous and peak current values are set correctly
Drive too soft	1. Kp (speed controller) too low 2. Ki (speed controller) too low 3. filters set too high	1. increase VL.KP (speed controller) 2. increase VL.KI (speed controller) 3. refer to documentation regarding reducing filtering (VL.AR*) Drive runs roughly Kp (speed controller) too high 4. Ki (speed controller) too high 5. filters set too low 6. reduce VL.KP
Drive runs roughly	1. Kp (speed controller) too high 2. Ki (speed controller) too high 3. filters set too low	1. reduce VL.KP (speed controller) 2. reduce VL.KI (speed controller) 3. refer to documentation regarding increasing filtering (VL.AR*)
"During the installation, a dialog box saying “Please wait while the installer finishes determining your disk space requirements” appears and never disappears."	1. MSI installer issue. 2. Harddisk space not sufficient	1. Cancel the installation. Relaunch the installer (you may need to try several times, the problem is random). 2. Make sure that you have enough disk space on your hard disk (~500MB to allow Windows .NET update if necessary), if not make some space.

Yearly Maintenance Checklist for Raptor

Below is the recommended maintenance checklist for the Raptor. It provides a good guideline for yearly maintenance and can be copied and kept as a maintenance log.

Raptor Machine	**Comments**	**Signoff**
Check painted surfaces for scratches or damage use touchup paint as required		
Visually check all labels and decals. Clean or replace as required.		
Check overhead light system for proper lighting. Replace bulbs and clean as required.		

X-Axis E-Chain Assembly	**Comments**	**Signoff**
X-Axis X1 Motor Cable		
X-Axis X2 Motor Cable		
X-Axis Y Motor Cable		
X-Axis Knife Motor Cable		
X-Axis Theta Motor Cable		
Network Slice I/O Cable		
DB25 M/F Cable		
f) Air Line		

Tool Head Assembly	Comments	Signoff
Inspect Theta Motor drive belt (cracks,etc)		
Grease Bearings -See Lube Chart		
Inspect & Oil Drill lift bearing		
Test Theta proximity sensor		
Secure Theta Motor drive pulley set screws		
Examine cylinder motion		
Inspect the knife intellicut system for any loose parts or wiring		
Inspect the drive belt for knife motor		

Control Panel Assembly	Comments	Signoff
Check UIT control assembly and cables		
Check the joy stick for proper operation		
Check tools on/off switch, wiring & light bulb		
Secure all screws		

Electrical Cabinet	Comments	Signoff
Clean fan filter on computer		
Use dry air to clean inside		
Secure all plugs and connections		
Check amplifiers and ensure mounting screws are secured		
Check wiring for 24V DC power supplies		
Check wiring and cables for any wear, cracks or loose connections		
Check all screw terminals to ensure that wiring is secure		
Inspect take-off I/O cable for proper secure-ness and damage		
Check take-off motor feedback cable		
Check take-off motor power cable		

Bristle Conveyor	Comments	Signoff
Examine surface for damaged bristles		
Inspect edge seals for damage		
Check excessive wear on drive sprockets		
Inspect Bristle drive bearings. See Lube Chart		
Inspect condition of roller bed surface		

Y-Carriage Assembly	Comments	Signoff
Check wiring and cables for and wear		
Check all screw terminals to ensure wiring is secure		
Examine Solenoid Block(Pressure regulator, valve body, flow control valve and air lines		
a) Check for air leaks		
Check and secure all set screws		
b) Large Pulley for signs of wear and damage		
c) Y motor drive pulley for signs of wear and damage		
Inspect Linear bearings for signs of wear or damage		
Check & secure all screws		
Check Y-, Y+ Y Home limit switches		

Rack & Rail Assembly	Comments	Signoff
Clean and oil THK rails. See Lube Chart		
Check rack and rail gaps		
Check rack and rail for wear		
Secure all screws		
Tighten rail screws		

Gantry Tube Assembly	Comments	Signoff
Check Y-switch and cam for proper operation		
Check Y+ and Y- limit switch & cam for proper operation		
Check Y E-chain cables		
Y-car power cable filtered		
SynqNet In Cable		
SynqNet Out Cable		
UIT Cable		
Y-car Power Cable		
Y-car I/O Cable		
Airline tubing		
Check electronics tray is secure		
Check wiring and cables for signs of wear		
Check all screw terminals to ensure wiring is secure		
Check & secure gear rack screws		
Check & secure all remaining hard-ware		
Check & secure linear rail & oil or grease rail as required. See Lube Chart.		

TECHNICAL DATA

Eastman® Raptor

Patent Pending

Raptor

Maximum Gantry Speed ……..	40 in/sec (102 cm/sec)
Maximum Conveyor Speed ……..	8 in/sec (20 cm/sec)
Cut Accuracy * ……..……..	+/- 0.010 in (0.025 cm)
Gantry Weight …….....	260 lbs (118 kg)
Machine Voltage …….....	208/220/380/400/415/440/575 VAC,
3 Phase	50/60 Hz
Blower Operating Voltage ……..	220/440 VAC, 3 Phase, 60Hz
Minimum Operating Pressure ……	75 psi
Volume of Air Service …….	30 SCFM

* Relative to type and quality of fabric, cutting speed, pulling mode operational settings.
* Conveyor pull accuracy to +/- 1/16" (+/- 1.6 mm)

Machine Size Long	**Machine Size Wide**	**Working Width**	**Table Width** (including Rack and Rail)	**Overall Machine Width**	**Cutting Window Width**	**Cutting Window Length**	**Operational Cutting Height**	**Reciproca-tion Speed RPM**
228" 579cm	110" 279cm	79" 200cm	96" 244cm	112" 284cm	79" 200cm	98" 249cm	3.0-7.5cm	5000 RPM

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