



Operation and Maintenance Manual

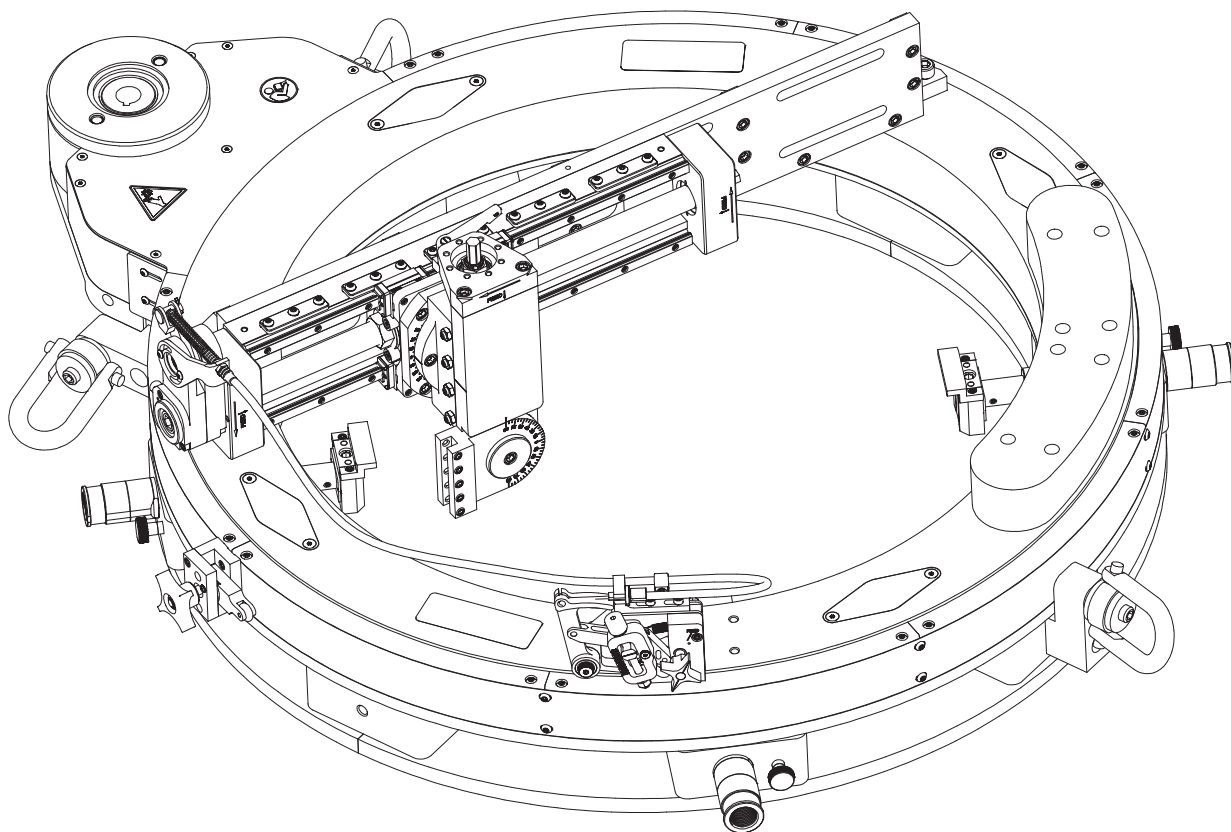
Enerpac MME Externally Mounted Flange Facing Machine

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To reduce the risk of injury, users must read and understand this document before use.

ABOUT US

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with a 110-year legacy, Enerpac has helped move and maintain some of the largest structures on earth. When safety and precision matters, elite professionals in industries such as aerospace, infrastructure, manufacturing, mining, oil & gas and power generation rely on Enerpac for quality tools, services and solutions. For additional information, visit www.enerpac.com.



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WARRANTY

Refer to the Enerpac Global Warranty document for terms and conditions of the product warranty. Such warranty information can be found at www.enerpac.com.

NAMEPLATE

HYDRATIGHT		CE
2010 Clermont St.		www.hydratight.com
○ Antigo, WI 54409	Year:	○
S/N:	Weight:	
P/N:	Max Speed:	

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1. Safety

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and / or damage to other property. Enerpac cannot be responsible for any damage or injury from unsafe use, lack of maintenance, or incorrect operation. Do not remove warning Labels, tags, or decals. In the event that any questions or concerns arise, contact Enerpac or a local Enerpac distributor for clarification.

Save these instructions for future use.

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service Center for information about Enerpac Hydraulic Safety Courses.

This manual follows a system of safety alert symbols, signals, words, and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.



The Safety Alert Symbol appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious injury.

Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are DANGER, WARNING, CAUTION, and NOTICE.

⚠ DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious personal injury.

⚠ WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious personal injury.

⚠ CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard related (e.g. messages related to property damage). Please note that the Safety Alert Symbol will not be used with the signal word.

1.1 Safety Precautions

The manufacturer has made every effort to ensure that the information given in this Operation & Maintenance manual, and other publications relating to this machine is correct and understandable. However, it is acknowledged that there may be errors or omissions in this publication.

The company also reserves the right not to provide updates, corrections or amendments to this publication but will keep customers up to date with all changes that may affect the machine operation. Any updates which affect the safe use of the machine shall be communicated to the customer in a prompt and appropriate manner.

Mandatory Safety Signs

ISO 7010 SYMBOL	SAFETY DESCRIPTION
	EYE PROTECTION MUST BE WORN
	EAR PROTECTION MUST BE WORN
	HARD HATS MUST BE WORN
	PROTECTIVE GLOVES MUST BE WORN
	PROTECTIVE FOOTWEAR MUST BE WORN
	OVERALL MUST BE WORN
	MACHINE GUARDS MUST BE USED

1.1.1 Handling

Customers, users and operators of the machines must be aware of the nature of the equipment supplied.

Although inherently robust, the machine is a precision tool and may be damaged by poor handling, tipping and falling, inadequate transport arrangements over e.g. rough terrain, misuse by operators and use outside its design specification.

Such poor handling may result in either broken or damaged parts or disturbance to fine settings resulting in an inability to meet the specified machining tolerances and capabilities.

1.1.2 Personnel

As a specialist portable machine the minimum standard for an operator is to be:

- The operator must be trained and conversant with the Enerpac MM760E.
- The operator to be able to identify the correct and incorrect use of static or portable machines.
- Comply with all local and internationally recognised safe use of powered machines.

1.2 Safety Procedures

Detailed in this section is a list of good Health and Safety practices that the manufacturer advise users to adhere to. Due to the nature of portable machine tools, not every eventuality can be catered for and the following is not exhaustive, as such the manufacturer strongly advise that the user carries out their own risk assessments based on the machining and environment in which they intend to use the machinery.

Machine Hazards /signs

ISO 7010 SYMBOL	HAZARD DESCRIPTION
	DANGER HIGH VOLTAGE
	WARNING MOVING MACHINERY
	CAUTION MOVING MACHINERY
	WARNING KEEP HANDS CLEAR

1.2.1 Pre-Operational Safety Checks

1. Always read safety signs / labels.
2. Ensure no slip / trip hazards are present in workspaces and walkways.
3. Locate and ensure you are familiar with the operation of the ON / OFF starter and E-Stop (if fitted). Do not leave equipment on top of the machine.
4. Do not leave equipment on top of the machine
5. Ensure each tool is in good condition and securely mounted.
6. Secure / Remove loose items.
7. Faulty equipment must not be used.
Immediately report any suspect machinery.

1.2.2 Operational Safety Checks

1. Operator is fully conversant and trained in use of equipment.
2. Keep clear of moving machine parts.
3. Never leave the machine running unattended.
4. Follow correct clamping procedures - keep overhangs as small as possible and check work piece is secure.
5. Set the correct speed to suit the tool, the depth of cut and the material.
6. Before making adjustments and measurements or before cleaning swarf accumulations switch off and bring the machine to a complete standstill.

1.2.3 Housekeeping

1. Switch off the machine.
2. Remove milling cutters, drill attachments and tap attachments and store them safely (if applicable).
3. Leave the machine and work area in a safe, clean and tidy state.

1.2.4 Potential Hazards



1. Sharp cutters. Use protective gloves when handling cutters.
2. Moving components – hair / clothing entanglement. Keep clear of hazard zone when the machine is in operation. See section 2.3.
3. Skin irritation. Overalls and gloves should be worn stop direct contact with swarf and lubricants.
4. Metal splinters and burrs. Wear gloves when handling the machine or any sharp object. Swarf should be removed with pliers as well as protective gloves.
5. Flying debris. Keep clear of hazard zone when the machine is in operation. Eye protection should be worn to prevent eye injuries.
6. Fumes. Continuous cutting of metal can create fumes, therefore the machine must be used in a well ventilated area.
7. Trip hazards from hoses or other equipment at low level.
8. Hearing Loss. Use appropriate ear protection when in the vicinity of the machine in operation.

1.3 Machine Hazard Zone

⚠ DANGER

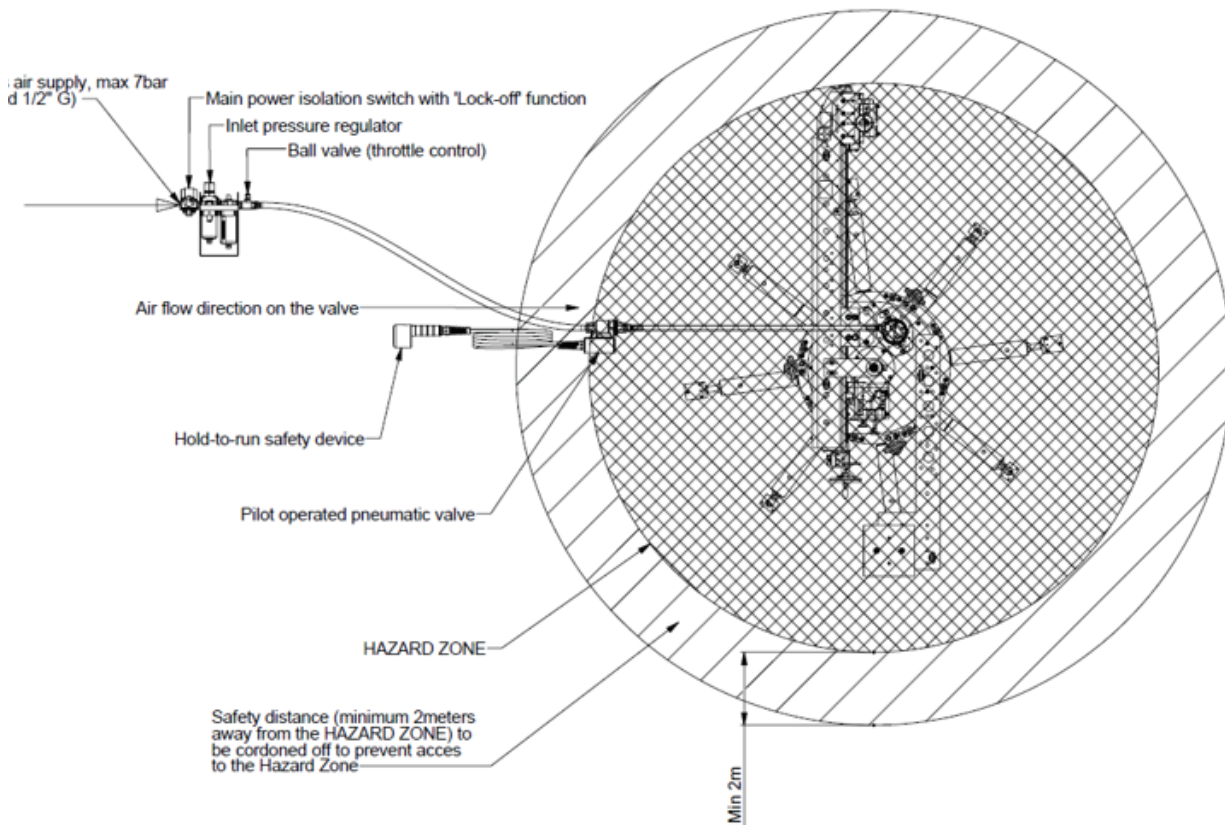


Figure 1: Supplied system layout drawing showing hazard area to be cordoned off

⚠ DANGER

The machine mains air valve must be switched off and locked off whilst performing the below tasks:

1. Setting up the machine into the work-piece.
2. Performing any maintenance, if necessary, before cut.
3. Cordoning off the area, a minimum 2m away from hazard zone.
4. All of the controls must be placed outside of the cordoned off zone.
5. Before switching the valve on, make sure there are no personnel in cordoned off zone.

After machines mains air valve is switched on:

1. Only the operator is allowed to enter cordoned off zone, if necessary.
2. Ball valve (throttle control) should be nearly closed in order to slowly start up the machine.
3. Operator to be outside of cordoned off zone and operate the machine by using the hold to run device.
4. Whilst the machine is running, no personnel including the operator, is allowed to enter the cordoned off zone under any circumstances.

1.4 Risk Assessment Checklist

The following checklist should not be taken as a comprehensive list of things to be vigilant for when installing and operating the flange facing machine. However these checklists are typical of the types of risks the assembler and operator should be considering. Use these checklists as part of your risk assessment.

Figure 2: Risk Assessment Checklist before installation

	<u>Before Installation</u>
☐	I understand how this machine operates and identified the best placement for the controls, cabling, and the operator (having reviewed the manual and section 1 in particular).
☐	I removed or mitigated all identified risks (such as shearing, cutting, crushing, tripping, entanglement, or falling objects).
☐	I considered the need for personnel safety protection and guarding and installed any necessary guards, if supplied.
☐	I read the Machine Assembly instructions and took inventory.
☐	I created a lift plan, for each of the setup lifts required during the setup of the machine.
☐	I located the fall paths involved in lifting. Precautions have been taken to keep workers away from the identified fall path.
☐	I have noted all the warning labels on the machine.
☐	I considered and mitigated any other potential risks specific to the working environment.
☐	I have checked that all of the ram bolts are not damaged or corroded.

Figure 3: Risk Assessment Checklist after installation

	<u>After Installation</u>
☐	I checked that the machine is safely installed and the hazard zone is cordoned off as section 1.3. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.
☐	I evaluated and mitigated the potential risks specific to the work environment.
☐	I checked that all affected personnel understand the hazard zone (section 1.3) and are outside of it.
☐	I followed the required Maintenance Intervals with the recommended lubricants in section 8.
☐	I checked that all affected personnel have the required personal protective equipment, as well as any site-required or regulatory equipment.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel, noting that no other personnel are allowed in the hazard zone unless the machine is isolated and locked off.
☐	I planned the safe guarding of any chips or swarf produced by the machining process.
☐	I considered that the tool tip cutter will be sharp and have planned adequate protection for handling.

2. Compliance Statement

2.1 Conformance to National and International Standards

•MM760e •MM1000e •MM1250e
•MM1500e •MM1775e •MM2000e



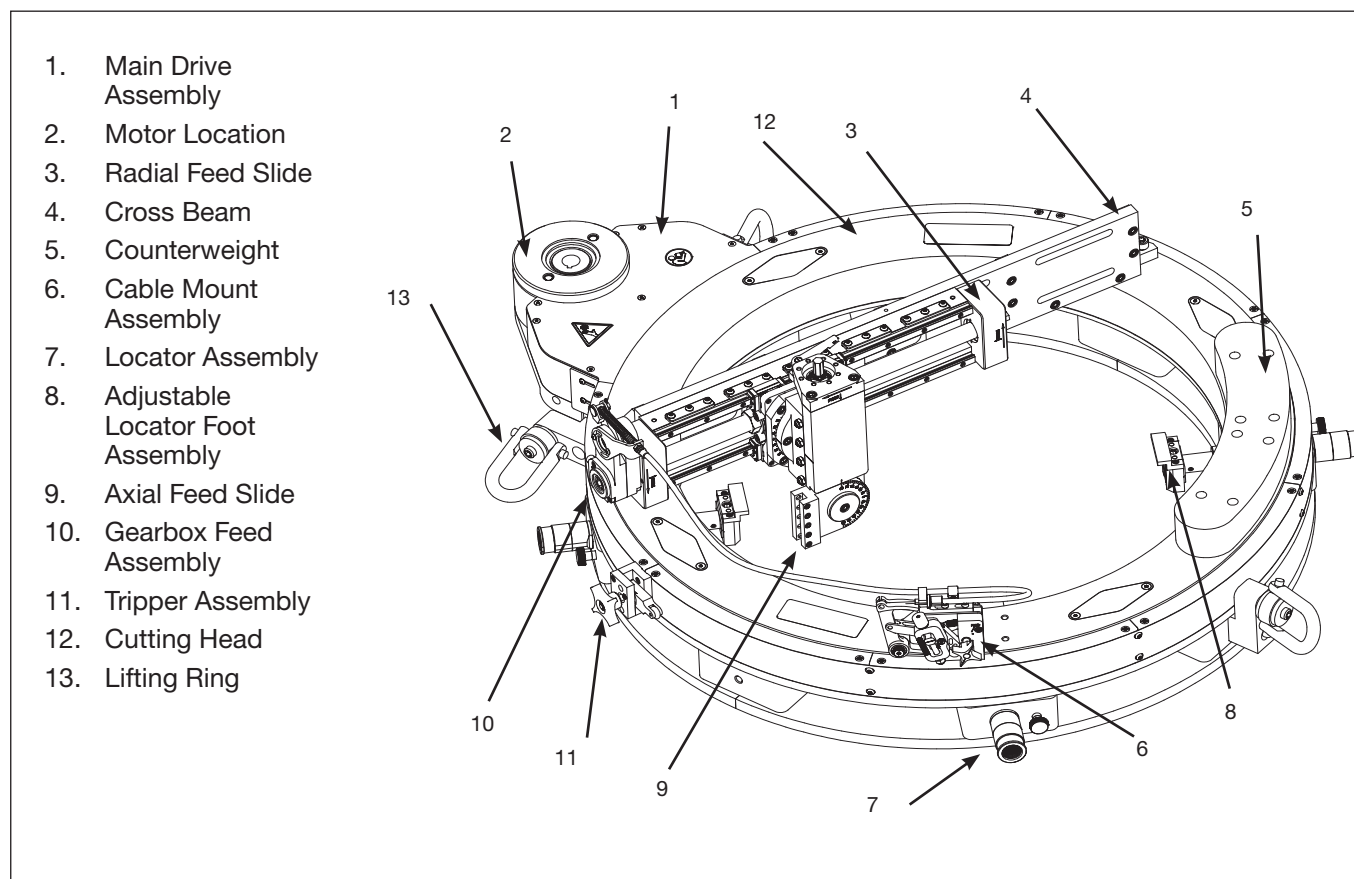
These tools conform with
the requirements for
CE and UKCA.

Enerpac declares that the product(s) have been tested and conforms to applicable standards and the product(s) are compatible to all EU and UK Requirements.

Copies of the EU Declaration as well as the UK Self-Declaration are enclosed with each shipment.

3. Features & Components

3.1 MME Externally Mounted Flange Facing Machine Feature Diagram



3.2 Feature Description

The MME series has been predominantly designed for the facing of 'Pipeline' coupling flanges but can also be used for any application that suits its externally mounting base.

It features

- Drive assembly that works with a pneumatic, hydraulic, or electric motor that is powered from an external power source.
- A feed rate of 0.1 - 0.8mm/rev (.004 - .031in/rev) in either the radial or axial direction, producing 1.6-12.5µm (63-500µin) surface finishes.
- Ratchet style locators that allow for 89mm (3.50in) of rough adjustment and 69mm (2.72in) of fine adjustment.
- Axial adjustable locator foot assemblies with ±3.2mm (.125in) of travel. Additional non-adjustable locators are included on larger machines.

4. Technical Product Data

NOTICE MMe-Series Externally Mounted Flange Facing Machines have been modularly designed for accurate in-situ machining of work surfaces, to this end the constituent parts are easily manipulated by hand or crane.

4.1 MM760e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	459-775mm	229-544mm	18.1-30.5"	9.0-21.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 787mm Ø		0 – 31.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	637-775mm	406-544mm	25.1-30.5"	16.0-21.4"
Ratchet Position 1	612-749mm	381-518mm	24.1-29.5"	15.0-20.4"
Ratchet Position 2	586-724mm	356-493mm	23.1-28.5"	14.0-19.4"
Ratchet Position 3	561-699mm	330-467mm	22.1-27.5"	13.0-18.4"
Ratchet Position 4	535-673mm	305-442mm	21.1-26.5"	12.0-17.4"
Ratchet Position 5	510-648mm	279-417mm	20.1-25.5"	11.0-16.4"
Ratchet Position 6	485-622mm	254-391mm	19.1-24.5"	10.0-15.4"
Ratchet Position 7	459-597mm	229-366mm	18.1-23.5"	9.0-14.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	426 kg		939 Lbs	
Shipping Weight	553 kg		1219 Lbs	
Designed for general use				

4.2 MM1000e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	713-1029mm	483-798mm	28.1-40.5"	19.0-31.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 1041mm Ø		0 – 41.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	891-1029mm	660-798mm	35.1-40.5"	26.0-31.4"
Ratchet Position 1	866-1003mm	635-772mm	34.1-39.5"	25.0-30.4"
Ratchet Position 2	840-978mm	610-747mm	33.1-38.5"	24.0-29.4"
Ratchet Position 3	815-953mm	584-721mm	32.1-37.5"	23.0-28.4"
Ratchet Position 4	789-927mm	559-696mm	31.1-36.5"	22.0-27.4"
Ratchet Position 5	764-902mm	533-671mm	30.1-35.5"	21.0-26.4"
Ratchet Position 6	739-876mm	508-645mm	29.1-34.5"	20.0-25.4"
Ratchet Position 7	713-851mm	483-620mm	28.1-33.5"	19.0-24.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	494 kg		1089 Lbs	
Shipping Weight	651 kg		1436 Lbs	
Designed for general use				

4.3 MM1250e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	967-1283mm	737-1052mm	38.1-50.5"	29.0-41.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 1295mm Ø		0 – 51.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	1145-1283mm	914-1052mm	45.1-50.5"	36.0-41.4"
Ratchet Position 1	1120-1257mm	889-1026mm	44.1-49.5"	35.0-40.4"
Ratchet Position 2	1094-1232mm	864-1001mm	43.1-48.5"	34.0-39.4"
Ratchet Position 3	1069-1207mm	838-975mm	42.1-47.5"	33.0-38.4"
Ratchet Position 4	1043-1181mm	813-950mm	41.1-46.5"	32.0-37.4"
Ratchet Position 5	1018-1156mm	787-925mm	40.1-45.5"	31.0-36.4"
Ratchet Position 6	993-1130mm	762-899mm	39.1-44.5"	30.0-35.4"
Ratchet Position 7	967-1105mm	737-874mm	38.1-43.5"	29.0-34.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	659 kg		1453 Lbs	
Shipping Weight	878 kg		1936 Lbs	
Designed for general use				

4.4 MM1500e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	1221-1537mm	991-1306mm	48.1-60.5"	39.0-51.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 1594mm Ø		0 – 61.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	1399-1537mm	1168-1306mm	55.1-60.5"	46.0-51.4"
Ratchet Position 1	1374-1511mm	1143-1280mm	54.1-59.5"	45.0-50.4"
Ratchet Position 2	1348-1486mm	1118-1255mm	53.1-58.5"	44.0-49.4"
Ratchet Position 3	1323-1461mm	1092-1229mm	52.1-57.5"	43.0-48.4"
Ratchet Position 4	1297-1435mm	1067-1204mm	51.1-56.5"	42.0-47.4"
Ratchet Position 5	1272-1410mm	1041-1179mm	50.1-55.5"	41.0-46.4"
Ratchet Position 6	1247-1384mm	1016-1153mm	49.1-54.5"	40.0-45.4"
Ratchet Position 7	1221-1359mm	991-1128mm	48.1-53.5"	39.0-44.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	730 kg		1610 Lbs	
Shipping Weight	989 kg		2181 Lbs	
Designed for general use				

4.5 MM1775e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	1475-1791mm	1245-1560mm	58.1-70.5"	49.0-61.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 1803mm Ø		0 – 71.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	1653-1791mm	1422-1560mm	65.1-70.5"	56.0-61.4"
Ratchet Position 1	1628-1765mm	1397-1534mm	64.1-69.5"	55.0-60.4"
Ratchet Position 2	1602-1740mm	1372-1509mm	63.1-68.5"	54.0-59.4"
Ratchet Position 3	1577-1715mm	1346-1483mm	62.1-67.5"	53.0-58.4"
Ratchet Position 4	1551-1689mm	1321-1458mm	61.1-66.5"	52.0-57.4"
Ratchet Position 5	1526-1664mm	1295-1433mm	60.1-65.5"	51.0-56.4"
Ratchet Position 6	1501-1638mm	1270-1407mm	59.1-64.5"	50.0-55.4"
Ratchet Position 7	1475-1613mm	1245-1382mm	58.1-63.5"	49.0-54.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	807 kg		1778 Lbs	
Shipping Weight	1264 kg		2787 Lbs	
Designed for general use				

4.6 MM2000e Specification Table

Description	Standard	with optional extension	Standard	with optional extension
Clamping Range	1729-2045mm	1499-1814mm	68.1-80.5"	59.0-71.4"
Axial Adjustment	±3.2mm		±.125"	
Machining Range				
STD Tooling	0 - 2057mm Ø		0 – 81.0"	
Tool post Stroke				
X - Axis	0 – 356mm		0 – 14"	
Z - Axis	0 – 102mm		0 – 4"	
Mounting Ranges	Standard	with optional extension	Standard	with optional extension
Ratchet Position 0	1907-2045mm	1676-1814mm	75.1-80.5"	66.0-71.4"
Ratchet Position 1	1882-2019mm	1651-1788mm	74.1-79.5"	65.0-70.4"
Ratchet Position 2	1856-1994mm	1626-1763mm	73.1-78.5"	64.0-69.4"
Ratchet Position 3	1831-1969mm	1600-1737mm	72.1-77.5"	63.0-68.4"
Ratchet Position 4	1805-1943mm	1575-1712mm	71.1-76.5"	62.0-67.4"
Ratchet Position 5	1780-1918mm	1549-1687mm	70.1-75.5"	61.0-66.4"
Ratchet Position 6	1755-1892mm	1524-1661mm	69.1-74.5"	60.0-65.4"
Ratchet Position 7	1729-1867mm	1499-1636mm	68.1-73.5"	69.0-64.4"
Feed Rates (per machine rev)				
X-Axis 1"-6 ACME LH	0.1 – 0.8mm		0.004 – 0.031"	
Z-Axis ¾"-6 UNC RH	0.1 – 0.8mm		0.004 – 0.031"	
Other				
Max Motor Speed (free)	200 rpm (pneumatic)			
Supply Pressure	6.2 bar		90 PSI	
Operational Weight	886 kg		1953 Lbs	
Shipping Weight	1448 kg		3193 Lbs	
Designed for general use				

4.7 MME Component Weight

	Assembled Machine		Motor Assembly		Air Caddy		Operational Weight		Shipping Crate		Shipping Weight	
	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg	Lbs	Kg
MM760e	892	405	28	13	19	9	939	426	280	127	1219	553
MM760e-H	892	405	20	9	-	-	912	414	280	127	1192	541
MM1000e	1042	473	28	13	19	9	1089	494	346	157	1436	651
MM1000e-H	1042	473	20	9	-	-	1062	482	346	157	1409	639
MM1250e	1406	638	28	13	19	9	1453	659	483	219	1936	878
MM1250e-H	1406	638	20	9	-	-	1426	647	483	219	1909	866
MM1500e	1563	709	28	13	19	9	1610	730	570	259	2181	989
MM1500e-H	1563	709	20	9	-	-	1583	718	570	259	2154	977
MM1775e	1731	785	28	13	19	9	1778	807	1009	458	2787	1264
MM1775e-H	1731	785	20	9	-	-	1751	794	1009	458	2760	1252
MM2000e	1906	865	28	13	19	9	1953	886	1239	562	3193	1448
MM2000e-H	1906	865	20	9	-	-	1926	874	1239	562	3166	1436

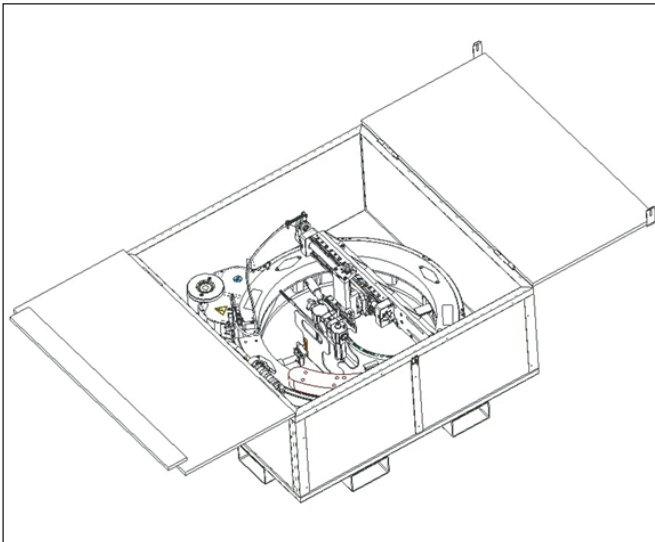


Figure 4: MM760e-MM1500e Shipping Box

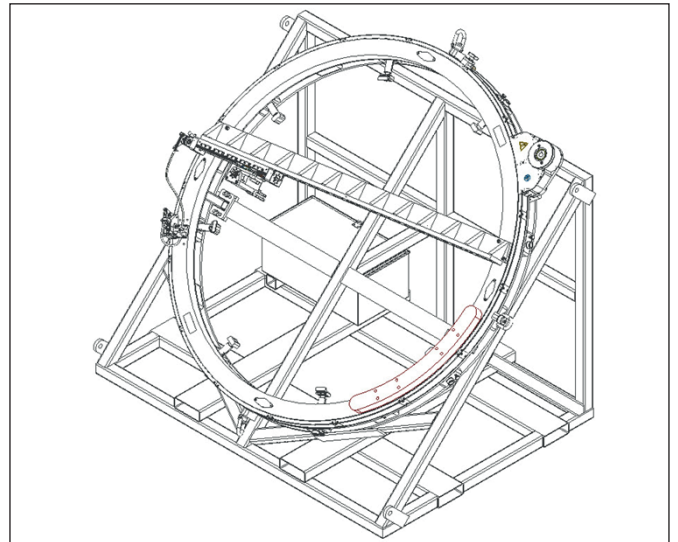


Figure 5: MM1775e-MM2000e Shipping Crate

4.8 Service and Supplies

- The MME Facing Machines use a 3.5hp pneumatic motor that requires a pneumatic supply capable of supplying 2.7 m³ of air per minute (95 CFM) at a pressure of 6 Bar (87 Psi).
- Hydraulic and electric drive motors with SAE-A, 2-bolt mounts and 1" round and keyed shafts may also be used.

4.8.1 Personnel

- As a specialist portable machine the minimum standard for an operator is to be:
- The operator must be trained and conversant with the Enerpac machines.
- The operator to be able to identify the correct and incorrect use of static or portable machines.
- Comply with all local and internationally recognised safe use of powered machines.

5. Installation

The MME series has been designed to fit onto a circular work piece, for example a pipe or flange. Manually adjustable, clamping jaws are used to secure the machine to the work piece.

1. Record the diameter of the work piece & ensure it falls within the working envelope of the machine. See Section 4, Technical Product Data for machine details.
2. Push the four 'Locator Assemblies' radially inward to the correct ratchet position (see spec table in section 4). Use the reference lines to keep all locators positioned equally.

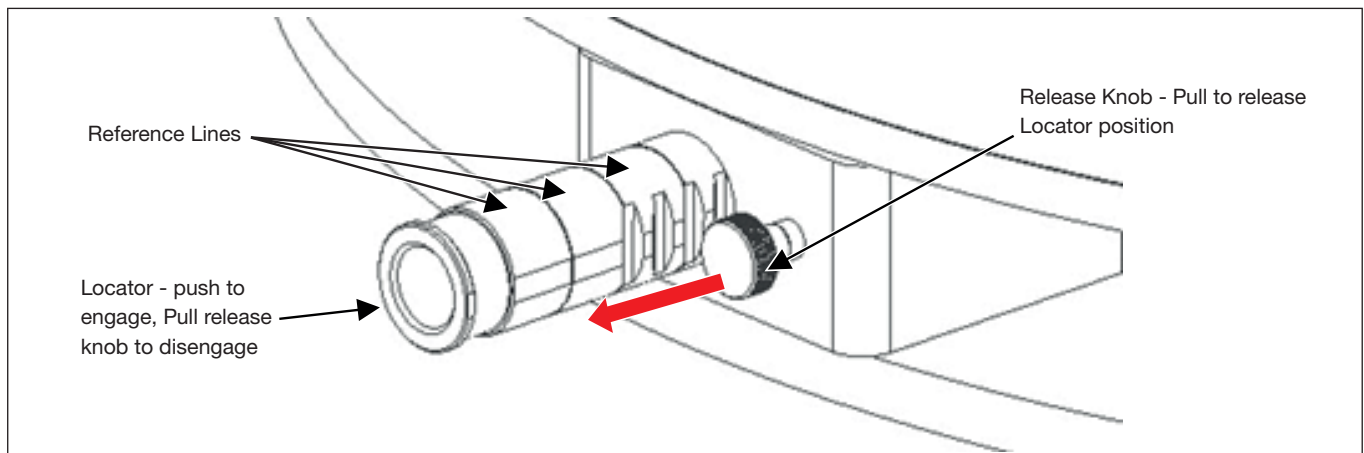


Figure 6: Locator and Release Knob

3. Adjust the four 'Locator Assemblies' using an 1/2" allen wrench or male hex socket until the distance between opposing clamping jaws is roughly 10mm larger than the recorded diameter from point 1. Be aware that all four jaws should be adjusted equally to ensure the machine is mounted concentrically to the diameter of the work piece.

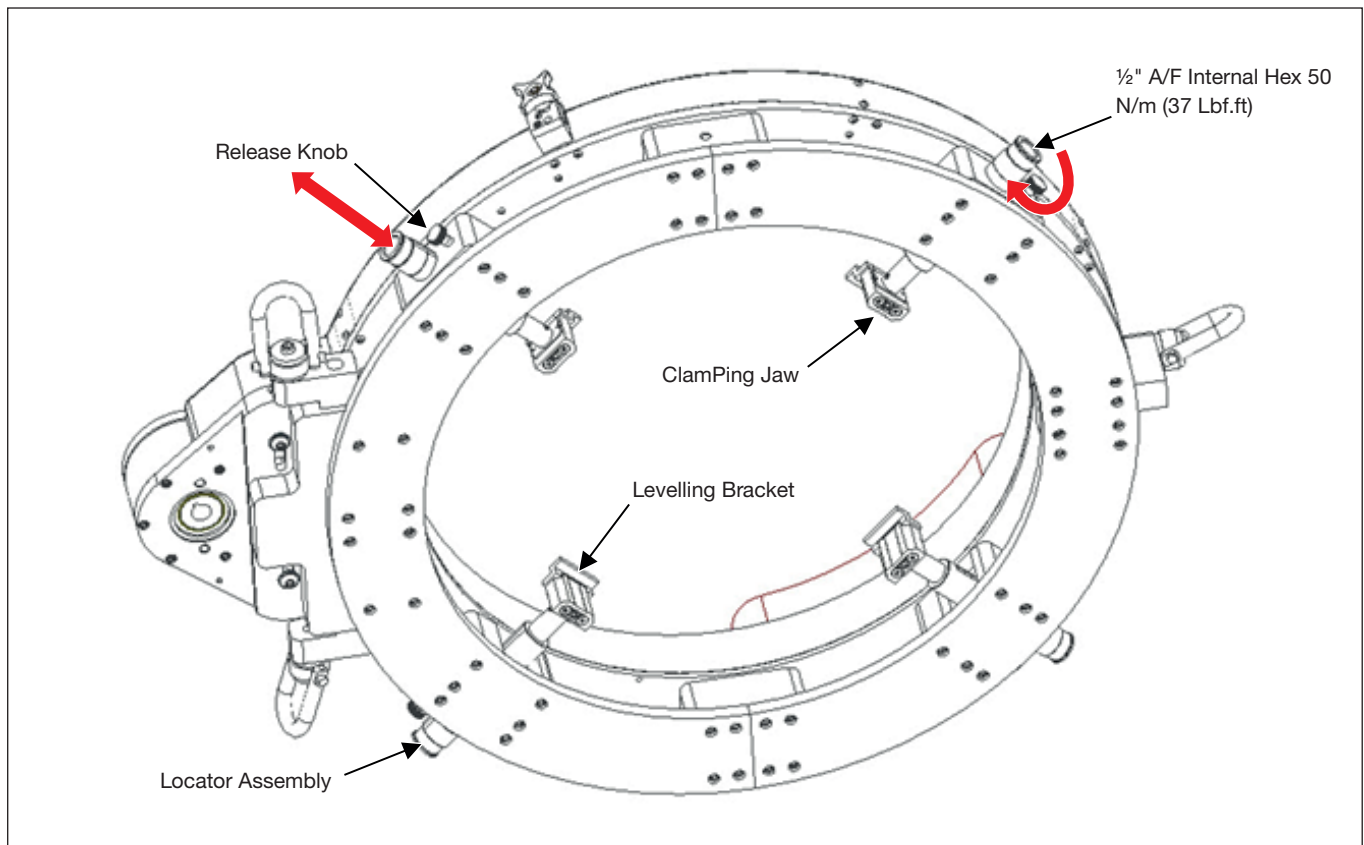


Figure 7: Locator Assemblies and Release Knob

4. Ensure each 'Adjustable Locator Foot Assembly' has a 'Leveling Bracket' fitted to it. Note that the leveling brackets cannot be used if the OD of the flange is less than 24mm (.95") from the ID of the machine.
5. Turn the adjusting screw to position the adjustable locator to the center axial position. When in the center position the indicator marks are aligned and the locator has $\pm 3.2\text{mm}$ (.125in) of axial adjustment.

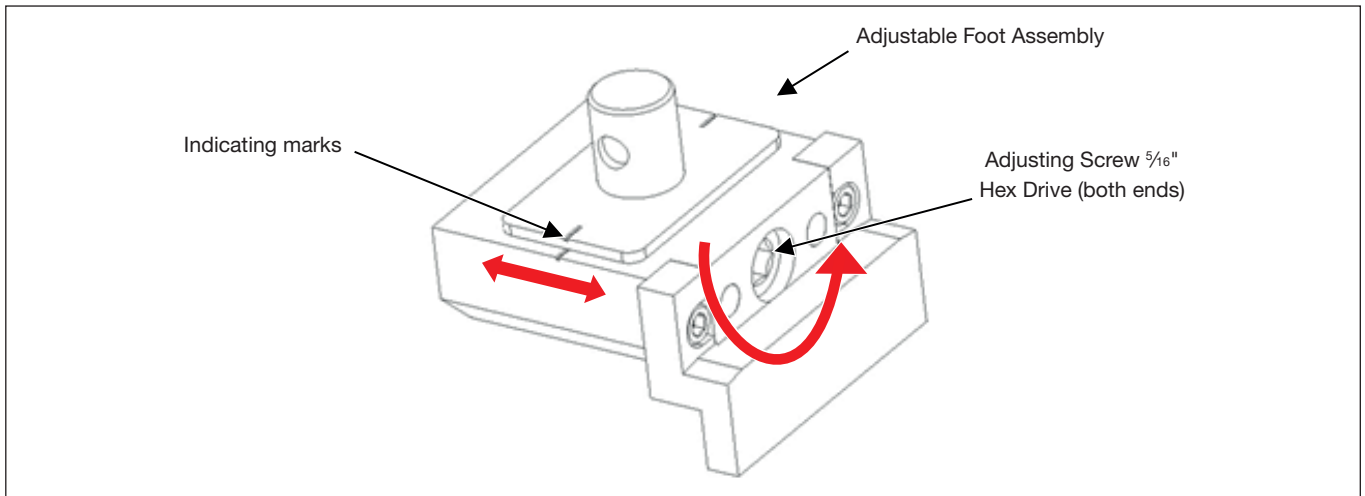


Figure 8: Levelling Bracket On Foot Assembly

6. Use the 3 (or 4) lifting rings to lift the machine safely over the work piece and lower it until all four leveling brackets are in contact with the work piece. Reposition the lifting brackets on the outside diameter of the machine if necessary.
7. Screw in each of the four jaws until they start to grip the work piece.
8. Adjust the machines perpendicularity to the work piece by adjusting the four adjusting screws located on each of the four 'Leveling Brackets'.
9. Whilst maintaining contact between 'Leveling Brackets' and the work piece, tighten each of the four 'Locator Assemblies' to a minimum torque figure of 50 N/m (37 Lbf·ft).

If the leveling brackets cannot be used, hit on the front or back of the locator foot with a dead blow mallet to slightly reposition the machine. **Never use a steel mallet or hammer on any part of this machine.**

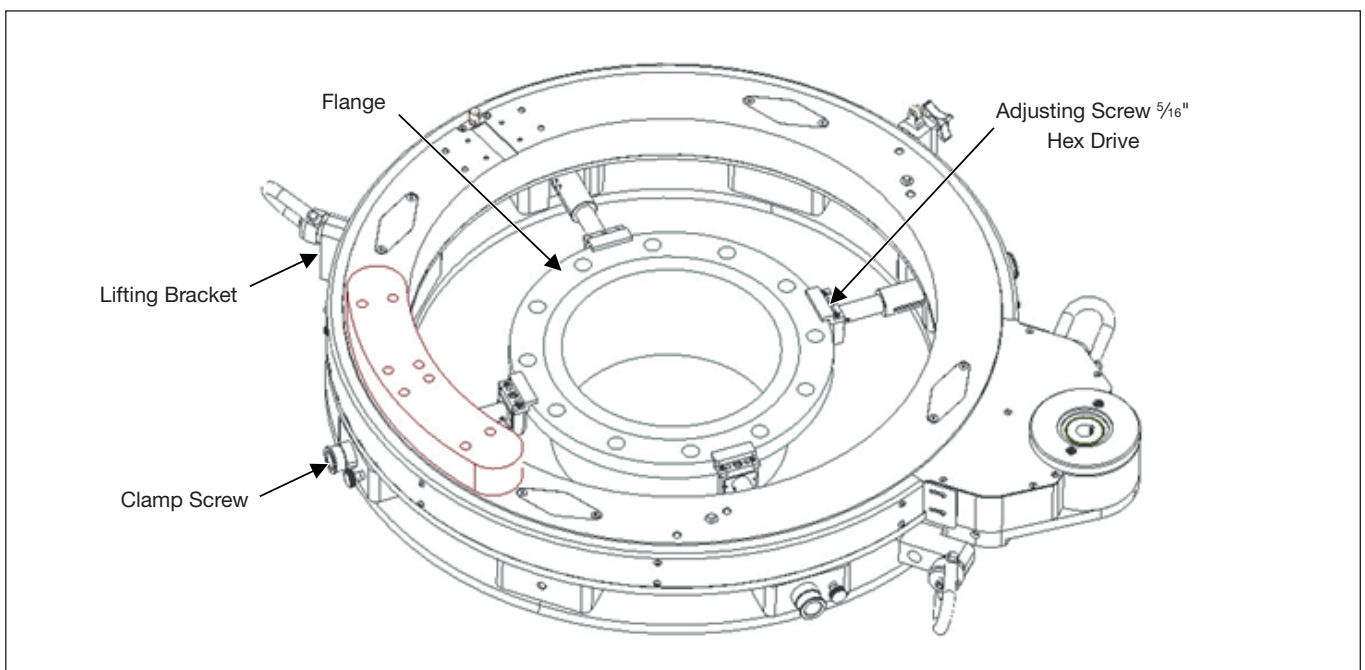


Figure 9: Machine On Workpiece

10. Now the machine is correctly fixed, the 'Leveling Brackets' can be removed.

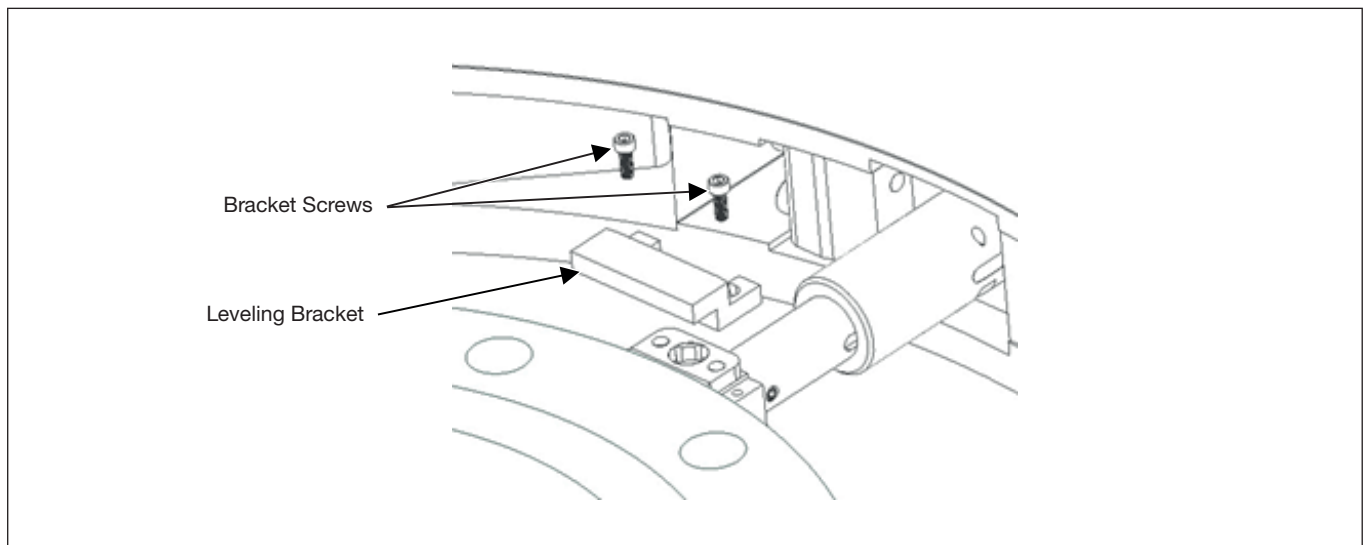


Figure 10: Removing Levelling Bracket

11. If any adjustments are required following the initial installation ensure that the leveling brackets are re-fitted to the 'Locator Assemblies' or secure the machine with lifting straps before releasing the four 'Clamp Screws'. This will prevent the machine slipping or falling down the work piece when the screws are released.

Following any adjustments, be sure to re-torque the four 'Clamp Screws' to a figure of 50 N/m (37 Lbf-ft).

12. Set the radial feed slide and cross beam onto the cutting head alignment bushings and secure with 4 socket head cap screws.

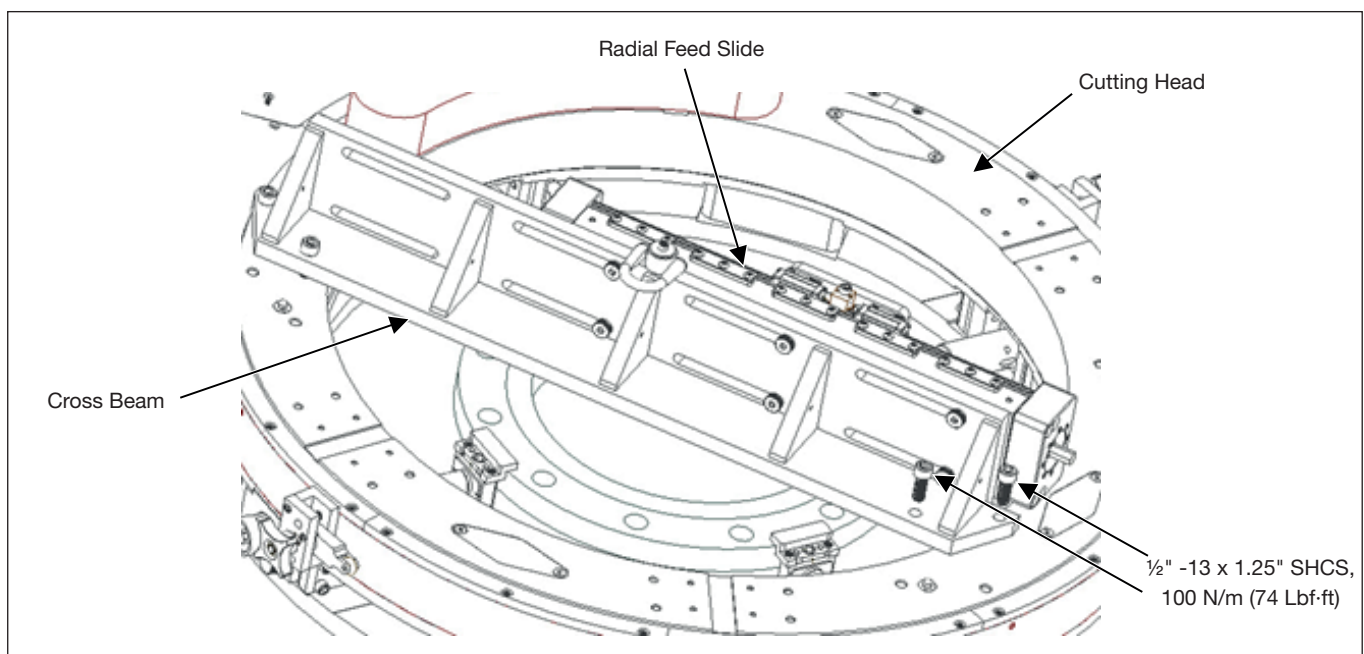


Figure 11: Installing Cross Beam

13. Attach the axial feed slide to the radial feed slide with 4 socket head cap screws. Use the 2 swivel locking cap screws to make sure the axial feed slide is perfectly square to the radial feed slide if performing counter boring operations.

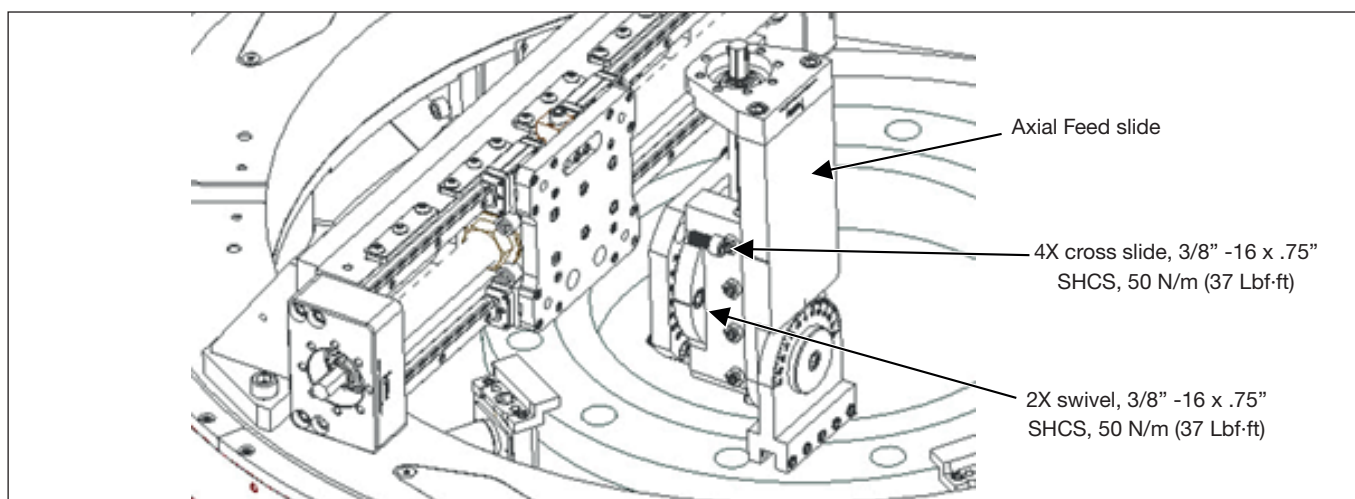


Figure 12: Attaching Axial feed Slide

14. Manually rotate the star wheel on the cable mount assembly until one of the star wheel points with the indicating marks aligns with the feed mark engraved on the cover. This ensures the lock hook does not interfere with the lifting pin. Rotating the star wheel 90 degrees alternates between locking the lifter pin which allows for feed and not locking the lifter pin which stops the feed.

Note: The locking hook cover is not transparent as shown.

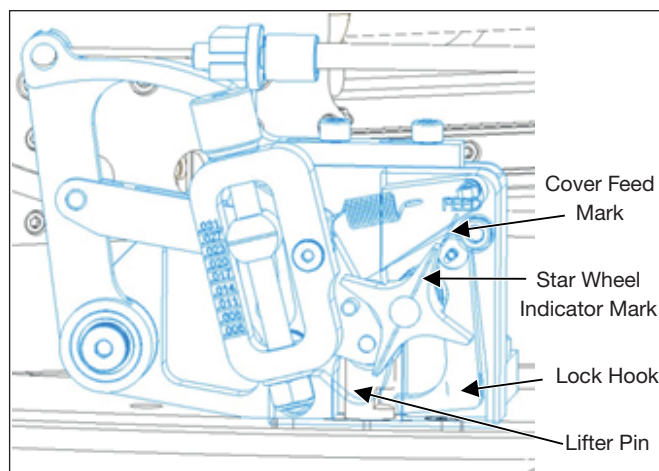


Figure 13: Cable Mount Assembly

15. Set the cable mount assembly on the cutting head at the lifter pin location. Make sure the star wheel is turned so the indicator mark aligns with the feed mark on the cover. The lock hook is now retracted so the cable mount assembly will sit flat on the cutting head. Radially position the cable mount assembly bracket such that the tripper roller contacts the mid-plane of the star wheel thru the entire tripping process. Secure with 4 socket head cap screws.

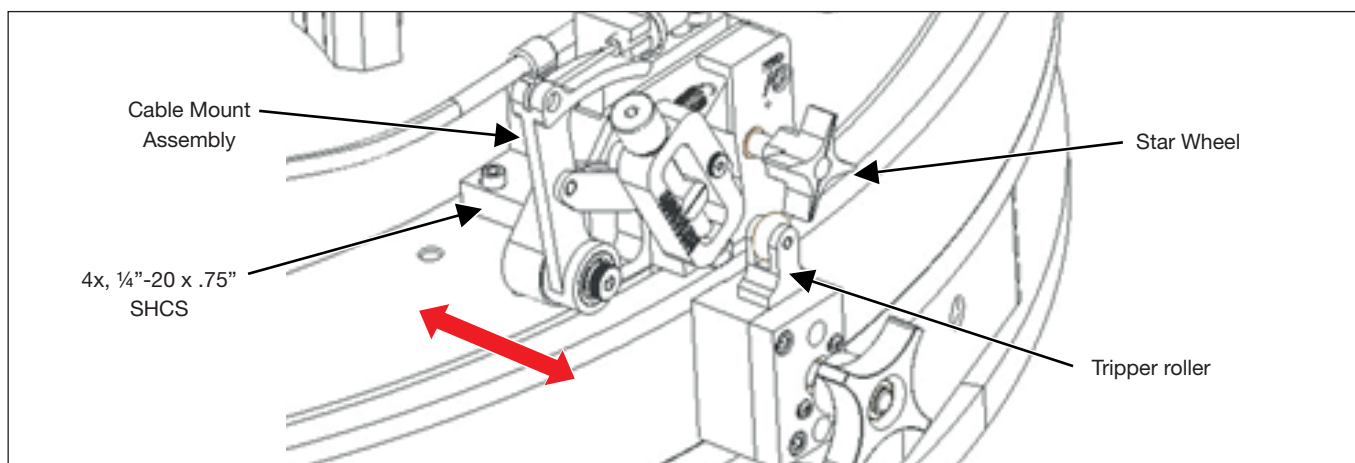


Figure 14: Setting The Cable Mount Assembly Star Wheel To Tripper Roller

16. Manually rotate the star wheel on the cable mount assembly until one of the points without an indicator mark aligns with the feed mark on the cover. This allows the lock hook to engage with the lifter pin.

Note: The locking hook cover is not transparent as shown in Figure 18.

17. Manually rotate the cutting head so the lifter pin is at its highest point (note that the feed cable arm is at its' maximum stroke position). The lock hook should slide into the slot of the lifter pin. If the lock hook catches, the feed cable arm will not move during rotation of the cutting head. If the lock hook does not catch the lifter pin slot and the feed cable arm moves during cutting head rotation, adjust the cable mount up or down by loosening 2 socket head cap screws located on the back side of the cable mount housing. The drawing below shows a cutaway section of how the lock hook and lifter pin should align.

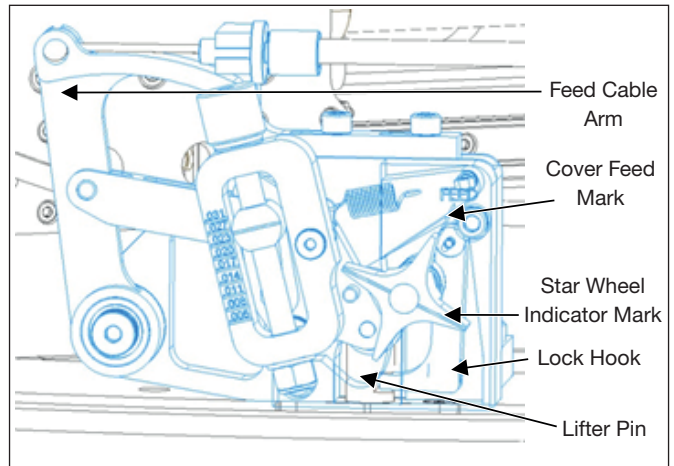


Figure 15: Cable Mount Assembly

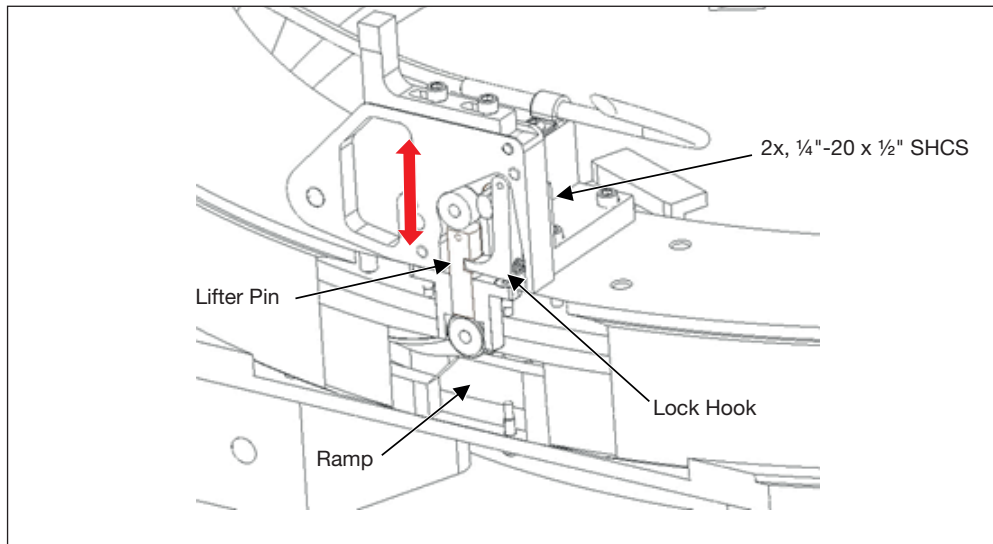


Figure 16: Cutaway Section Of Cable Mount Assembly

18. Slide the cable feed gearbox onto the feed screw of either the radial feed slide or the axial feed slide. Note the gearbox can be flipped to change the feed direction. Ensure proper feed direction before mounting the gearbox to the slide. Rotate the position of the gearbox to prevent cable obstruction or kinking and secure with 2 socket head cap screws.

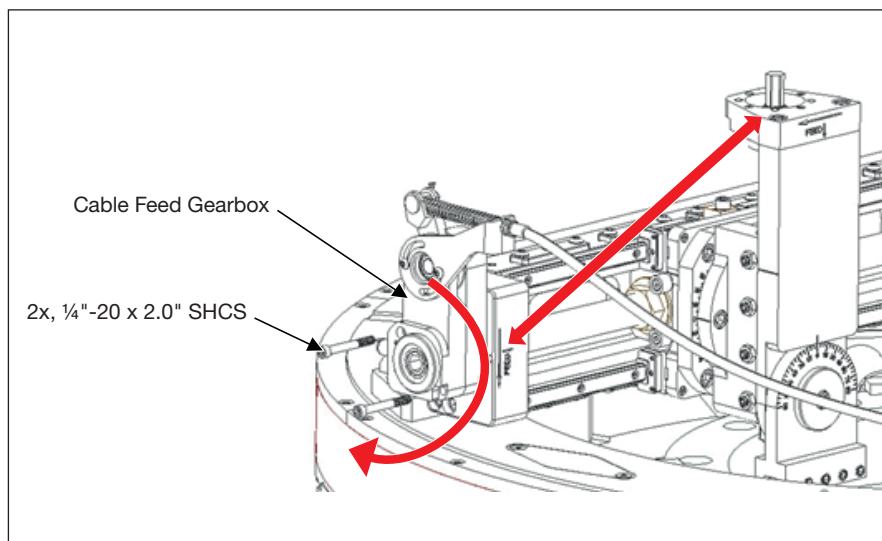


Figure 17: Cable Feed Gearbox

19. Loosen the 2 button head socket screws that secure the gearbox cable mounting bracket to change the cable pull angle. Turn the star wheel to the feed position to release the lifter pin. Turn the cable adjuster to be about 3mm (.120") from fully seated. Insert the opposite end of the cable into the feed cable arm and into the cable adjuster. Loosen the two cable adjuster bracket screws and slide the adjuster bracket away from the feed cable arm to remove any cable slack and then retighten

the screws to hold the cable adjuster bracket. The cutting head may need to be rotated so the lifter pin is at the lowest position in order to get the cable end into the cam arm.

20. Make sure the cable can be fully stroked by turning the feed rate knob to the full feed position. Rotate the cutting head to the highest lifter pin position. Turn the cable adjuster to remove any cable slack and then tighten the adjuster lock to hold the cable adjuster.

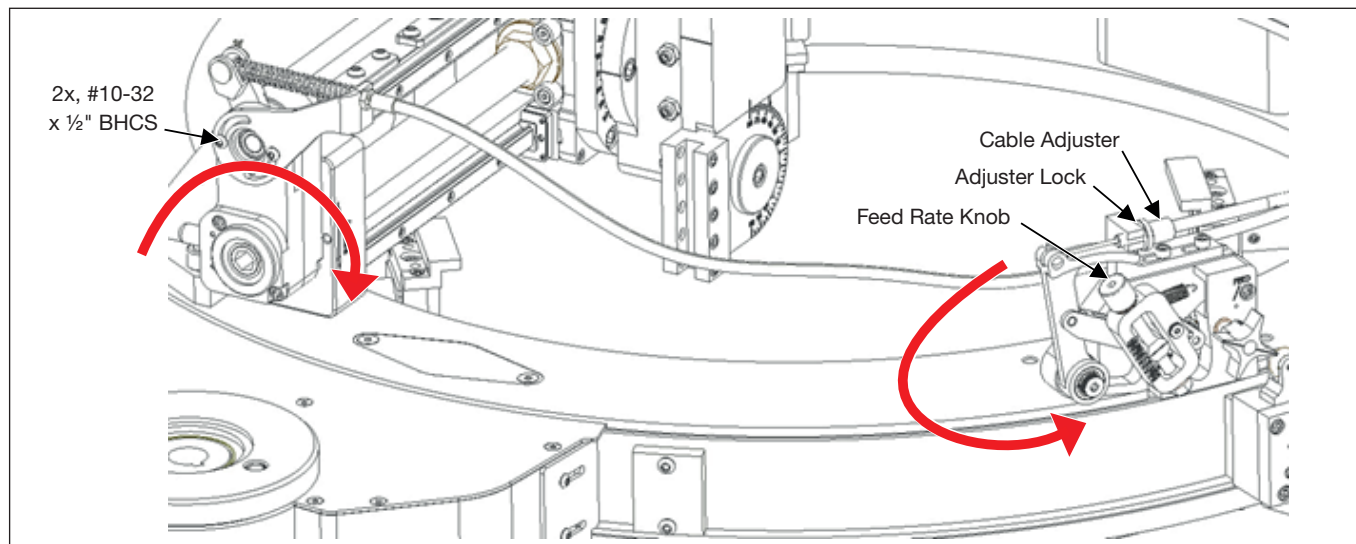


Figure 18: Installing Cable

21. Install the drive motor on either the top or bottom of the motor mount using 2 socket head cap screws. Check to make sure the screws only extend beyond the motor flange by .70" (17.5mm) or less before installing them. Note that for certain motors, screws with turned down heads are required. **The cutting head must rotate clockwise.** If the cutting head does not rotate clockwise, the motor must be mounted on the opposite side.

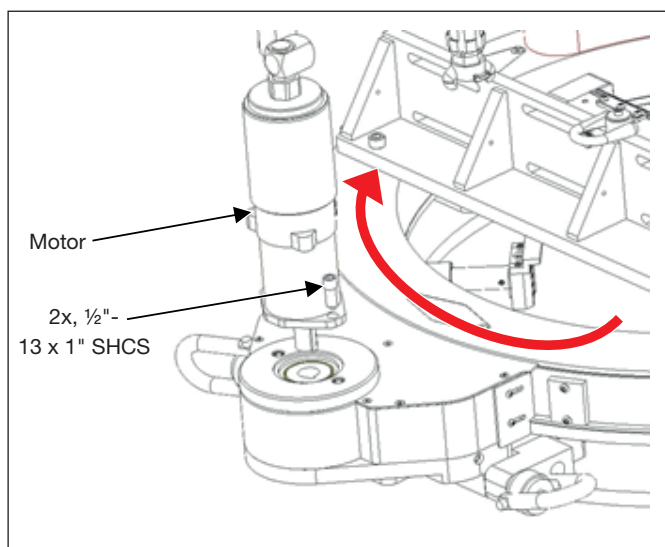


Figure 19: Installing Motor

If the cutting head direction needs to be changed when using a reversible motor, simply switch the exhaust and inlet ports on the end of the motor.

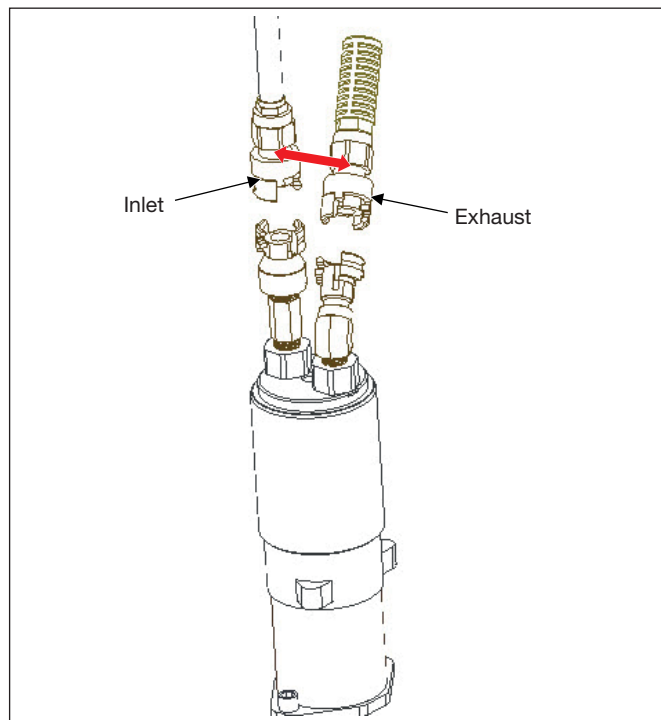


Figure 20: Changing Cutting Head Direction

6. Operation

6.1 Facing



1. Ensure power supply is turned off & isolated correctly before making adjustments to the machine prior to operation.

2. Adjust the 'Radial Feed Slide' position if necessary by loosening the 6 shoulder bolts that secure it to the cross arm. Shift the feed gear to the neutral position (N), which may require slightly turning the feed screw back and forth with a ½" hex wrench while pulling on the shifter. Rotate the radial feed slide feed screw to position the axial feed slide close to the start of the cut.

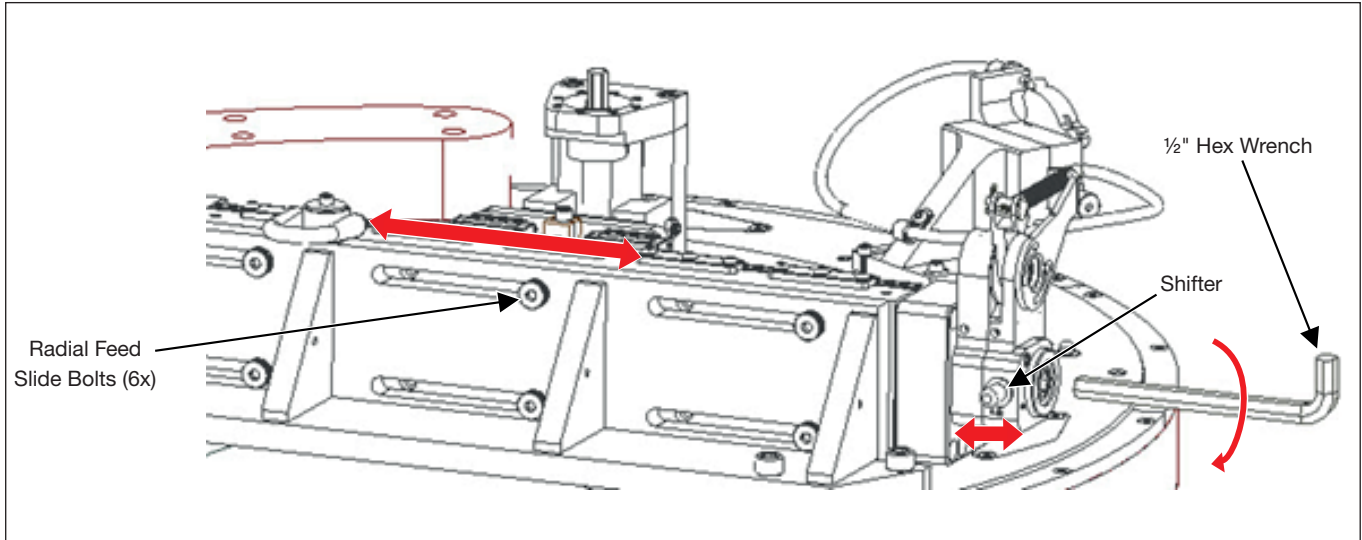


Figure 21: Adjusting Radial Feed Slide Position

3. Adjust the 'Tool Holder' located at the end of the axial feed slide to position the cutting tool in a desired location. The tool holder can be rotated and locked in any position from 0 to 180° by loosening the clamping bolt. Once the tool holder position is established, install the tool bit. The tool bit requires at least 2 set screws to adequately hold it.
4. Use the radial and axial slides to position the tool bit at the start of the cut. The axial feed slide feed screw can be turned using a ½" wrench or socket. Use an indicator mounted to the axial feed slide to set the depth of cut.
5. Set the feed rate on the cable mount bracket assembly. Turn the feed rate knob to align the indicator marks for the desired feed rate. The feed rate range is 0.1-0.8mm/rev (.004-.031in/rev).

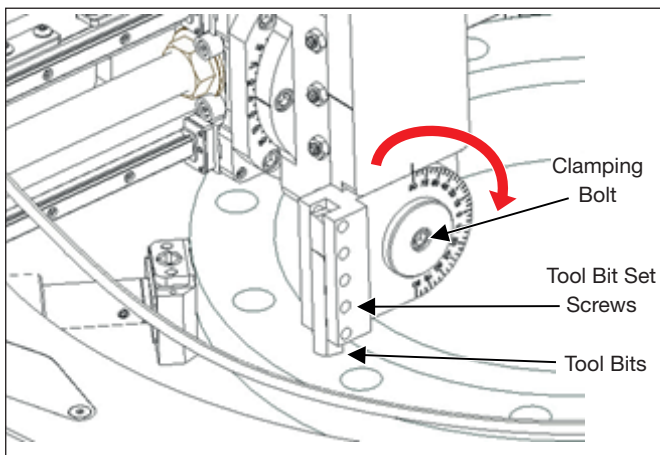


Figure 22: Tool Holder

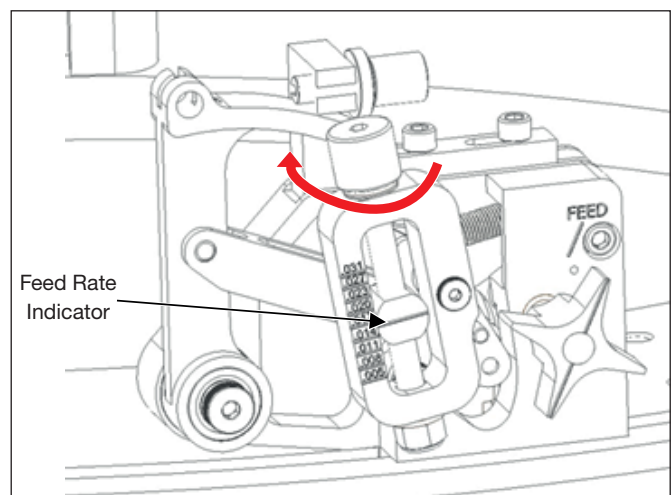


Figure 23: Cable Mount Assembly

Feed Rate (in/rev)	Feed Rate (mm/rev)	Ra (µin)	Ra (µm)	RMS	Grooves/in
0.004	0.1	7	0.1	4	250
0.008	0.2	29	.5	32	125
0.011	0.28	54	0.9	60	91
0.014	0.36	88	1.4	97	71
0.017	0.43	129	2.1	144	59
0.023	0.58	237	3.8	263	43
0.027	0.69	327	5.2	363	37
0.031	0.79	431	6.8	478	32

NOTE: The surface finishes are estimates and vary with tooling, depth of cut, and material.

- With the tool bit located in the correct starting position, shift the feed gearbox into the engaged or feed (F) position by either pushing or pulling on the shifter. Note that rotating the feed screw may be required to shift the gearbox.

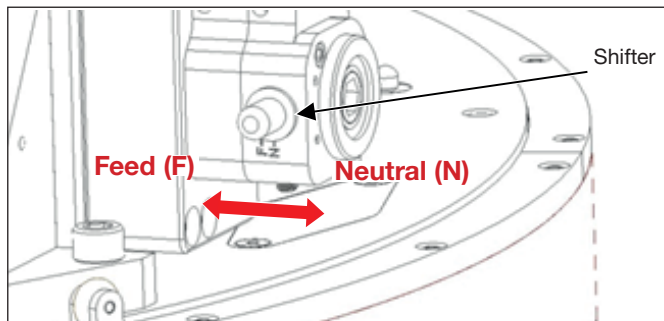


Figure 24: Engaging Feed

- Make sure the star wheel on the cable mount assembly is rotated to a position to allow for feed.
- Disengage the tripper by turning the tripper knob clockwise. NOTE: Trip the star wheel 1 time to either stop or disengage the feed. Leaving the tripper engaged will cause the feed to start and stop every other revolution of the cutting head resulting in an inconsistent surface finish.

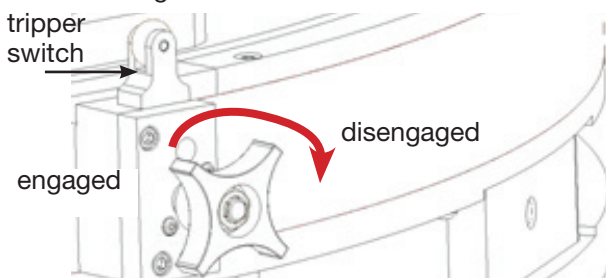


Figure 25: Disengage tripper

- Introduce power to the drive motor to start driving the 'Feed Gear Box and Radial Feed Slide Assembly' around. Note the feed direction; flip the feed gearbox over if the feed is the wrong direction. The axial feed slide should **not** be feeding in any direction.
- Finally check that the cutting tool is positioned correctly and then re-introduce power to the drive motor to start driving the cutting tool. Adjust machine rpm as needed.
- When the required cut has been completed, terminate power to the drive motor before it

clashes with any stationary feature or reaches the end of travel.

- If another pass is required, set up a dial indicator and use the axial feed slide to pull the bit away from the cutting surface noting the distance travelled.
- Repeat steps 4 to 10 until the work piece is correct to your required dimensions.

6.2 Counter Boring

- Ensure power supply is turned off & isolated correctly before making adjustments to the machine prior to operation.
- Make sure the axial feed slide is perpendicular to the cross beam for counter-boring. Loosen the 2 axial feed clamping bolts if any perpendicularity adjustment is required.
- Remove the feed gearbox from the radial slide assembly and slide it onto the hex end of the axial feed slide. Make sure the feed gearbox is orientated to get the desired feed direction. Rotate the feed gearbox to a position that keeps the cable from being damaged or kinked and secure it with 2 socket head cap screws.

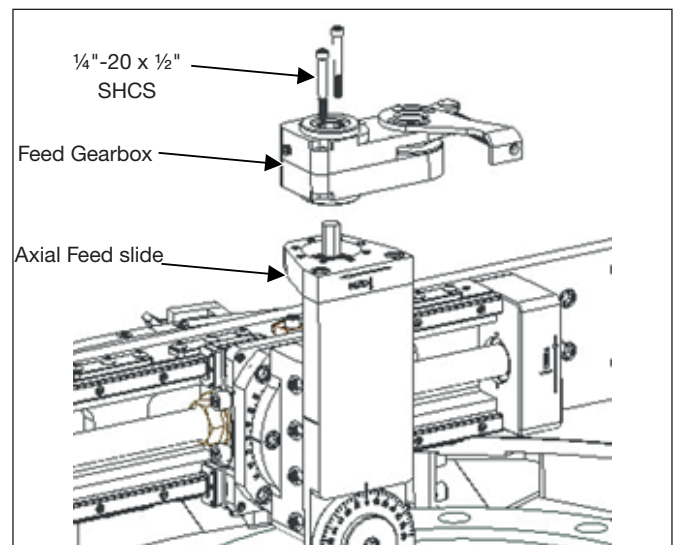


Figure 26: Installing Feed Gearbox

- Adjust the radial feed slide position if necessary by loosening the 6 shoulder bolts that secure it to the cross beam.
- Shift the feed gear to the neutral position (N), which may require slightly turning the feed screw back

and forth with a ½” hex wrench while pulling on the shifter.

6. Adjust the ‘Tool Holder’ located at the end of the axial feed slide to position the cutting tool in a desired location. The tool holder can be rotated and locked in any position from 0 to 180° by loosening the clamping bolt. Once the tool holder position is established, install the tool bit. The tool bit requires at least 2 set screws to adequately hold it.

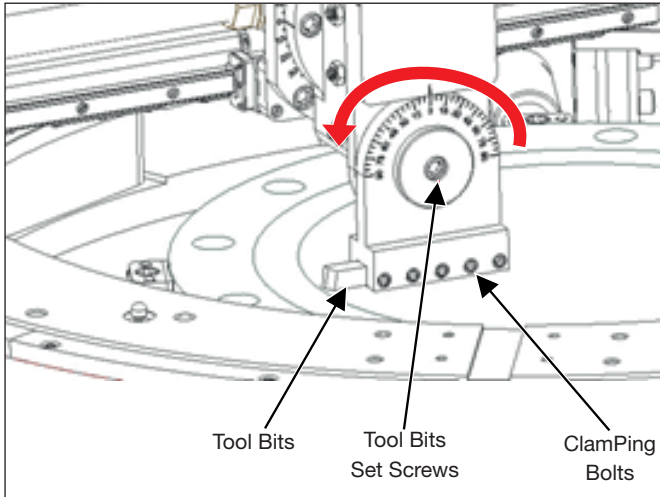


Figure 27: Tool holder Assembly

8. Set the feed rate on the cable mount bracket assembly. Turn the knurled knob to align the indicator marks for the desired feed rate. The feed rate range is .1-.8mm/rev (0.004-.031in/rev) per revolution.

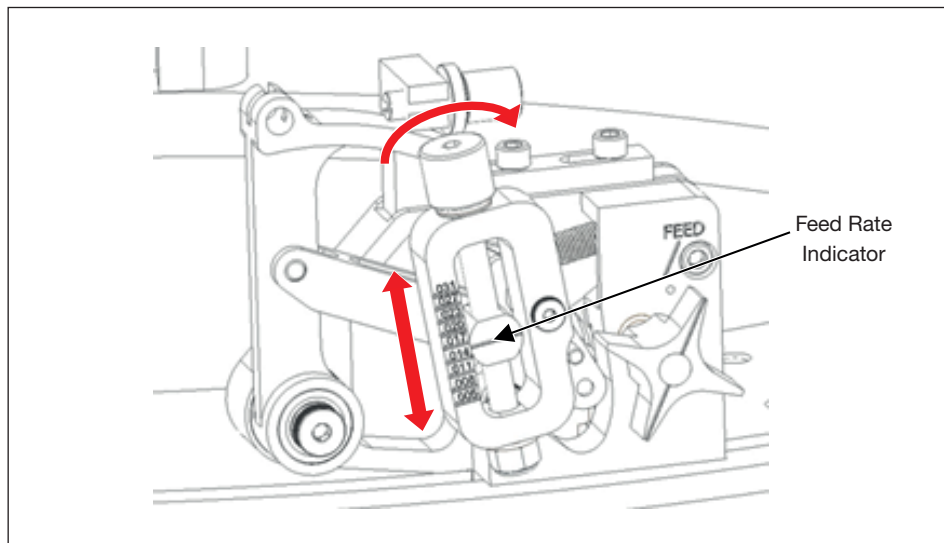


Figure 29: Cable Mount Assembly

Feed Rate (in/rev)	Feed Rate (mm/rev)	Ra (µin)	Ra (µm)	RMS	Grooves/in
0.004	0.1	7	0.1	4	250
0.008	0.2	29	0.5	32	125
0.011	0.28	54	0.9	60	91
0.014	0.36	88	1.4	97	71
0.017	0.43	129	2.1	144	59
0.023	0.58	237	3.8	263	43
0.027	0.69	327	5.2	363	37
0.031	0.79	431	6.8	478	32

NOTE: The surface finishes are estimates and vary with tooling, depth of cut, and material.

7. Use the radial and axial slides to position the tool bit at the start of the cut. Tighten the cross slide locking handle to hold the radial position. The axial feed slide can be turned using a ½” hex bit or allen wrench. Use an indicator mounted to the cross slide to set the depth of cut.

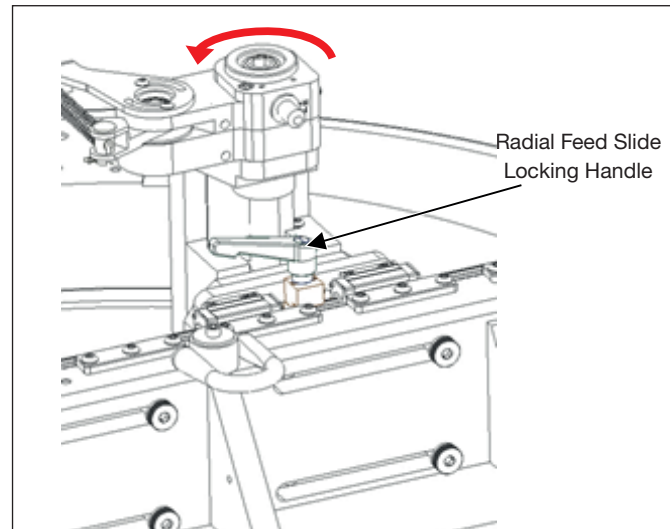


Figure 28: Axial and Radial Feed slide

9. With the tool bit located in the correct starting position, shift the feed gearbox into the engaged or feed (F) position by either pushing or pulling on the shifter. Note that rotating the feed screw may be required to shift the gearbox.
10. Make sure the star wheel on the cable mount assembly is rotated to a position to allow for feed. Disengage the tripper by turning the tripper knob clockwise.
11. Disengage the tripper by turning the tripper knob clockwise. NOTE: Trip the star wheel 1 time to either stop or start the feed. Leaving the tripper engaged will cause the feed to start and stop every other revolution of the cutting head resulting in an inconsistent surface finish.

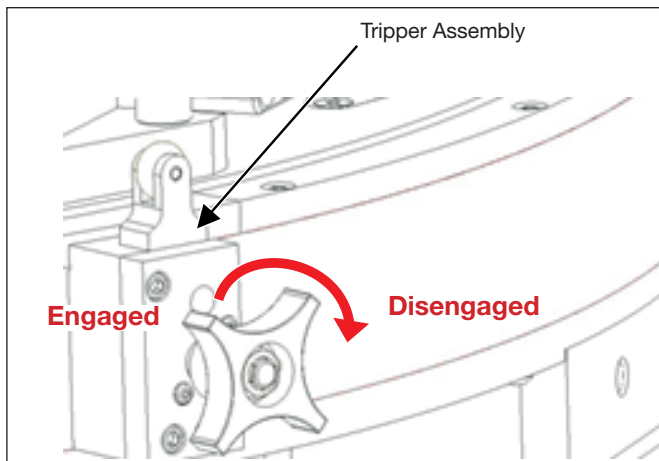


Figure 30: Tripper Assembly

12. Introduce power to the drive motor to start driving the 'Feed Gear Box and Axial Feed Slide Assembly'. Note the feed direction; flip the feed gearbox over if the feed is the wrong direction. The radial feed slide should not be feeding in any direction.
13. Finally check that the cutting tool is positioned correctly and then re-introduce power to the drive motor to start driving the cutting tool. Adjust machine rpm as needed.
14. When the required cut depth has been completed, disengage the feed by engaging the tripper for 1 trip (1/4 rotation of the star wheel) and then disengaging it. Allow the machine to turn a couple of revolutions and then terminate power to the drive motor.
15. If another pass is required, set up a dial indicator and loosen the radial feed slide lock. Use the radial feed slide to pull the bit away from the cutting surface noting the distance travelled. Turn the star wheel 1/4 of a turn either manually or using the tripper to start the feed.
16. Repeat steps 5 to 13 until the work piece is correct to your required dimensions.

6.3 Back-facing (optional attachment)

1. Ensure power supply is turned off & isolated correctly before making adjustments to the machine prior to operation. Note that motor will have to be mounted on the backside of the machine to allow for clearance of the back-facing attachment

2. Remove the feed gearbox from the radial feed slide to prevent damaging the cable.
3. If only the axial feed slide will be used for the back facing operation, remove the 4 screws that hold the axial feed slide to the radial feed slide. Keep the screws nearby for reuse.
4. If both the radial feed slide and the axial feed slide will be used for the back-facing operation, remove the 6 shoulder bolts that secure the radial feed slide to the cross beam. Keep the bolts nearby for reuse.
5. Unbolt the cross beam from the cutting head, 2 of the screws will be reused in the next step.
6. Set the back-facing bracket over the male dowel located on the cutting head face and align the holes with the 2 tapped holes in the cutting head. Use the 2 screws to secure the back-facing bracket to the cutting head.

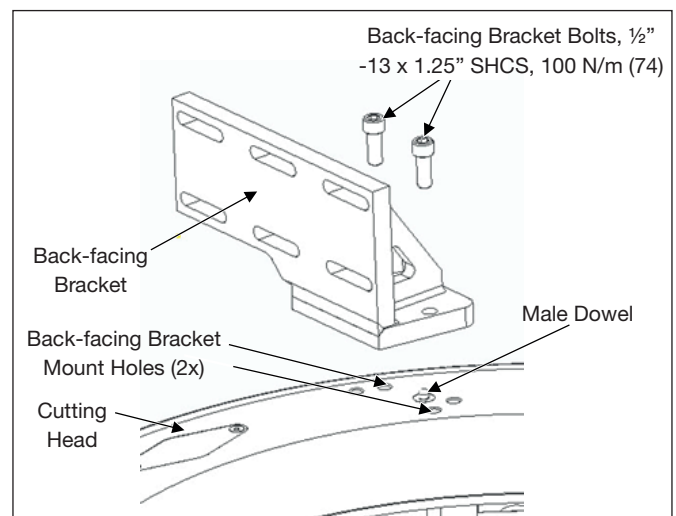


Figure 31: Back Facing Bracket

7. If the radial feed slide will not be used, skip to step 9. Position the radial feed slide to the back-facing bracket making sure the end of the radial feed slide is clear of all obstructions for the full rotation of the cutting head. Install the 6 shoulder bolts to secure the radial feed slide into position.

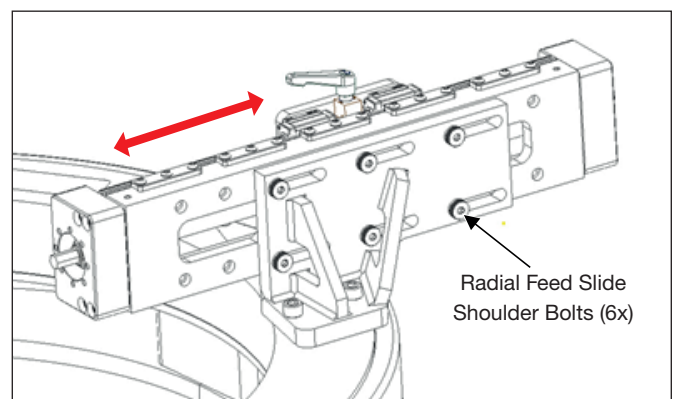


Figure 32: Radial Feed Slide Shoulder Bolts

8. Adjust the radial feed slide position if necessary by loosening the 6 shoulder bolts that secure it to the back facing bracket. Skip to step 10.
9. When using only the axial feed slide, install the back-facing spacer to the back-facing bracket using at least 4 shoulder bolts. Bolt the axial feed slide to the opposite side of the back-facing spacer with the 4 axial feed slide screws

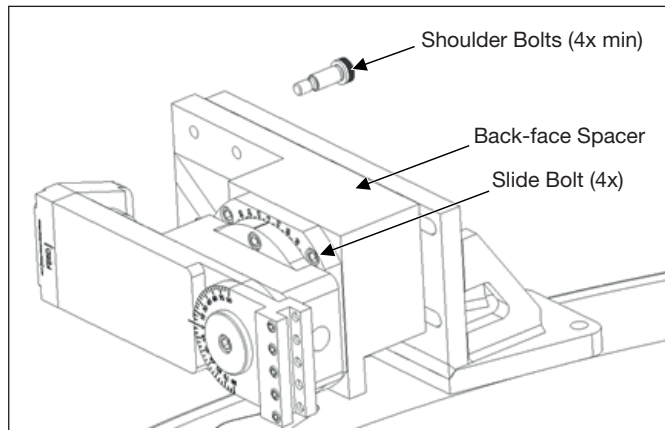


Figure 33: Axial Feed Slide on Back Facing Bracket

10. Install the feed gearbox in a position to ensure the cable feed operates properly.
11. Shift the feed gear to the neutral position (N), which may require slightly turning the feed screw back and forth with a 1/2" hex wrench while pulling on the shifter. Rotate the slide feed screw to radially position the axial feed slide close to the start of the cut.
12. Adjust the 'Tool Holder' located at the end of the axial feed slide to position the cutting tool in a desired location. The tool holder can be rotated and locked in any position from 0 to 180° by loosening the clamping bolt. Once the tool holder position is established, install the tool bit. The tool bit requires at least 2 set screws to adequately hold it..

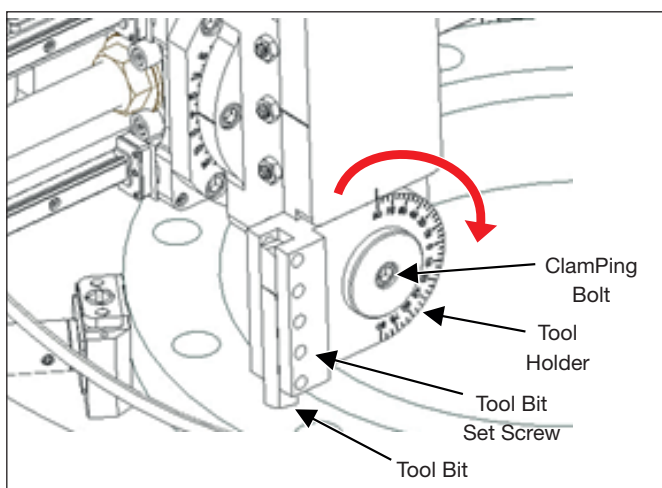


Figure 34: Tool Holder Assembly

13. Use the radial (if used) and axial slides to position the tool bit at the start of the cut. The axial feed slide can be turned using a 1/2" wrench or socket. Use an indicator mounted to the axial feed slide to set the depth of cut. Use the tool holder extension and depth adjustment bracket and screw if needed.

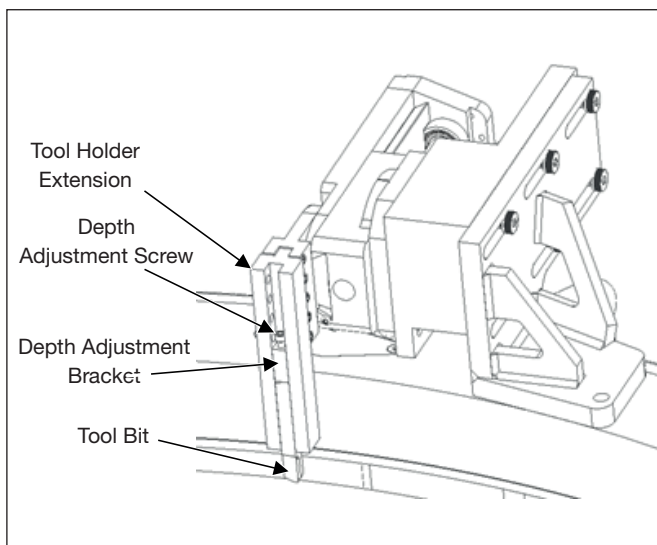


Figure 35: Tool Holder Extension

14. Set the feed rate on the cable mount bracket assembly. Turn the knurled knob to align the indicator marks for the desired feed rate. The feed rate range is 0.1-0.8mm/rev (.004-.031in/rev).

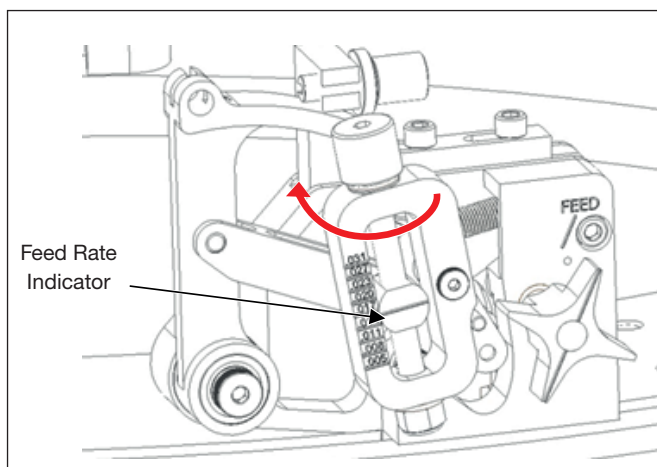


Figure 36: Cable Mount Bracket Assembly

Feed Rate (in/rev)	Feed Rate (mm/rev)	Ra (µin)	Ra (µm)	RMS	Grooves/in
0.004	0.1	7	0.1	4	250
0.008	0.2	29	0.5	32	125
0.011	0.28	54	0.9	60	91
0.014	0.36	88	1.4	97	71
0.017	0.43	129	2.1	144	59
0.023	0.58	237	3.8	263	43
0.027	0.69	327	5.2	363	37
0.031	0.79	431	6.8	478	32

NOTE: The surface finishes are estimates and vary with tooling, depth of cut, and material.

- With the tool bit located in the correct starting position, shift the feed gearbox into the engaged or feed (F) position by either pushing or pulling on the shifter. Note that rotating the feed screw may be required to shift the gearbox.

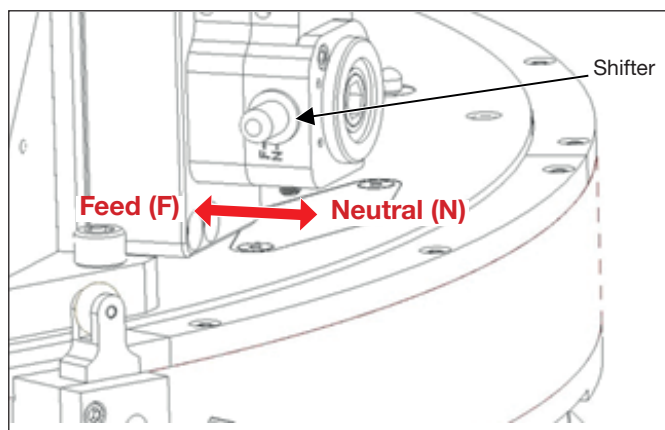


Figure 37: Engaging feed

- Make sure the star wheel on the cable mount assembly is rotated to a position to allow for feed.
- Disengage the tripper** by turning the tripper knob clockwise. NOTE: Trip the star wheel 1 time to either stop or disengage the feed. Leaving the tripper engaged will cause the feed to start and stop every other revolution of the cutting head resulting in an inconsistent surface finish. Refer to figure 30.

Introduce power to the drive motor to start driving the 'Feed Gear Box and Slide Assembly' around. Note the rotation of the cutting head; reverse the drive motor if necessary. Note the feed direction; flip the feed gearbox over if the feed is the wrong direction. The 'Tool Post' should not be feeding in the Z direction.

- Finally check that the cutting tool is positioned correctly and then re-introduce power to the drive motor to start driving the cutting tool. Adjust machine rpm as needed.
- When the required cut has been completed, terminate power to the drive motor before it clashes with any stationary feature or reaches the end of travel.
- If another pass is required, set up a dial indicator and pull the bit away from the cutting surface noting the distance travelled.
- Repeat steps 13 to 19 until the work piece is correct to your required dimensions.

6.4 Milling Division Plates (optional attachment)

A heat exchanger milling kit is available for all of the OD mount flange facers. This kit allows one of the LMR series of milling machines to be mounted to the face of the flange facer. Call Enerpac for additional information.

- Ensure power supply is turned off & isolated correctly before making adjustments to the machine prior to operation. Note that motor should be removed to allow for full rotation of the milling attachment.**
- Remove the feed gearbox from the radial feed slide to prevent damaging the cable.
- Unbolt the cross beam from the cutting head, the 4 screws will be reused in the next step.
- Remove the cable from the cable mount assembly.
- Set the right hand milling mount plate over the male dowel located on the cutting head face. Install one of the lock clamps into the mount plate and align the holes with the 2 tapped holes in the cutting head. Use 2 screws to secure the mount bracket to the cutting head. Note that the mount bracket may have to be repositioned when installing the milling rail.

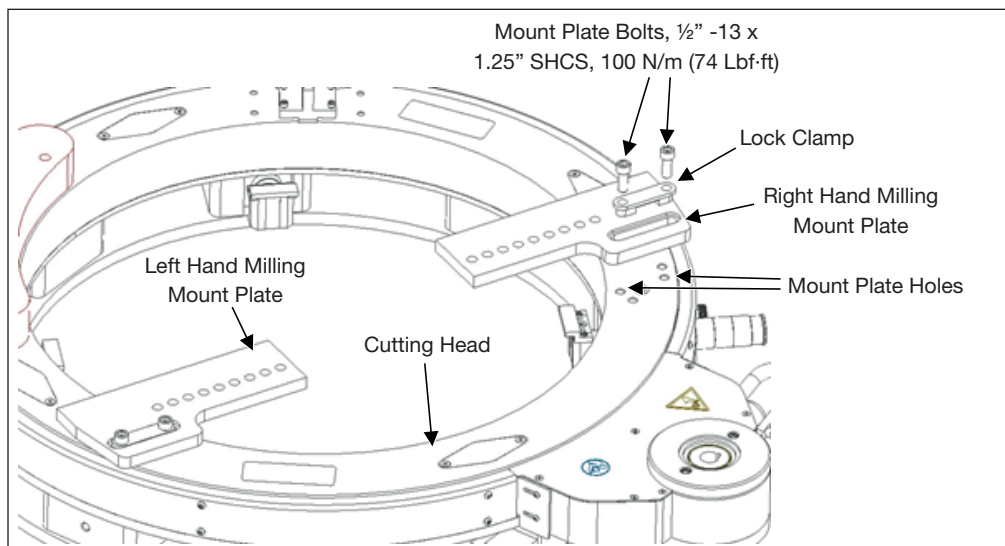


Figure 38: Mount Brackets on Cutting Head

6. Set the left hand milling mount plate over the male dowel located on the opposite side of the cutting head face. Install the lock clamp into the mount plate and align the holes with the 2 tapped holes in the cutting head. Use 2 screws to secure the mount bracket to the cutting head. Note that the mount bracket may have to be repositioned when installing the milling rail.
7. Position the LMR mill to the milling mount plates making sure the end of the mill slide is clear of all obstructions for the full rotation of the cutting head. Adjust the radial position of the milling mount plates to align the bolt holes if needed and install the 4 LMR bolts to secure the mill into position.

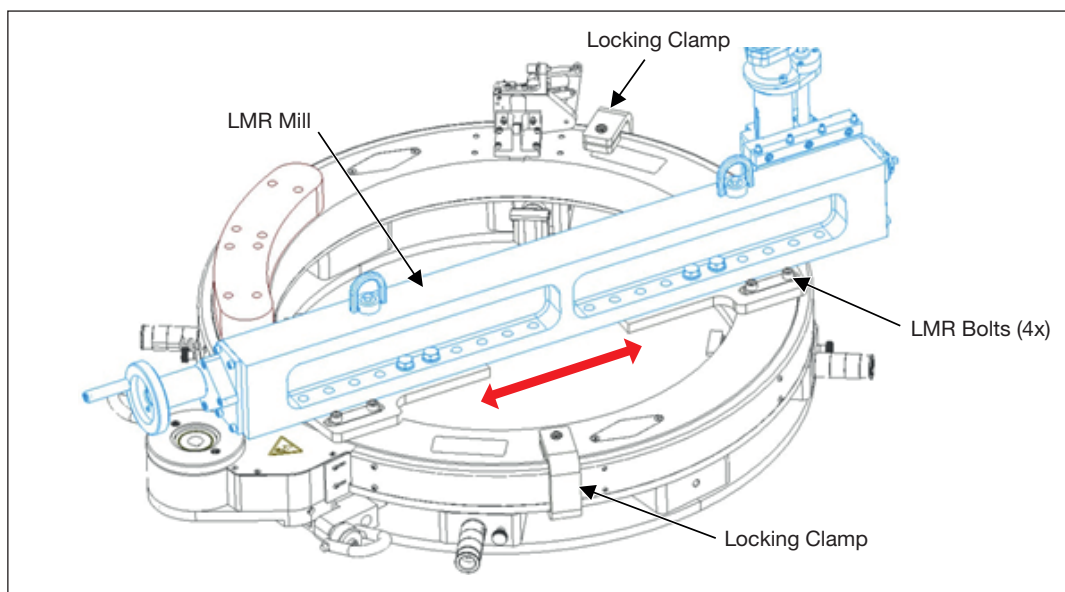


Figure 39: LMR Mill

8. Make sure the mount plate lock clamps bolts are tight.
9. Manually rotate the cutting head to position the mill. Install the locking clamps to secure the cutting head during the milling operation.
10. Refer to the LMR manual for additional operating instructions.

7. Storage

Storing the machine in the original box will extend the longevity of the machine. Before storing make sure the machine is clean and dry. Pay particular attention to the V grooves in the rail. Grease the leadscrew and slide ways (using WD40 or similar) before storing the machine.

Refer to section 4.7 for packaging information

8. Maintenance



NO MACHINE ADJUSTMENTS SHOULD BE MADE WHILE THE MACHINE IS IN OPERATION. TURN AND LOCK OFF THE ISOLATION VALVE ON THE PNEUMATIC SUPPLY BEFORE MAKING ANY ADJUSTMENTS.

8.1 General Maintenance

General wear and tear items should be replaced with like for like components as per the machine general Assembly drawings detailed in this manual. Failure to do so may result in a machine that is not fit for purpose and is outside the design intent it was supplied for. Items that require specific maintenance regimes and products will be detailed here in.

Time Period (of machine use)	Action	Recommended Lubricant
After every use	Clean all cutting debris from machine. Pay particular attention to lead screws, pivots, sealing, sliding & rotating faces. Inspect belt for cuts or fraying.	General water displacing, cleaning oil.
As required	Replace cutting tool/cutting tool inserts.	N/A
Every 10 hours	Apply a small amount of low viscosity oil to all lead screws, pivots, sliding & rotating faces.	Mineral based SAE 10 oil.
	Check all securing nuts & bolts are tight.	N/A
Every 25 hours	Grease bearing race by applying 1 shot at each bearing location. 	Lithium based 'Extreme Pressure' Grease (EPL)
Every 100 hours	Check for backlash in lead screw/lead screw nut & correct if necessary.	N/A
	Make sure all bearings rotate when manually rotating the cutting head, adjust if necessary.	
	Check belt for wear, damage, and proper tension.	
Before long term storage (12 months minimum)	Protect machine, components & accessories from corrosion. Store all machine components securely in original packing box.	General, oil based, rust inhibitor.

8.2 Bearing Adjustment

1. Check all bearings for rotation by removing one of the four bearing access covers located on the face of the cutting head.

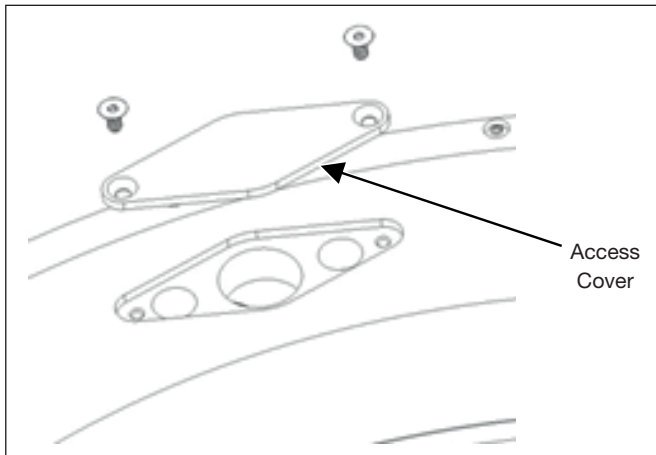


Figure 40: Access Cover for Bearing

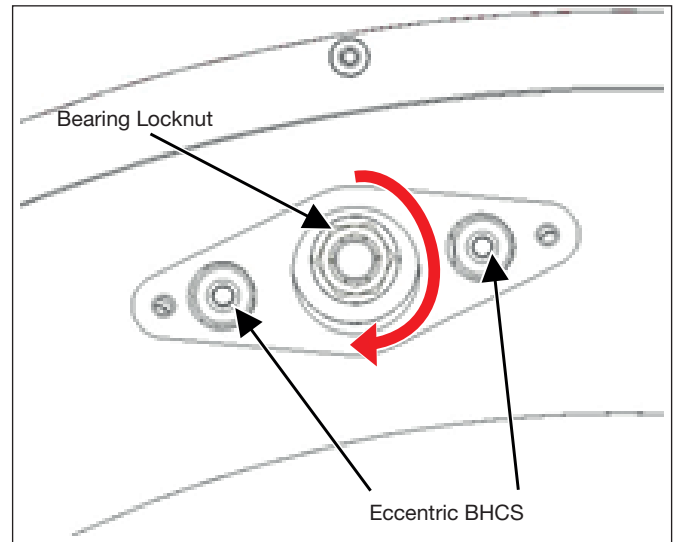


Figure 41: Bearing

2. Manually rotate the cutting head watching each bearing to make sure it rotates. If a bearing does not rotate, align the cutting head access holes directly over the non-rotating bearing.
3. Use a 7/32" hex bit or allen wrench to loosen the 2 eccentric button head cap screws. Turn the bearing locking hex nut clockwise using a 13/16" socket and a beam style of torque wrench. Hold the bearing against the bearing race with 5.4 Nm (48 in-lbs) while tightening the eccentric screws. Tighten the 2 eccentric screws to 40 Nm (29.5 ft-lbs).
4. After adjusting all of the non-rotating bearings, rotate the cutting head and recheck all of the bearings again. Once all of the bearings are turning, install the access cover and the 2 cover screws.

8.3 Belt Adjustment

1. Check belt tension by measuring the adjustment screw depth on both of the idler pulleys. Insert the measuring tool into the adjustment hole until it rests against the adjustment set screw. The initial screw depth for each size of machine is listed below. Do not overtighten the drive belt as belt breakage or machine damage can occur.

MACHINE SIZE	MM760e	MM1000e	MM1250e	MM1500e	MM1775e	MM2000e
SCREW DEPTH	0.875 (22.2mm)	0.84 (21.3mm)	1.032 (26.2mm)	1.19 (30.2mm)	1.31 (33.3mm)	1.07 (27.2mm)

2. If the belt slips during normal operation and operating conditions, adjust the belt tension by loosening the 2 idler shaft screws and turning the adjustment set screws 1 revolution. Tighten the idler shaft screws and test the machine.
3. Repeat step 2 until the belt stops slipping and the machine operates properly. Note that the belt may break if over-stretched.
4. If the belt runs out of tension adjustment, replace the belt per section 8.4.

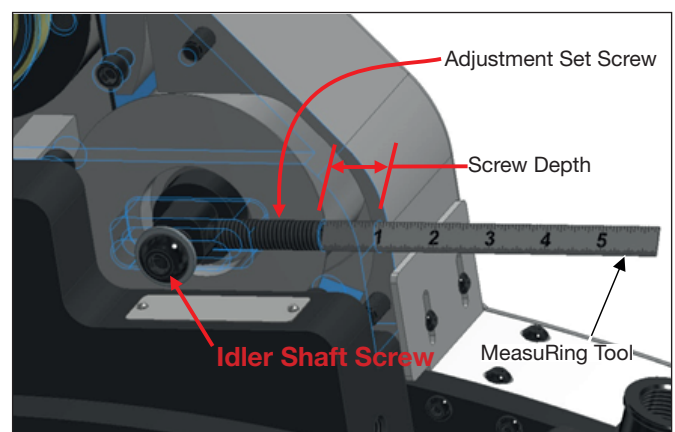


Figure 42: Belt Adjustment

8.4 Belt Replacement

1. If the belt is worn, cut, stretched, or broken replace it by first removing the (7) belt top cover screws.
2. Remove the belt cover by pulling up on the bottom end and sliding it over the top of the cutting head being careful not to bend the cover.

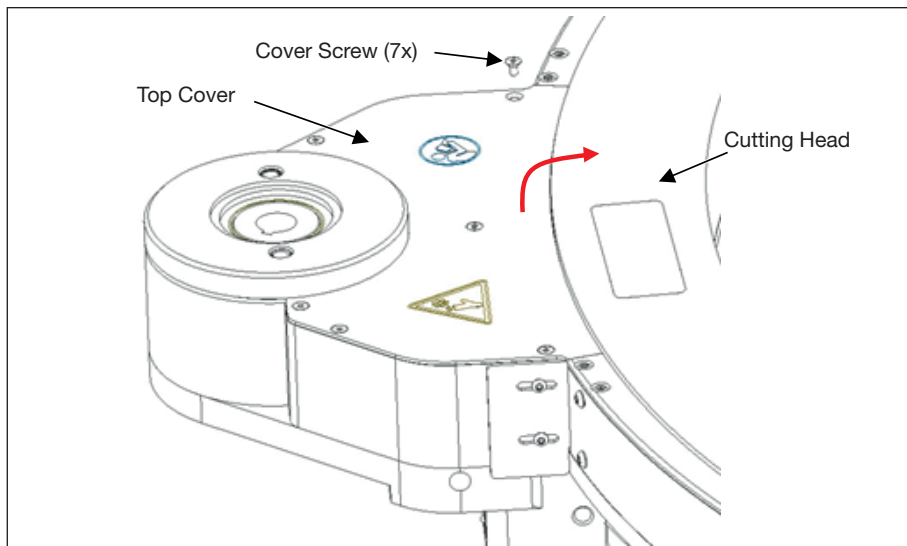


Figure 43: Belt cover

3. Loosen the 2 idler shaft screws and 2 belt tension adjustment screws. This will allow the 2 idler pulleys to slide, releasing the belt tension.
4. Remove the top motor mount by removing the 5 screws and pulling the mount off. Using a dead blow mallet on the drive shaft may be needed to remove the top motor mount.

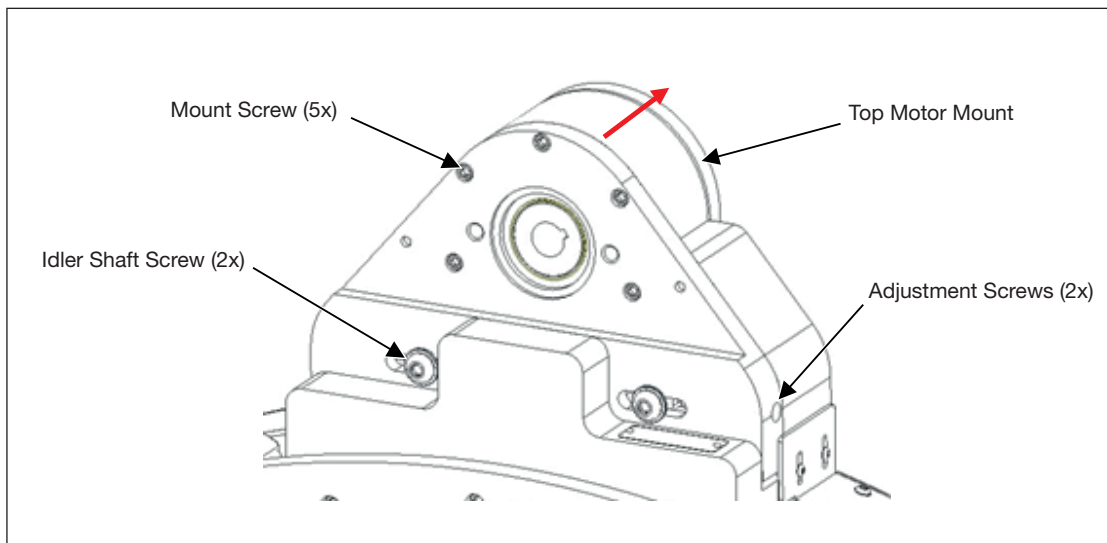


Figure 44: Top Motor Mount

5. Remove all the belt cover screws and belt covers. Slide the idler pulleys apart and pull the belt off of the drive pulley, idler pulleys, and the cutting head.

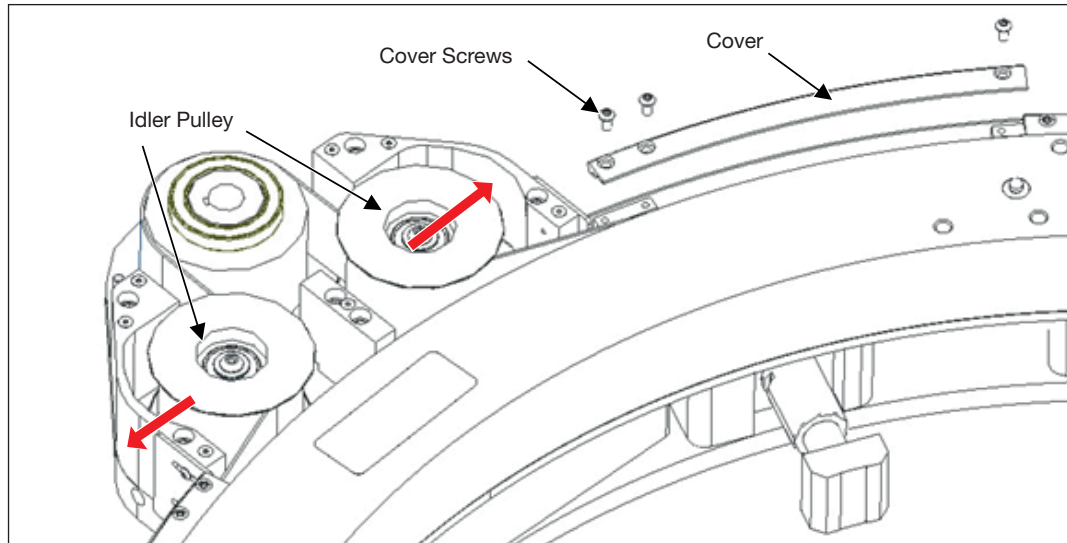
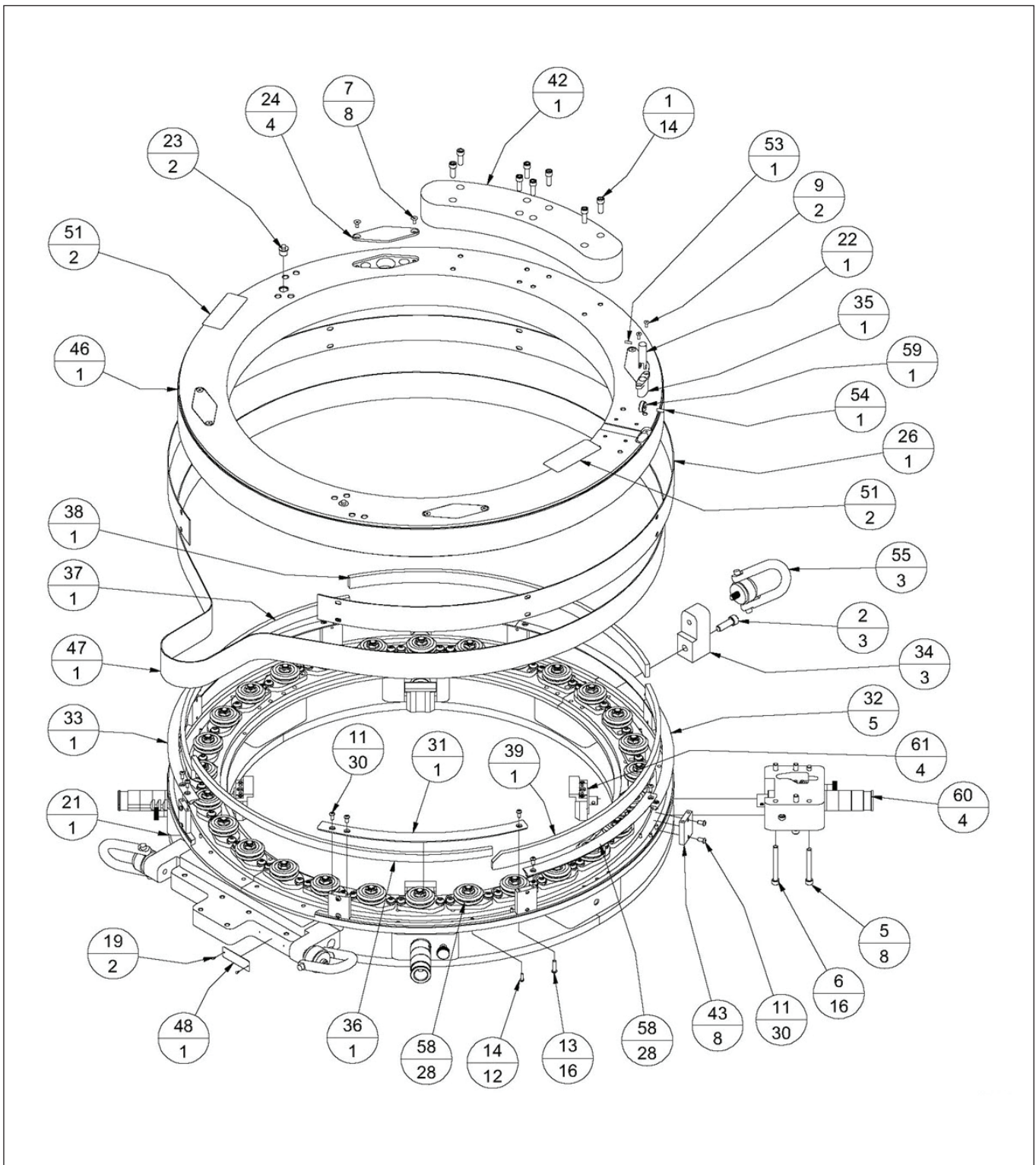


Figure 45: Idler Pulleys

6. Install the new belt around the cutting head, idler pulleys, and the drive pulley. Make sure the belt is installed with the blue side facing away from the cutting head. The belt is directional so make sure it is installed for clockwise rotation when viewed from the cutting head side.
7. Reinstall all of the covers, the top motor mount, and the belt top cover before tensioning the belt.
8. Tension the belt per section 8.3 Belt Adjustment.

9. Parts List

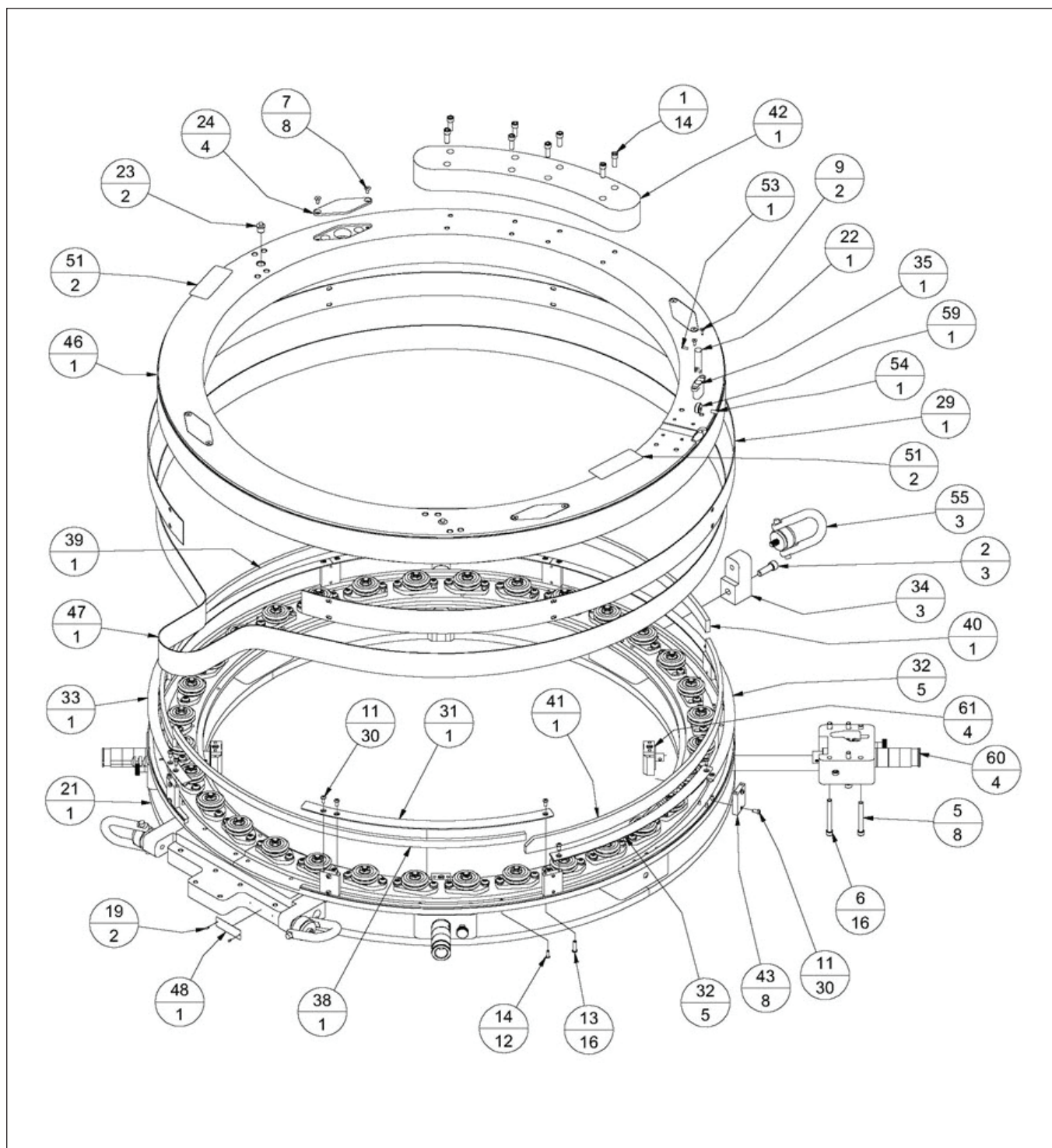
9.1 F0440A0301HH Belt Drive Facer - 30" Continuous Feed Exploded View



9.2 F0440A0301HH Belt Drive Facer - 30" Continuous Feed Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr 8	3
3	001AE0044233	Socket Head Cap Screw 5/16-18 UNC X 1 Gr 8	5
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr 8	8
6	001AE0047547	Socket Head Cap Screw 3/8-16 X 3-1/4" Gr 8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	30
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	16
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	12
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085110	Housing - BDF half ring, 30in	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
23	006AM0038833	Bullet Dowel - Male (NB/MS Clamshells)	2
24	006AU0041796	Cover - CCF Eccentric	4
26	006AU0085120	Shield - BDF30 OD Belt	1
31	006AU0085424	Shield - Top, Belt Guard BDF30 RH	1
32	006AU0085425	Shield - Top, Belt Guard BDF30	5
33	006AU0085426	Shield - Top, Belt Guard BDF30 LH	1
34	006BA0075996	Bracket - Lifting, BDF	3
35	006BA0077253	Bracket - BDF Lifter Guide	1
36	006BA0077734	Ramp - BDF30 Section 1	1
37	006BA0077735	Ramp - BDF30 Section 2	1
38	006BA0077736	Ramp - BDF30 Section 3	1
39	006BA0077737	Ramp - BDF30 Section 4	1
41	006BA0085119	Motor Mount - BDF Top	1
42	006BH0085054	Block - BDF 30, Counterweight	1
43	006BH0085124	Plate - BDF30 Shield Mount	8
46	006BN0085053	Cutting Head - Flange Facer, Belt Drive 30in	1
47	006BW0075998	Belt - BDF30, 2mm X 2.5in X 136in	1
48	006BY0045250	TAG - CE Serial	1
51	006BY0085268	Label - MM-003 (45mm X 148mm)	2
53	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
54	017AA0077212	Dowel Pin 1/4 X 9/16	1
55	018AE0044422	Hoist Ring - 1/2-13 Center Pull	3
58	023AC0085126	Bearing - BDF Eccentric Assembly	28
59	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
60	F0446A0003XX	Locator - BDF Assembly	4
61	F0446A0004XX	Locator - BDF Adjustable	4

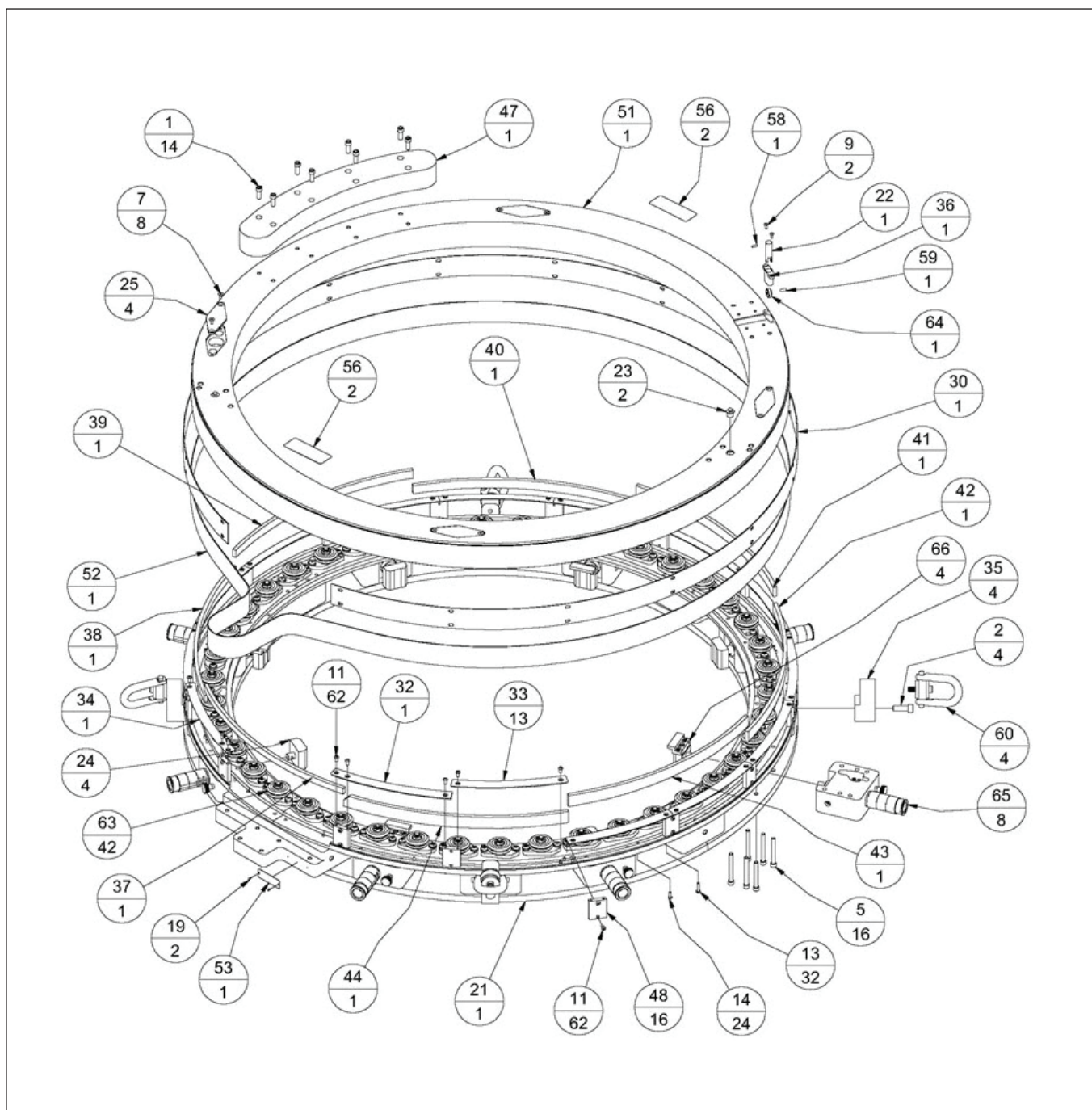
9.3 F0440A0401HH Belt Drive Facer - 40" Continuous Feed Exploded View



9.4 F0440A0401HH Belt Drive Facer - 40" Continuous Feed Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr 8	3
3	001AE0044233	Socket Head Cap Screw 5/16-18 UNC X 1 Gr 8	5
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr 8	8
6	001AE0047547	Socket Head Cap Screw 3/8-16 X 3-1/4" Gr 8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	30
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	16
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	12
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085276	Housing - BDF40 Continuous Feed	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
23	006AM0038833	Bullet Dowel - Male (NB/MS Clamshells)	2
24	006AU0041796	Cover - CCF Eccentric	4
29	006AU0085278	Shield - BDF40 OD Belt	1
31	006AU0085279	Cover - BDF40 Belt Top	1
32	006AU0085430	Shield - Top, Belt Guard BDF40	5
33	006AU0085431	Shield - Top, Belt Guard BDF40 LH	1
34	006BA0075996	Bracket - Lifting, BDF	3
35	006BA0077253	Bracket - BDF Lifter Guide	1
37	006BA0085119	Motor Mount - BDF Top	1
38	006BA0085283	Ramp - BDF40 Section 1	1
39	006BA0085284	Ramp - BDF40 Section 2	1
40	006BA0085285	Ramp - BDF40 Section 3	1
41	006BA0085286	Ramp - BDF40 Section 4	1
42	006BH0085280	Block - BDF 40, Counterweight	1
43	006BH0085290	Plate - BDF40 Shield Mount	8
46	006BN0085277	Cutting Head - Flange Facer, Belt Drive 40in	1
47	006BW0085281	Belt - BDF40, 2mm X 2.5in X 167in	1
48	006BY0045250	TAG - CE Serial	1
51	006BY0085268	Label - MM-003 (45mm X 148mm)	2
53	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
54	017AA0077212	Dowel Pin 1/4 X 9/16	1
55	018AE0044422	Hoist Ring - 1/2-13 Center Pull	3
58	023AC0085126	Bearing - BDF Eccentric Assembly	32
59	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
60	F0446A0003XX	Locator - BDF Assembly	4
61	F0446A0004XX	Locator - BDF Adjustable	4

9.5 F0440A0501HH Belt Drive Facer - 50" Continuous Feed Exploded View



9.6 F0440A0501HH Belt Drive Facer - 50" Continuous Feed Table of Parts

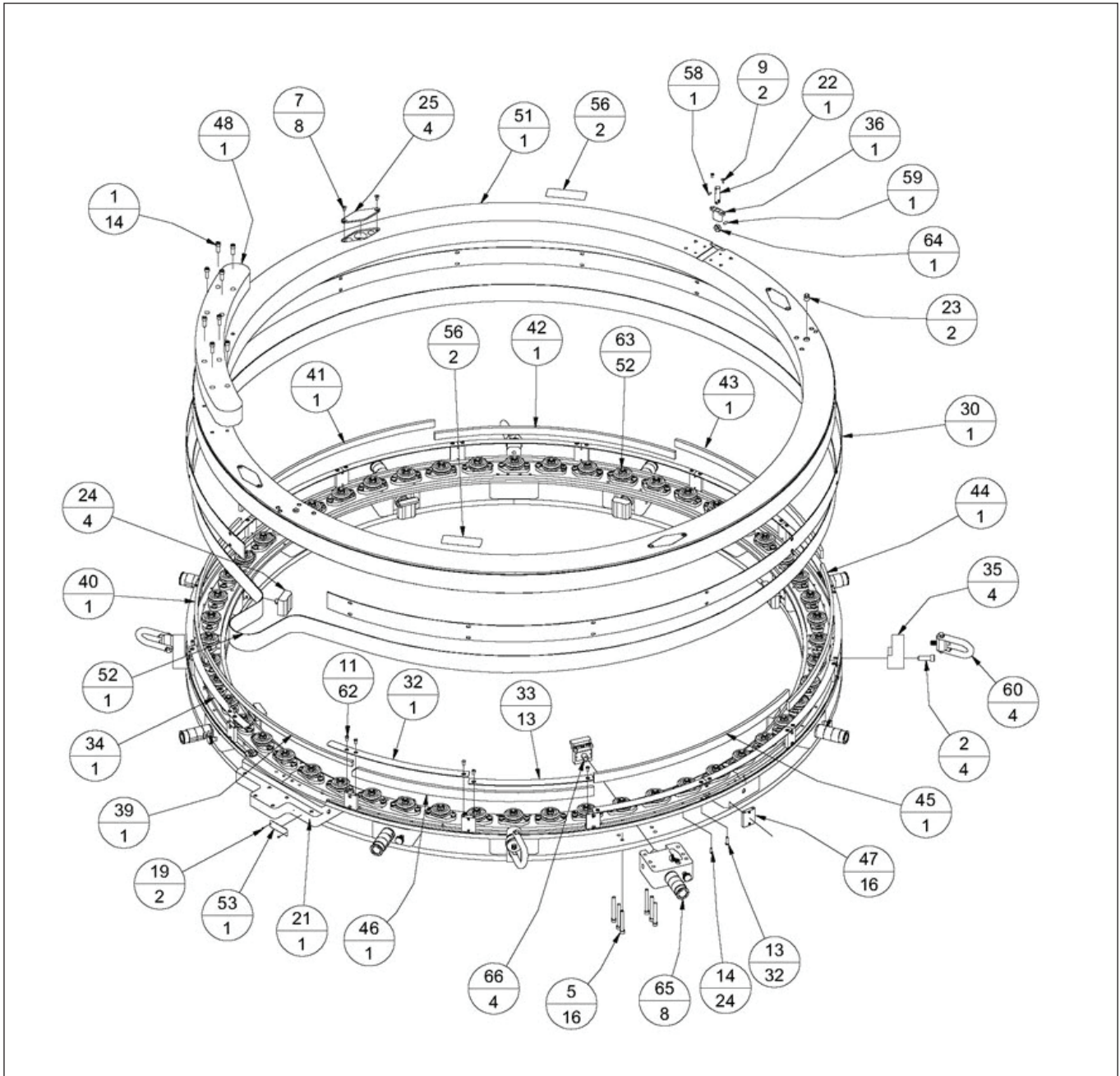
Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr 8	4
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr 8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	62
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	32
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	24
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085160	Housing - BDF50 Continuous Feed	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
24	006AN0085155	Locator Foot - BDF Non-Adjustable	4
25	006AU0041796	Cover - CCF Eccentric	4
30	006AU0085161	Shield - BDF50 OD Belt	1
32	006AU0085432	Shield - Top, Belt Guard BDF50 RH	1
33	006AU0085433	Shield - Top, Belt Guard BDF50	13
34	006AU0085434	Shield - Top, Belt Guard BDF50 LH	1
35	006BA0075996	Bracket - Lifting, BDF	4
36	006BA0077253	Bracket - BDF Lifter Guide	1
37	006BA0077978	Ramp - BDF50 Section 1	1
38	006BA0077979	Ramp - BDF50 Section 2	1
39	006BA0077980	Ramp - BDF50 Section 3	1
40	006BA0077981	Ramp - BDF50 Section 4	1
41	006BA0077982	Ramp - BDF50 Section 5	1
42	006BA0077983	Ramp - BDF50 Section 6	1
43	006BA0077984	Ramp - BDF50 Section 7	1
44	006BA0077985	Ramp - BDF50 Section 8	1
47	006BH0077976	Block - BDF 50, Counterweight	1
48	006BH0085163	Plate - BDF50 Shield Mount	16
51	006BN0077963	Cutting Head - Flange Facer, Belt Drive 50in	1
52	006BW0077975	Belt - BDF50, 2mm X 64mm X 5042mm	1
53	006BY0045250	TAG - CE Serial	1
56	006BY0085268	Label - MM-003 (45mm X 148mm)	2
58	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
59	017AA0077212	Dowel Pin 1/4 X 9/16	1
60	018AE0044422	Hoist Ring - 1/2-13 Center Pull	4
63	023AC0085126	Bearing - BDF Eccentric Assembly	42
64	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
65	F0446A0003XX	Locator - BDF Assembly	8
66	F0446A0004XX	Locator - BDF Adjustable	4

[illegible]

9.8 F0440A0601HH Belt Drive Facer - 60" Continuous Feed Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr 8	4
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr 8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	62
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	32
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	24
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085147	Housing - BDF60 Continuous Feed	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
24	006AN0085155	Locator Foot - BDF Non-Adjustable	4
25	006AU0041796	Cover - CCF Eccentric	4
30	006AU0085151	Shield - BDF60 OD Belt	1
32	006AU0085435	Shield - Top, Belt Guard BDF60 RH	1
33	006AU0085436	Shield - Top, Belt Guard BDF60	13
34	006AU0085437	Shield - Top, Belt Guard BDF60 LH	1
35	006BA0075996	Bracket - Lifting, BDF	4
37	006BA0077445	Ramp - BDF60 Section 1	1
42	006BA0077450	Ramp - BDF60 Section 6	1
43	006BA0077451	Ramp - BDF60 Section 7	1
44	006BA0077452	Ramp - BDF60 Section 8	1
47	006BH0075587	Block - BDF 60, Counterweight	1
48	006BH0085153	Plate - BDF60 Shield Mount	16
51	006BN0075582	Cutting Head - Flange Facer, Belt Drive 60in	1
52	006BW0075586	Belt - 60in Flange Facer, 0.14 X 2.5in	1
53	006BY0045250	TAG - CE Serial	1
54	006BY0045253	Label - Read OP Manual	1
55	006BY0053015	Label - ISO J6527 Rotating Cutter Hazard	1
56	006BY0085268	Label - MM-003 (45mm X 148mm)	2
58	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
59	017AA0077212	Dowel Pin 1/4 X 9/16	1
60	018AE0044422	Hoist Ring - 1/2-13 Center Pull	4
63	023AC0085126	Bearing - BDF Eccentric Assembly	48
64	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
65	F0446A0003XX	Locator - BDF Assembly	8
66	F0446A0004XX	Locator - BDF Adjustable	4

9.9 F0440A0701HH Belt Drive Facer - 70" Continuous Feed Exploded View



9.10 F0440A0701HH Belt Drive Facer - 70" Continuous Feed Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr.8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr.8	4
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr.8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	62
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	32
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	24
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085353	Housing - BDF70 Continuous Feed	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
24	006AN0085155	Locator Foot - BDF Non-Adjustable	4
25	006AU0041796	Cover - CCF Eccentric	4
30	006AU0085354	Shield - BDF70 OD Belt	1
32	006AU0085438	Shield - Top, Belt Guard BDF70 RH	1
33	006AU0085439	Shield - Top, Belt Guard BDF70	13
34	006AU0085440	Shield - Top, Belt Guard BDF70 LH	1
35	006BA0075996	Bracket - Lifting, BDF	4
36	006BA0077253	Bracket - BDF Lifter Guide	1
39	006BA0085358	Ramp - BDF70 Section 1	1
40	006BA0085359	Ramp - BDF70 Section 2	1
41	006BA0085360	Ramp - BDF70 Section 3	1
42	006BA0085361	Ramp - BDF70 Section 4	1
43	006BA0085362	Ramp - BDF70 Section 5	1
44	006BA0085363	Ramp - BDF70 Section 6	1
45	006BA0085364	Ramp - BDF70 Section 7	1
46	006BA0085365	Ramp - BDF70 Section 8	1
47	006BH0085370	Plate - BDF70 Shield Mount	16
48	006BH0085371	Block - BDF 70, Counterweight	1
51	006BN0085366	Cutting Head - Flange Facer, Belt Drive 70in	1
52	006BW0085372	Belt - BDF70, 2mm X 64mm X 6640mm	1
53	006BY0045250	TAG - CE Serial	1
56	006BY0085268	Label - MM-003 (45mm X 148mm)	2
58	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
59	017AA0077212	Dowel Pin 1/4 X 9/16	1
60	018AE0044422	Hoist Ring - 1/2-13 Center Pull	4
63	023AC0085126	Bearing - BDF Eccentric Assembly	52
64	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
65	F0446A0003XX	Locator - BDF Assembly	8
66	F0446A0004XX	Locator - BDF Adjustable	4

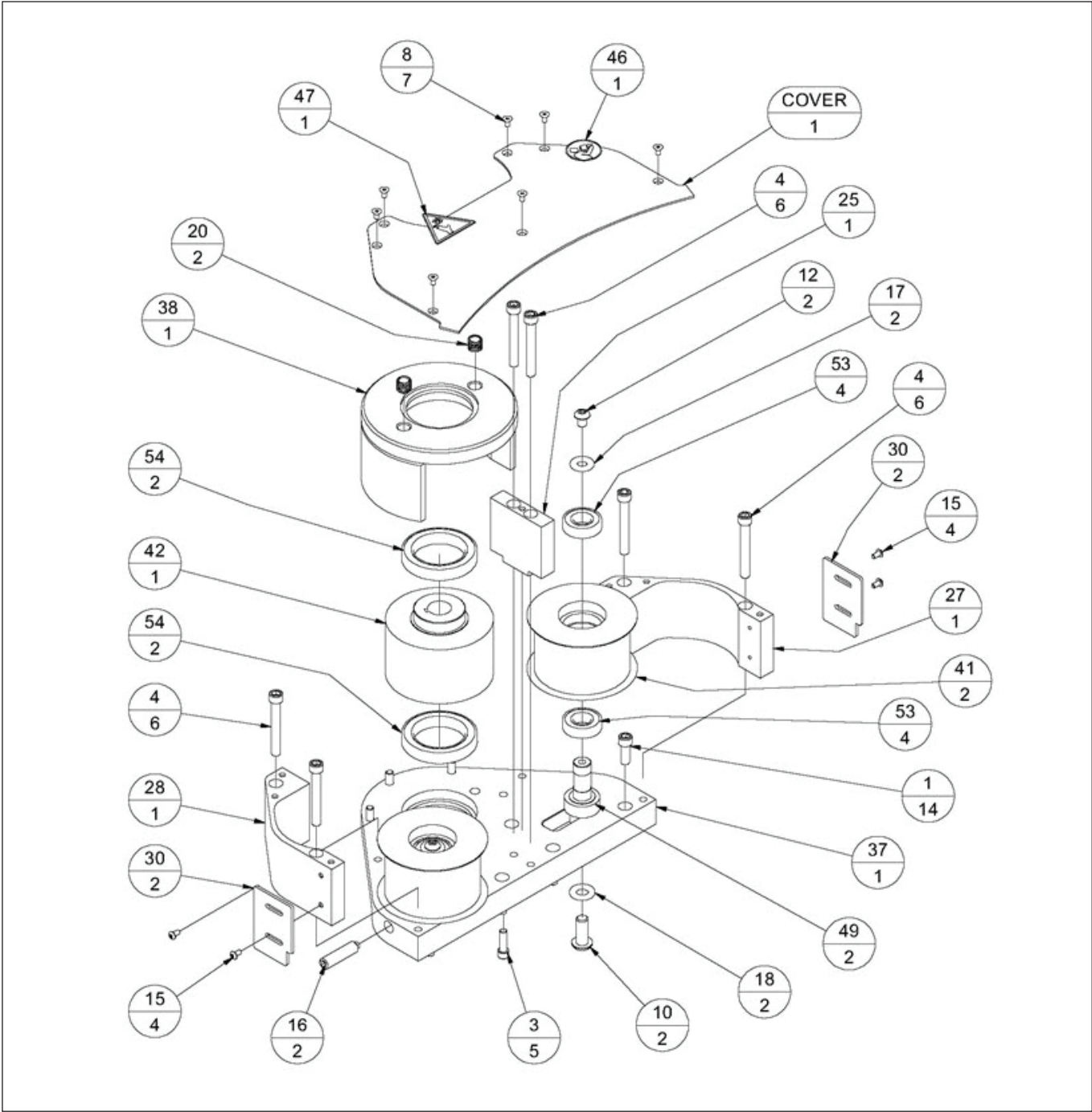
This diagram shows an exploded perspective view of a circular mechanical assembly, likely a turntable or a similar rotating component. The assembly consists of several concentric rings and a central hub. The components are labeled with numbers in circles, indicating their positions and quantities. The labels are as follows:

- 1: 14 (Outer ring)
- 47: 1 (Inner ring)
- 7: 8 (Bushing)
- 25: 4 (Bushing)
- 51: 1 (Bushing)
- 56: 2 (Bushing)
- 58: 1 (Bushing)
- 9: 2 (Bushing)
- 22: 1 (Bushing)
- 36: 1 (Bushing)
- 59: 1 (Bushing)
- 64: 1 (Bushing)
- 23: 2 (Bushing)
- 30: 1 (Bushing)
- 42: 1 (Bushing)
- 35: 4 (Bushing)
- 60: 4 (Bushing)
- 2: 4 (Bushing)
- 43: 1 (Bushing)
- 48: 16 (Bushing)
- 13: 32 (Bushing)
- 14: 24 (Bushing)
- 65: 8 (Bushing)
- 5: 16 (Bushing)
- 66: 4 (Bushing)
- 44: 1 (Bushing)
- 21: 1 (Bushing)
- 53: 1 (Bushing)
- 19: 2 (Bushing)
- 37: 1 (Bushing)
- 24: 4 (Bushing)
- 34: 1 (Bushing)
- 38: 1 (Bushing)
- 52: 1 (Bushing)
- 39: 1 (Bushing)
- 56: 2 (Bushing)
- 40: 1 (Bushing)
- 63: 60 (Bushing)
- 41: 1 (Bushing)
- 11: 62 (Bushing)
- 32: 1 (Bushing)
- 33: 13 (Bushing)
- 3: 1 (Bushing)
- 4: 1 (Bushing)
- 6: 1 (Bushing)
- 8: 1 (Bushing)
- 10: 1 (Bushing)
- 12: 1 (Bushing)
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- 17: 1 (Bushing)
- 18: 1 (Bushing)
- 20: 1 (Bushing)
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- 31: 1 (Bushing)
- 32: 1 (Bushing)
- 33: 1 (Bushing)
- 34: 1 (Bushing)
- 35: 1 (Bushing)
- 36: 1 (Bushing)
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- 66: 1 (Bushing)

9.12 F0440A0801HH Belt Drive Facer - 80" Continuous Feed Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
2	001AE0044228	Socket Head Cap Screw 1/2-13 UNC X 1-1/2 Gr 8	4
5	001AE0044846	Socket Head Cap Screw 3/8-16 UNC X 3 Gr 8	16
7	001BT0044244	Flat Head Cap Screw 1/4-20 UNC X 1/2	8
9	001BU0044254	Flat Head Cap Screw 10-32 UNF X 1/2	2
11	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	62
13	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	32
14	001CF0044283	Button Head Cap Screw 10-32 UNF X 5/8	24
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
21	006AA0085173	Housing - BDF80 Continuous Feed	1
22	006AJ0077207	Lifter - BDF CAM Feed	1
23	006AM0038833	Bullet Dowel - Male (NB/MS Clamshells)	2
24	006AN0085155	Locator Foot - BDF Non-Adjustable	4
25	006AU0041796	Cover - CCF Eccentric	4
30	006AU0085174	Shield - BDF80 OD Belt	1
32	006AU0085441	Shield - Top, Belt Guard BDF80 RH	1
33	006AU0085442	Shield - Top, Belt BDF80	13
34	006AU0085443	Shield - Top, Belt Guard BDF80 LH	1
35	006BA0075996	Bracket - Lifting, BDF	4
36	006BA0077253	Bracket - BDF Lifter Guide	1
37	006BA0077668	Ramp - BDF80 Section 1	1
38	006BA0077669	Ramp - BDF80 Section 2	1
39	006BA0077670	Ramp - BDF80 Section 3	1
40	006BA0077671	Ramp - BDF80 Section 4	1
41	006BA0077672	Ramp - BDF80 Section 5	1
42	006BA0077673	Ramp - BDF80 Section 6	1
43	006BA0077674	Ramp - BDF80 Section 7	1
44	006BA0077675	Ramp - BDF80 Section 8	1
47	006BH0077507	Block - BDF 80, Counterweight	1
48	006BH0085176	Plate - BDF80 Shield Mount	16
51	006BN0077483	Cutting Head - Flange Facer, Belt Drive 80in	1
52	006BW0077678	Belt - BDF80, 2mm X 64mm X 7416mm	1
53	006BY0045250	TAG - CE Serial	1
56	006BY0085268	Label - MM-003 (45mm X 148mm)	2
58	017AA0054038	Dowel Pin 4mm DIA x 14mm LG	1
59	017AA0077212	Dowel Pin 1/4 X 9/16	1
60	018AE0044422	Hoist Ring - 1/2-13 Center Pull	4
64	023AP0077208	CAM Follower - .875OD X .375W X .25ID	1
65	F0446A0003XX	Locator - BDF Assembly	8
66	F0446A0004XX	Locator - BDF Adjustable	4

9.13 F0440A0XXXHH Belt Drive Facer - Belt Adjustment Exploded View

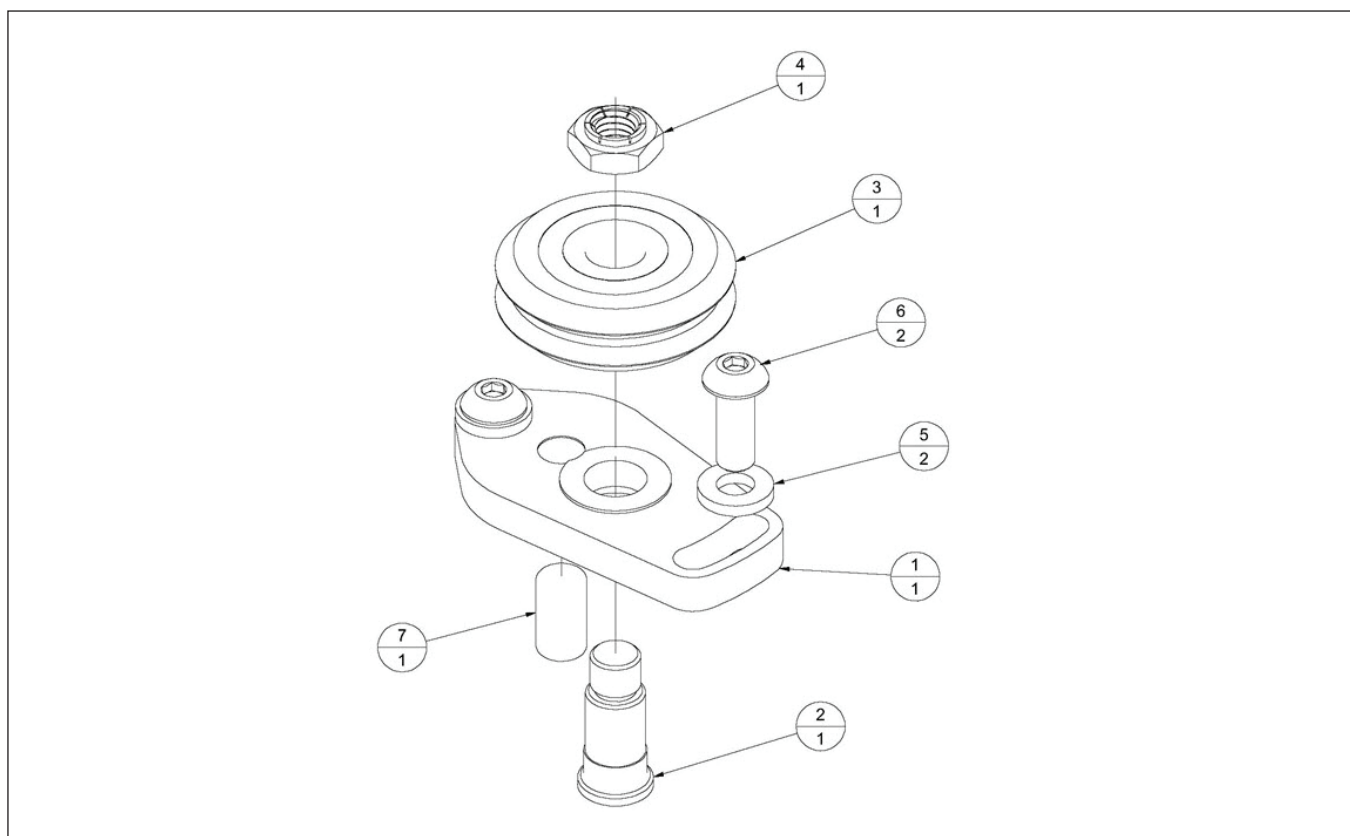


9.14 F0440A0XXXHH Belt Drive Facer - Belt Adjustment Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	14
3	001AE0044233	Socket Head Cap Screw 5/16-18 UNC X 1 Gr 8	5
4	001AE0044275	Socket Head Cap Screw 3/8-16 UNC X 2-3/4 Gr 8	6
8	001BU0044253	Flat Head Cap Screw 10-32 UNF X 3/8	7
10	001CE0041109	Button Head Socket Screw 1/2-13 X 1-1/4 LG	2
12	001CE0044835	Button Head Cap Screw 3/8-16 UNC X 1/2	2
15	001CF0044837	Button Head Cap Screw 10-32 UNF X 3/8	4
16	001EE0050407	Socket Set Screw - Full Dog Point 1/2-13 UNC x 2	2
17	001HA0036521	Washer, Flat - 3/8" SAE (13/16" OD)	2
18	001HA0054973	Washer, 1/2 in SAE Flat 1.0625OD x 0.53125ID x 0.1thk Zinc	2
19	001TE0044545	Drive Screw VM - #4-7X3/16"	2
20	003AJ0044278	Helicoil 1/2 - 13 X 1/2	2
25	006AU0075949	Bracket - Center SUPPORT, BDF Drive Cover	1
27	006AU0085121	Shield - BDF Belt RH Side	1
28	006AU0085122	Shield - BDF Belt LH Side	1
30	006AU0085128	Shield - BDF Side	2
37	006BA0085118	Motor Mount - BDF	1
38	006BA0085119	Motor Mount - BDF Top	1
41	006BN0075281	Pulley - Flat Belt 4in, Flange Facer - Idler	2
42	006BN0075282	Pulley - Flat Belt 4.5in, Flange Facer	1
45	006BY0045250	TAG - CE Serial	1
46	006BY0045253	Label - Read OP Manual	1
47	006BY0053015	Label - ISO J6527 Rotating Cutter Hazard	1
48	006BY0085268	Label - MM-003 (45mm X 148mm)	2
49	006CD0075283	Post - Idler Shaft, BDF Adjustable - Pulley Wheel	2
53	023AA0043244	Bearing - Ball Single Rcae 0.750ID X 1.625OD X 0.4375W in	4
54	023AA0075365	Bearing - Ball, Single Race - 55ID X 80OD X 13MM Sealed	2

Cover (BDF Size)	Part Number
30	006AU0085123
40	006AU0085279
50	006AU0085162
60	006AU0085152
70	006AU0085354
80	006AU0085175

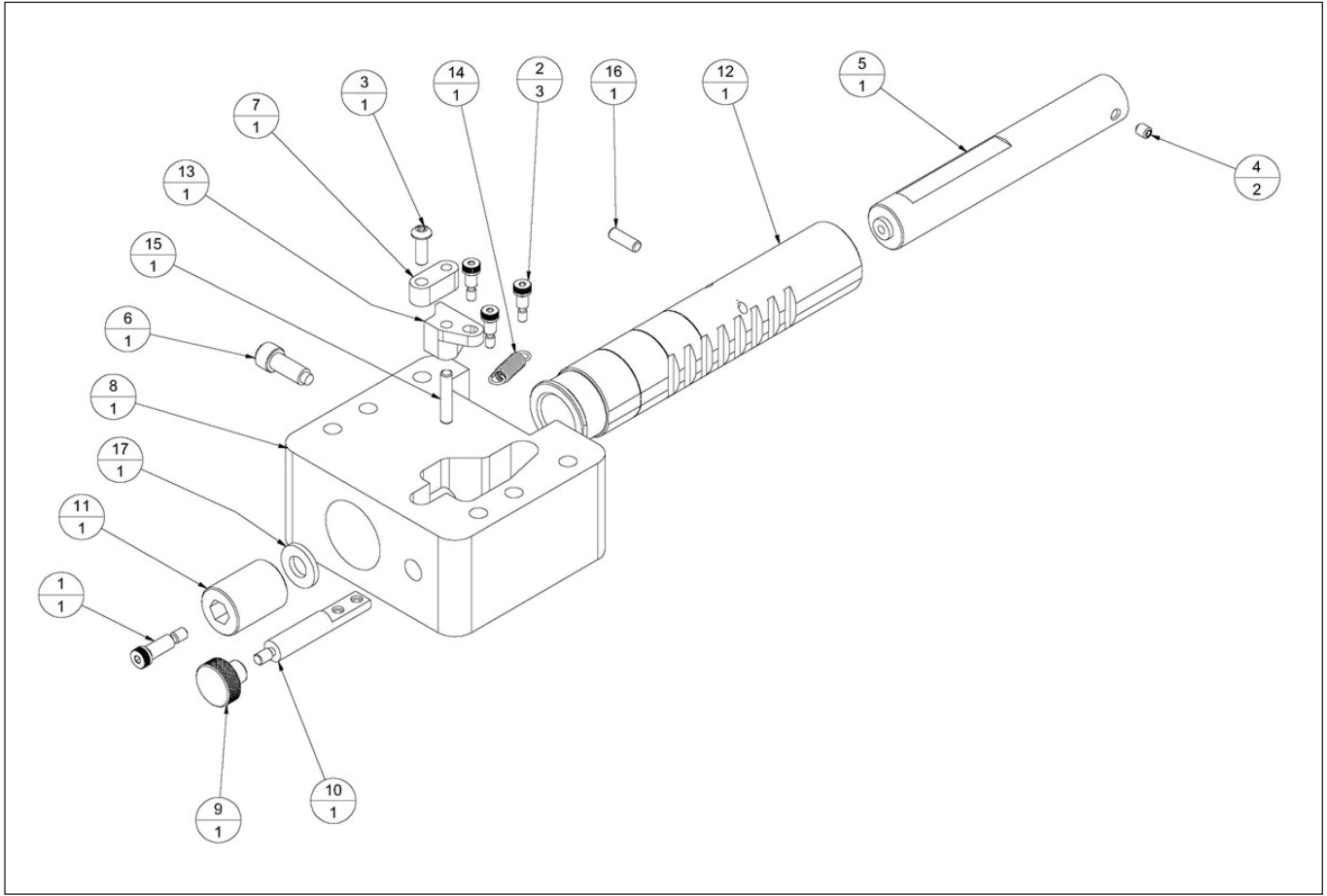
9.15 023AC0085126 Bearing - BDF Eccentric Assembly Exploded View



9.16 023AC0085126 Bearing - BDF Eccentric Assembly Table of Parts

Item Number	Part Number	Description	QTY
1	006BE0085125	Eccentric - BDF	1
2	006CD0044551	Stud - CFF Bearing	1
3	023AC0043206	Bearing – Ball, Dualvee W4X	1
4	001NB0044845	Hex Lock Nut-Extra Wide Cadmium 1/2-13 UNC, 13/16 A/F, 21/64H	1
5	006AX0043493	Washer -Machined 0.378ID X 0.752OD X 0.125W in	2
6	001CE0044824	Button Head Cap Screw 3/8-16 UNC X 1	2
7	017AA0085127	Dowel Pin 1/2 X 7/8	1

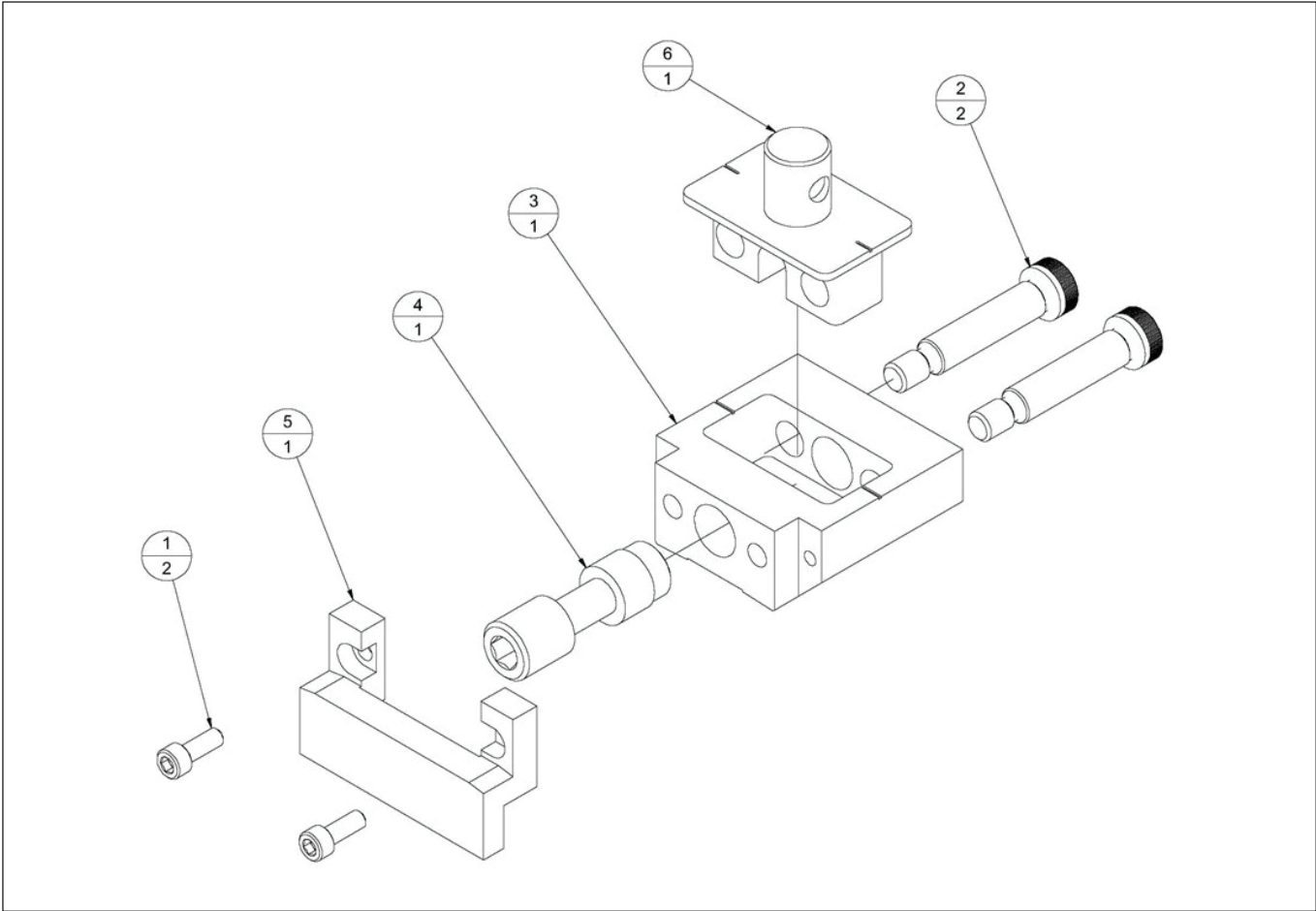
9.17 F0449A0003XX Locator Assembly - Belt Drive Facer Exploded View



9.18 F0446A0003XX Locator Assembly - Belt Drive Facer Table of Parts

Item Number	Part Number	Description	QTY
1	001BE0047622	Shoulder Screw 5/16" X 3/4" Long X 1/4"-20 UNC	1
2	001BE0053860	Shoulder Screw - DIA 0.25 in X 0.375 in lg - 10-24 UNC	3
3	001CE0044830	Button Head Cap Screw 1/4-20 UNC X 3/4	1
4	001DT0047717	Socket Set Screw 1/4"-20 UNC X 5/16" Long - Flat Point	2
5	006AJ0085134	Shaft - BDF, Locator Solid	1
6	006AN0085136	Screw - BDF Locator Stop	1
7	006BA0075290	Bracket - Pawl Brace, BDF Locator	1
8	006BA0085132	Locator Housing - BDF	1
9	006BB0051406	Knob - Knurled Rim 1", 1/4-20 Threaded Hole	1
10	006BB0075288	Handle - Flange Facer, Locator Fine Adjustment	1
11	006BB0085135	Screw - BDF Locator Adjustment	1
12	006BN0085133	Rack - Locator Threaded BDF	1
13	006BP0075289	Pawl - Wide Locator Rack Retainer	1
14	016AB0075291	Spring - Extension .36OD X .055 X 1.25 Loop Ends	1
15	017AA0044259	Dowel Pin 1/4 X 1 1/4in	1
16	017AA0044268	Dowel Pin 1/4 X 3/4in	1
17	023DK0085137	High-Load Oil-Embedded Thrust Bearing - .50ID, SAE 863 Bronze	1

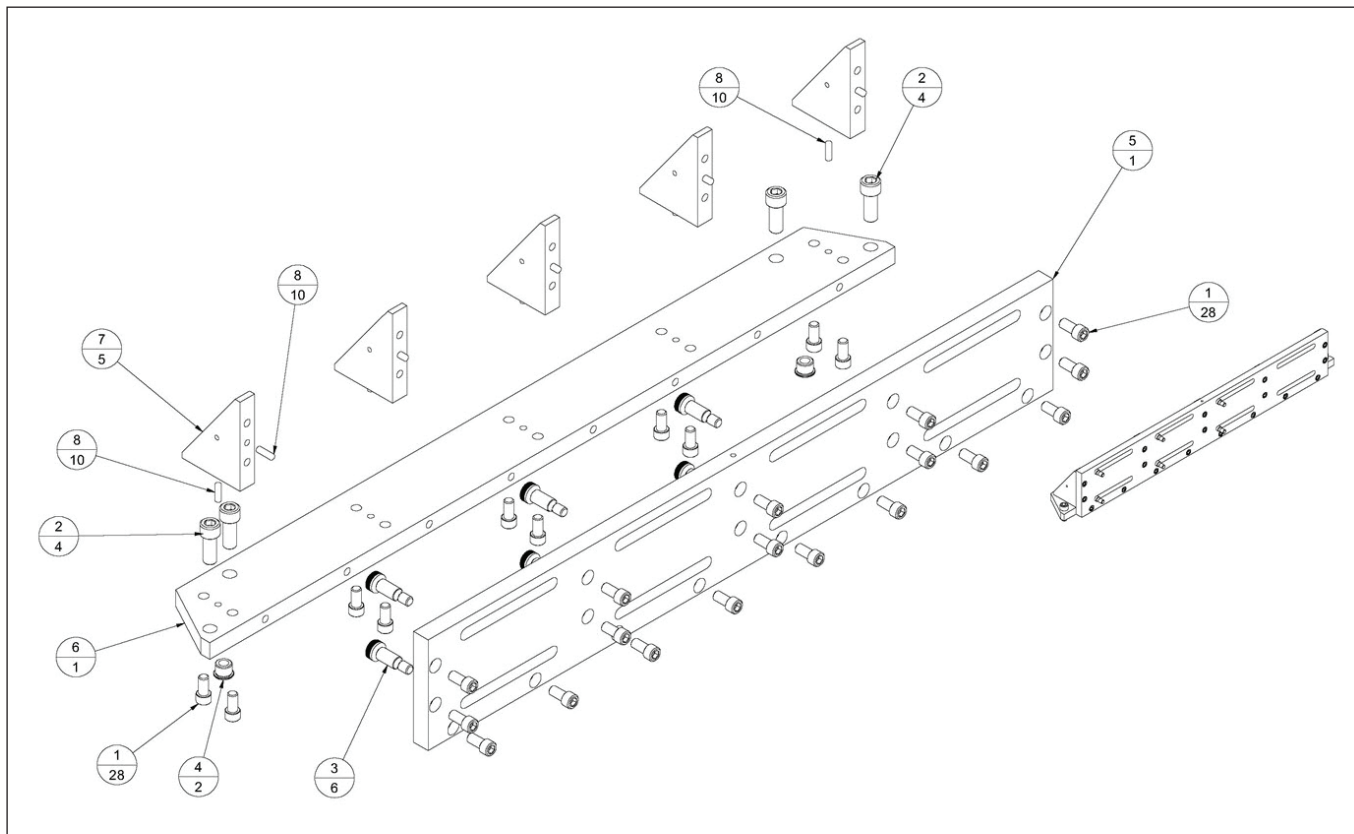
9.19 F0446A0004XX Locator Foot Assembly - BDF Adjustable Exploded Views



9.20 F0446A0004XX Locator Foot Assembly - BDF Adjustable Table of Parts

Item Number	Part Number	Description	QTY
1	001AF0044248	Socket Head Cap Screw 10-32 UNF X 1/2	2
2	001BE0047625	Shoulder Screw 3/8" X 1-1/2" Long X 5/16"-18 UNC	2
3	006AN0085138	Locator - Pad BDF Adjustable	1
4	006AY0085140	Screw - BDF Locator Adjust	1
5	006BA0075457	Bracket - BDF Depth Stop Locator	1
6	006BA0085139	Bracket - Adjustable Locator BDF	1

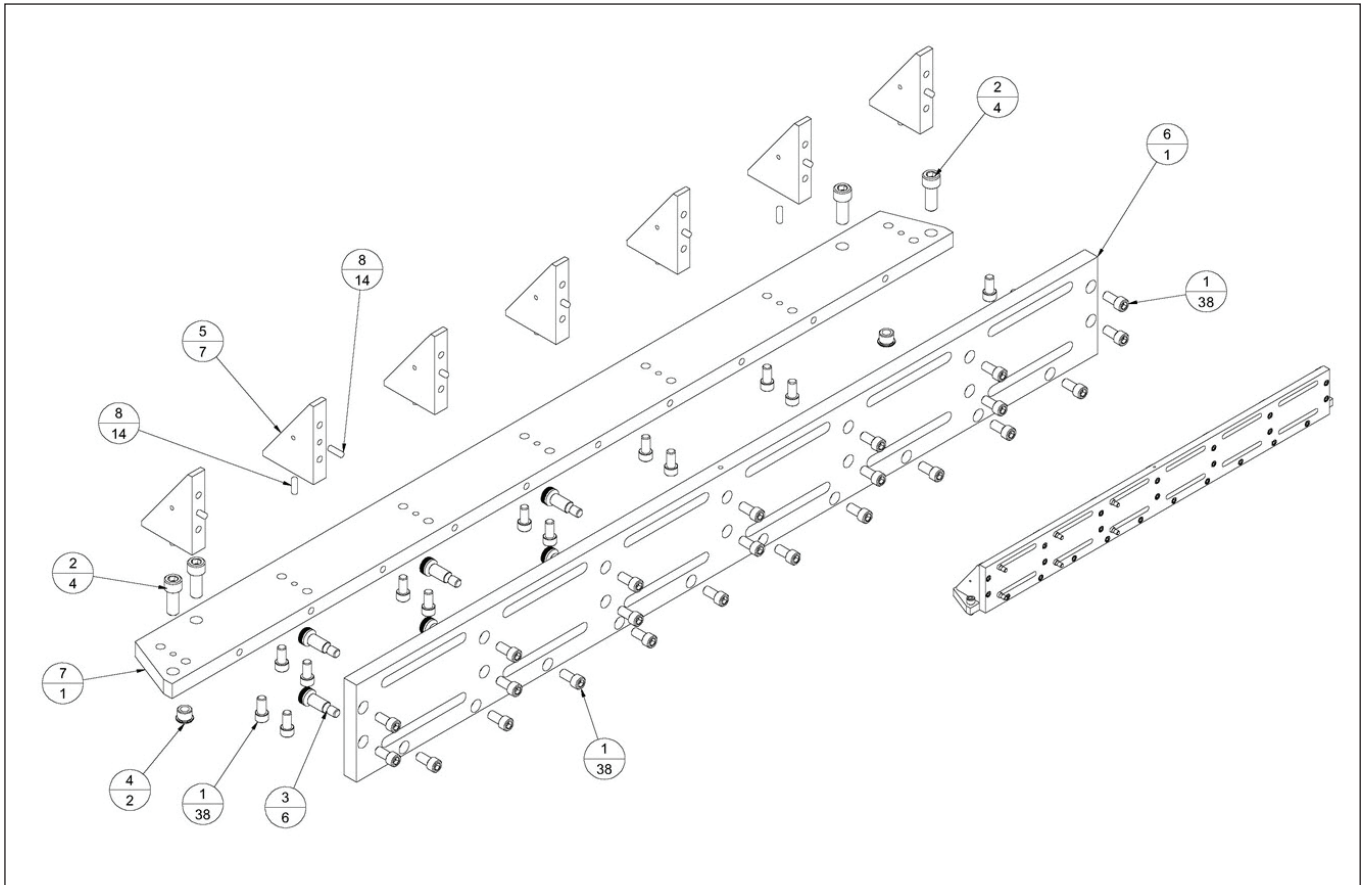
9.21 006BX0075417 Cross Beam - Mount BDF30 Exploded Views



9.22 006BX0075417 Cross Beam - Mount BDF30 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long	28
2	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
3	001BE0047550	Shoulder Screw 1/2" X 1"	6
4	006AM0038832	Bushing - Alignment Female	2
5	006BH0075414	Plate - Cross Beam BDF, Vertical - Facing Arm	1
6	006BH0075415	Plate - Cross Beam BDF, Base - Facing Arm	1
7	006BH0075416	Plate - Gusset, BDF - Facing Arm	5
8	017AA0044268	Dowel Pin 1/4 X 3/4	10

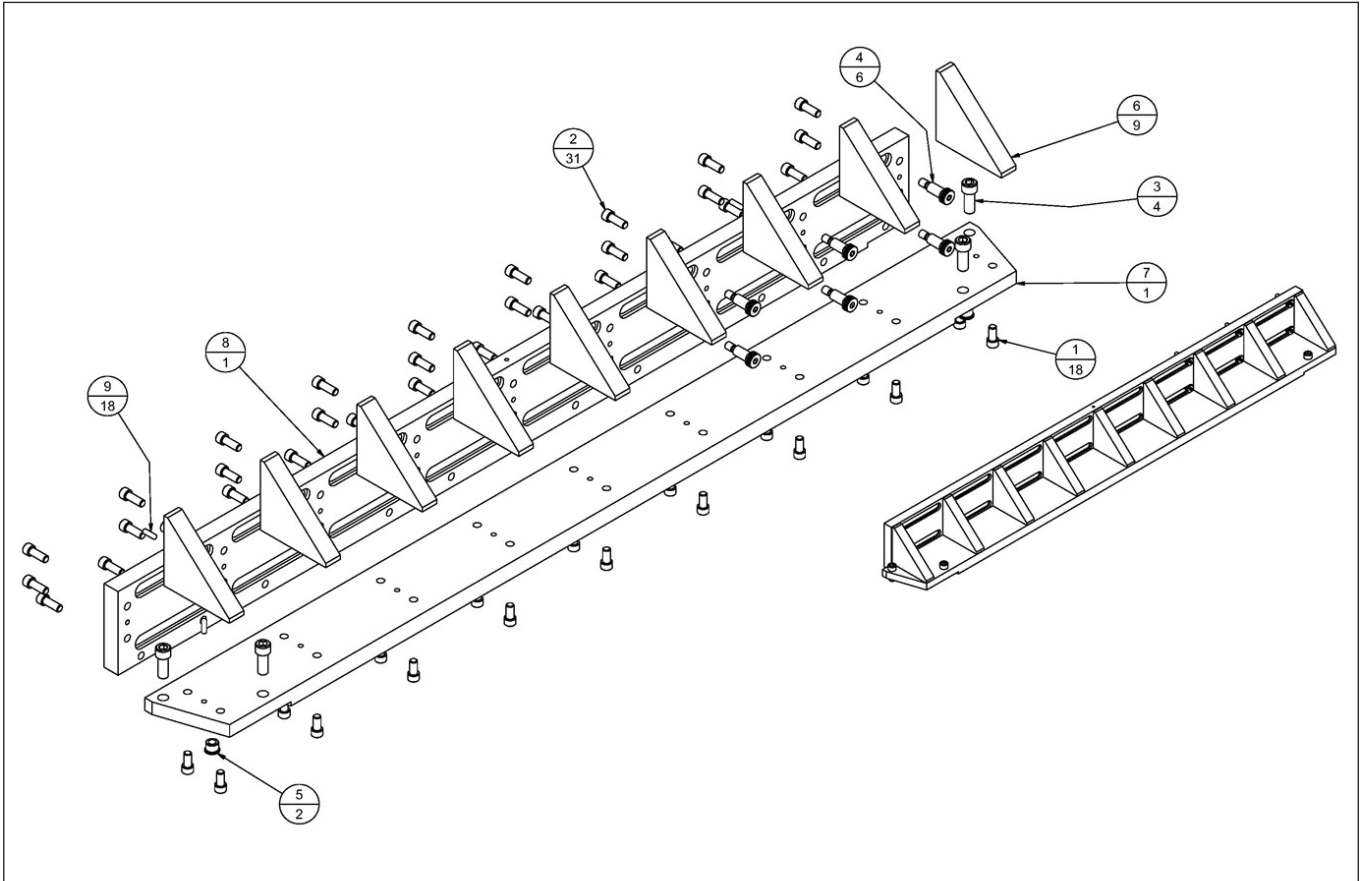
9.23 006BX0085289 Cross Beam - Mount BDF40 Exploded Views



9.24 006BX0085289 Cross Beam - Mount BDF40 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long	38
2	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
3	001BE0047550	Shoulder Screw 1/2" X 1"	6
4	006AM0038832	Bushing - Alignment Female	2
5	006BH0075416	Plate - Gusset, BDF -Facing Arm	7
6	006BH0085287	Plate - Cross Beam BDF40	1
7	006BH0085288	Plate - Cross Beam BDF40, Base	1
8	017AA0044268	Dowel Pin 1/4 X 3/4	14

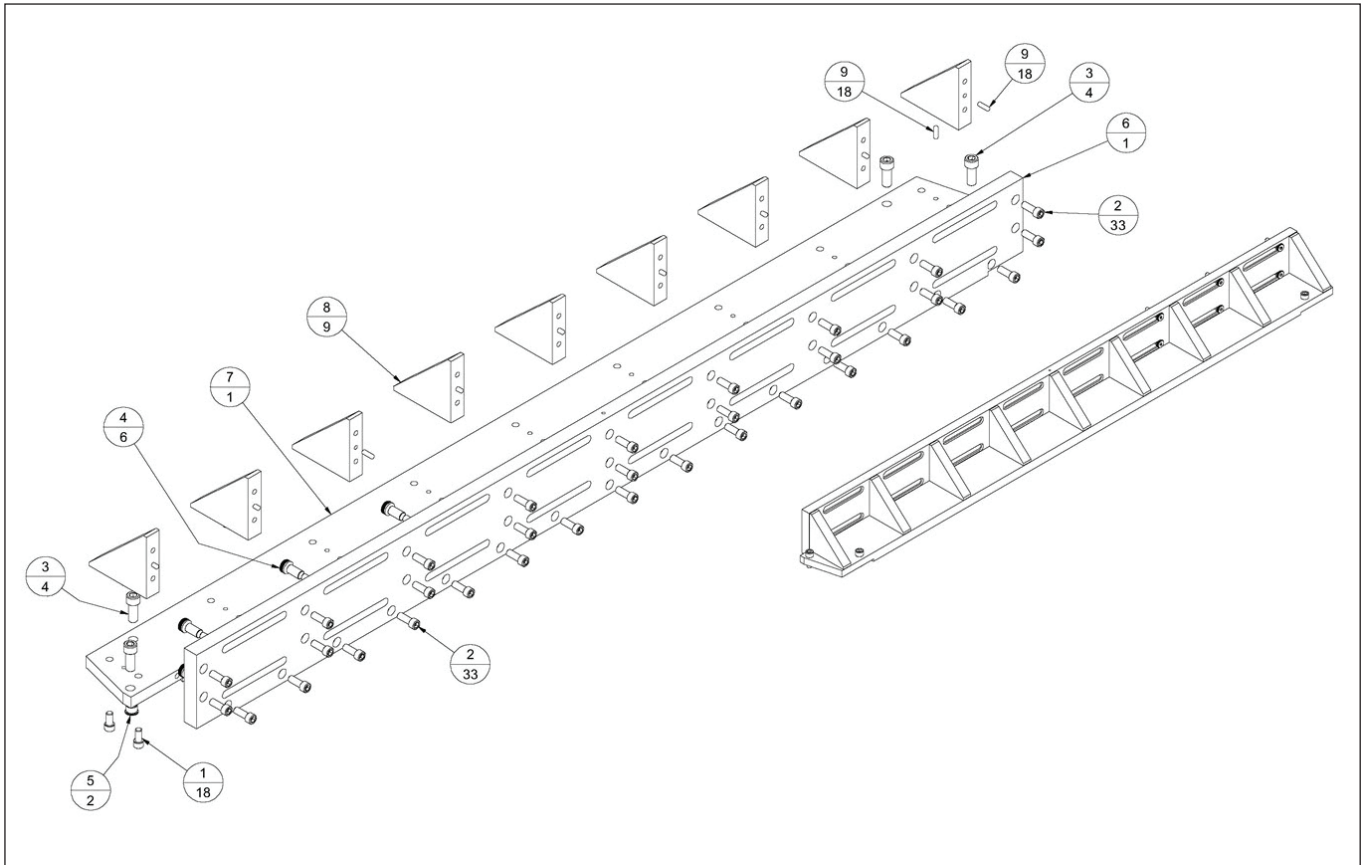
9.25 006BX0085060 Cross Beam - Mount BDF50 Exploded Views



9.26 006BX0085060 Cross Beam - Mount BDF50 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long	18
2	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long	31
3	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
4	001BE0047550	Shoulder Screw 1/2" X 1"	6
5	006AM0038832	Bushing - Alignment Female	2
6	006BH0075625	Plate - Gusset, BDF 60 -Facing Arm	9
7	006BH0085058	Plate - Cross Beam 50IN BDF, Base - Facing Arm	1
8	006BH0085059	Plate - Cross Beam 50IN BDF, Vertical - Facing Arm	1
9	017AA0044268	Dowel Pin 1/4 X 3/4	18

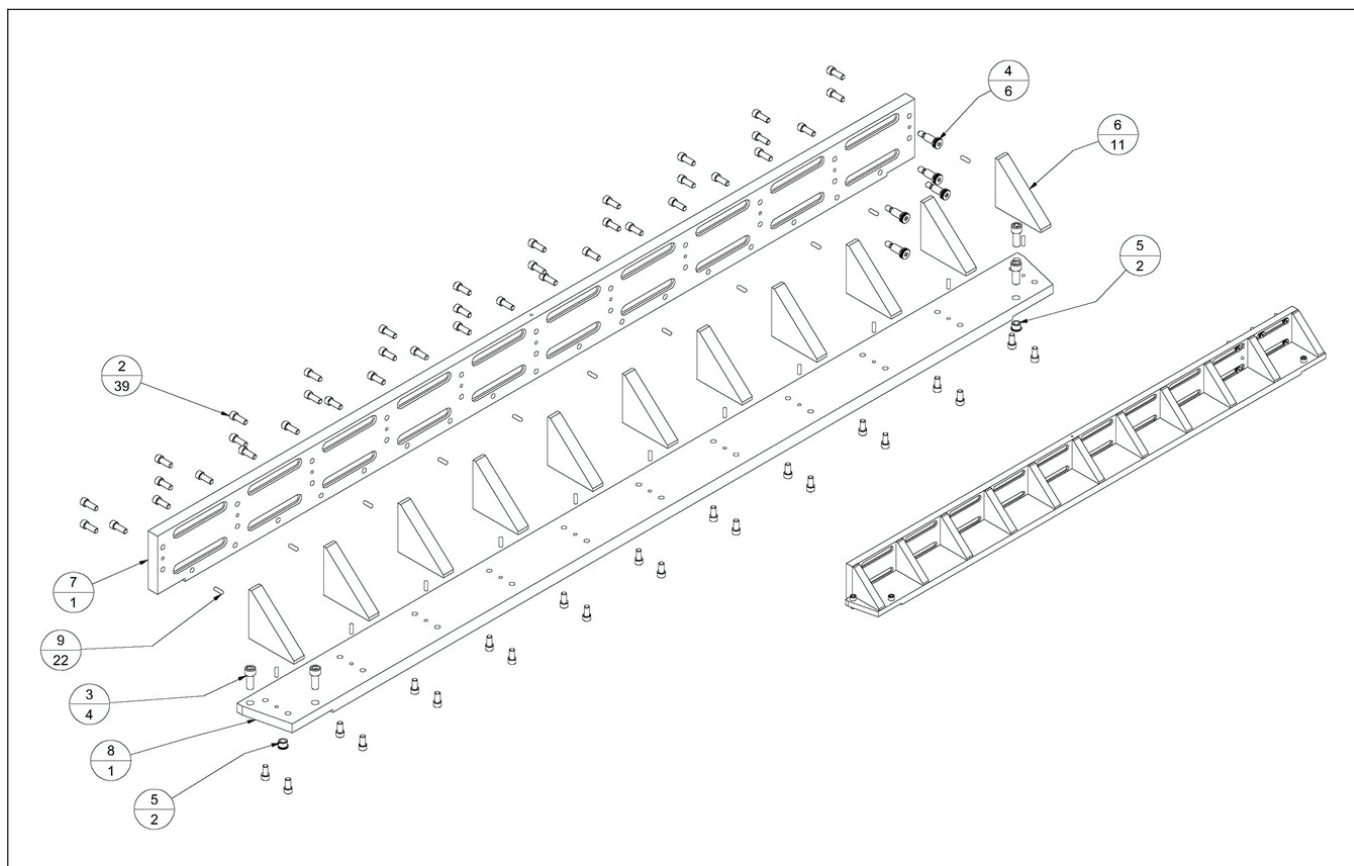
9.27 006BX0075593 Cross Beam - Mount BDF60 Exploded View



9.28 006BX0075593 Cross Beam - Mount BDF60 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long Gr 8	18
2	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	33
3	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4 Gr 8	4
4	001BE0047550	Shoulder Screw 1/2" X 1"	6
5	006AM0038832	Bushing - Alignment Female	2
6	006BH0075591	Plate - Cross Beam 60IN BDF, Vertical - Facing Arm	1
7	006BH0075592	Plate - Cross Beam 60IN BDF, Base - Facing Arm	1
8	006BH0075625	Plate - Gusset, BDF 60 -Facing Arm	9
9	017AA0044268	Dowel Pin 1/4 X 3/4	18

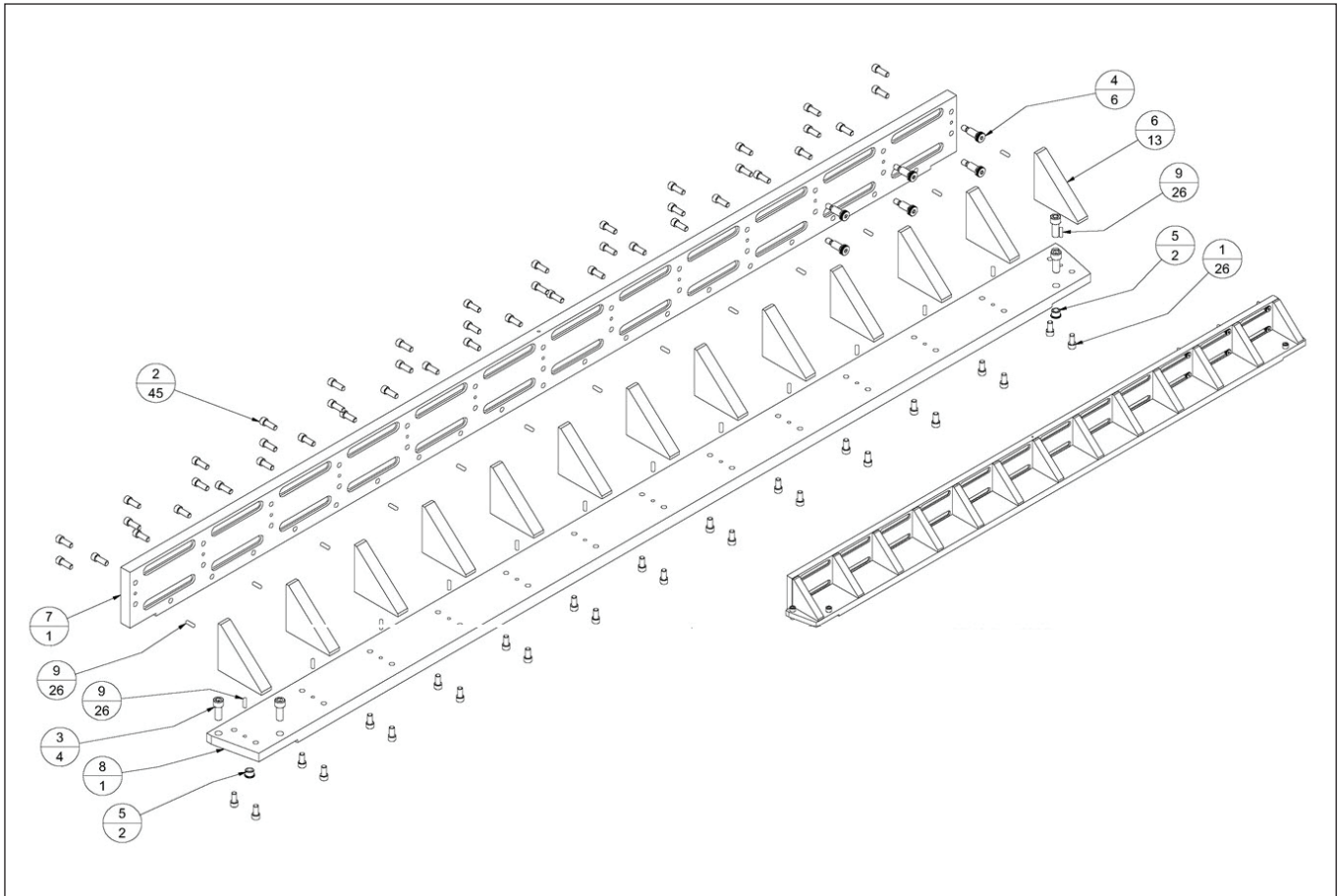
9.29 006BX0085369 Cross Beam - Mount BDF70 Exploded Views



9.30 006BX0085369 Cross Beam - Mount BDF70 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long	22
2	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long	39
3	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
4	001BE0047550	Shoulder Screw 1/2" X 1"	6
5	006AM0038832	Bushing - Alignment Female	2
6	006BH0075625	Plate - Gusset, BDF 60 -Facing Arm	11
7	006BH0085367	Plate - Cross Beam 70IN BDF, Vertical - Facing Arm	1
8	006BH0085368	Plate - Cross Beam 70IN BDF, Base - Facing Arm	1
9	017AA0044268	Dowel Pin 1/4 X 3/4	22

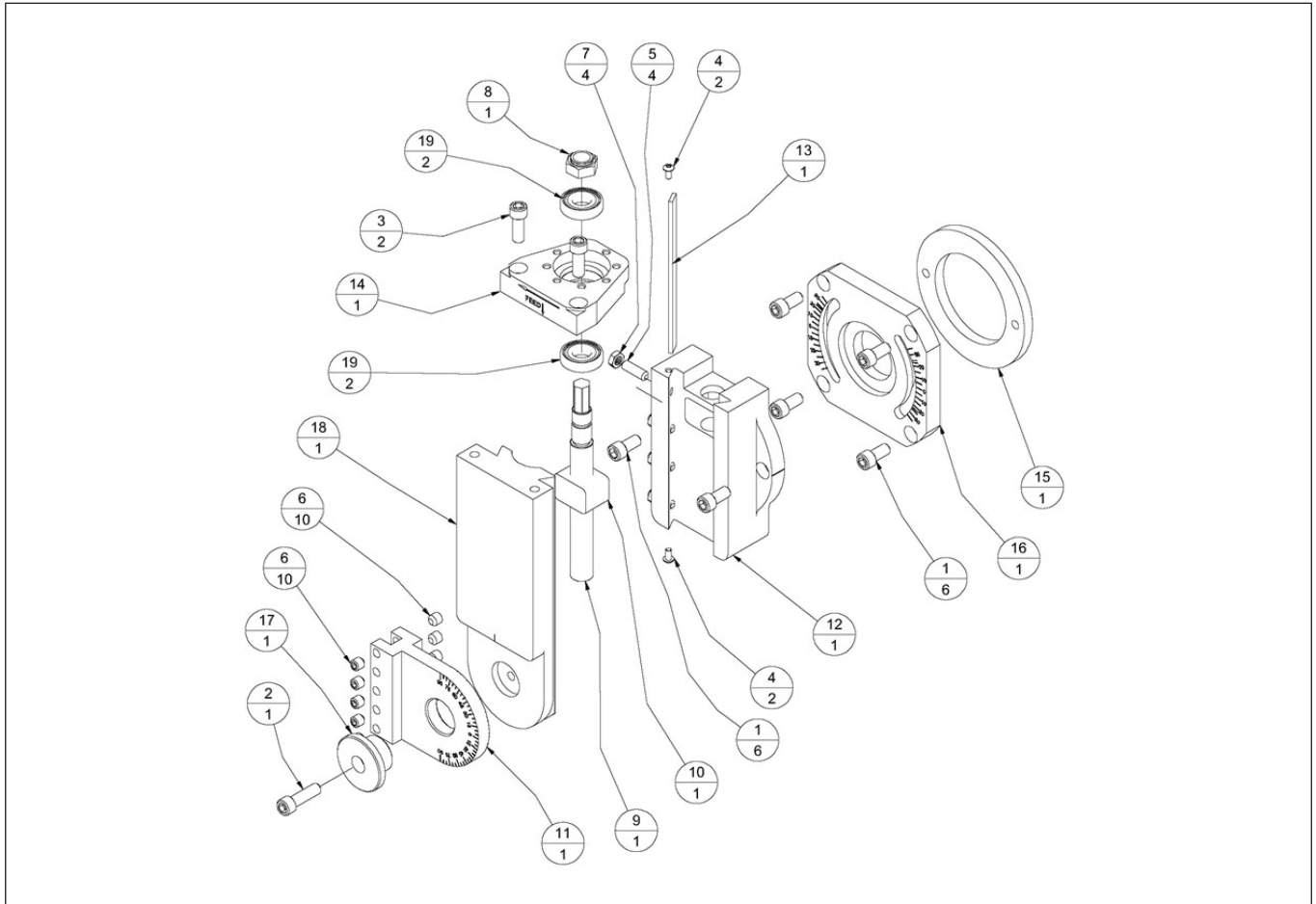
9.31 006BX0077686 Cross Beam - Mount BDF80 Exploded Views



9.32 006BX0077686 Cross Beam - Mount BDF80 Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long	26
2	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long	45
3	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
4	001BE0047550	Shoulder Screw 1/2" X 1"	6
5	006AM0038832	Bushing - Alignment Female	2
6	006BH0075625	Plate - Gusset, BDF 60 -Facing Arm	13
7	006BH0077684	Plate - Cross Beam 80IN BDF, Vertical - Facing Arm	1
8	006BH0077685	Plate - Cross Beam 80IN BDF, Base - Facing Arm	1
9	017AA0044268	Dowel Pin 1/4 X 3/4	26

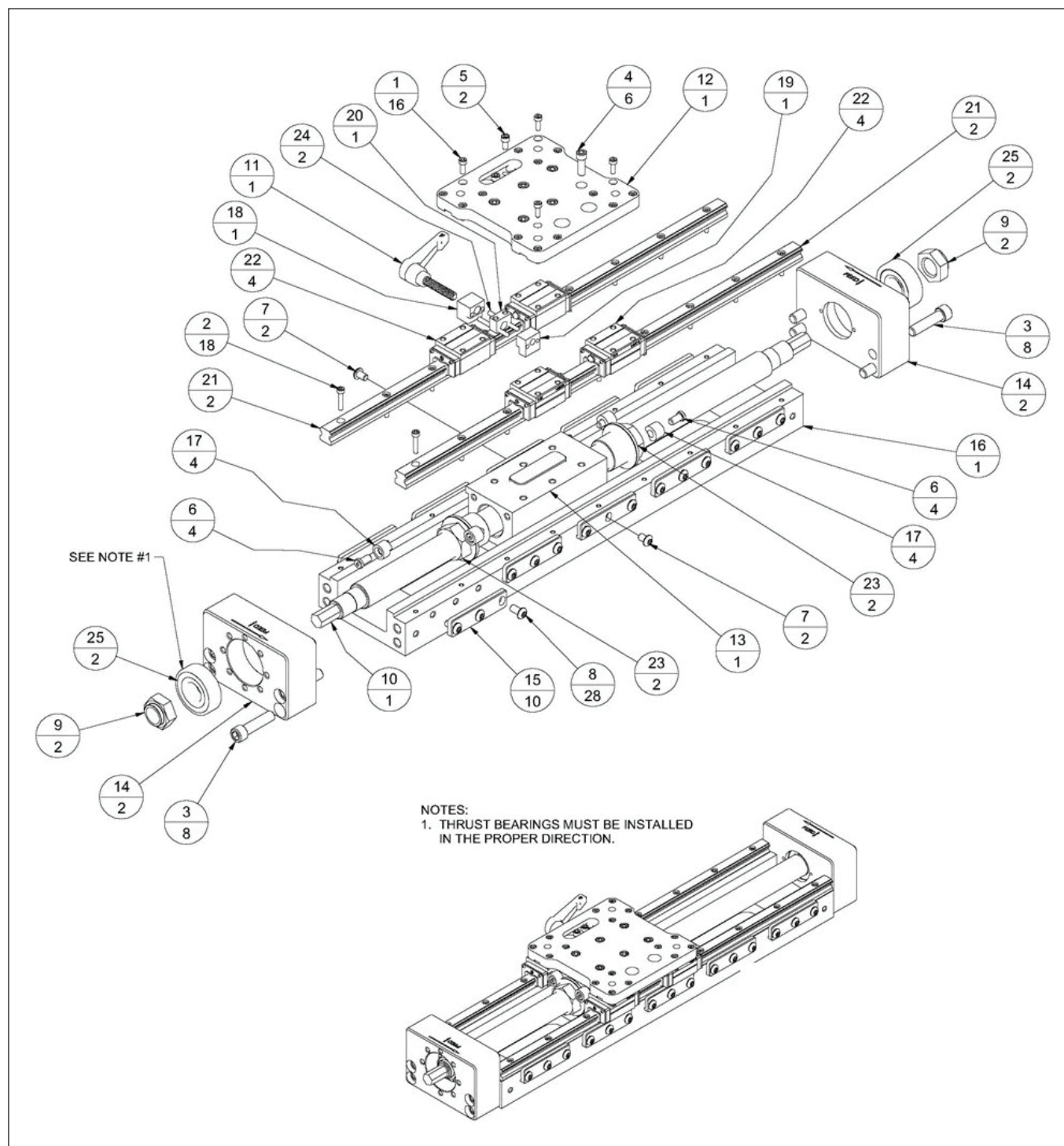
9.33 F0442B0040XX Axial Feed Slide Exploded Views



9.34 F0442B0040XX Axial Feed Slide Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035939	Socket Head Cap Screw 3/8" - 16 UNC x 3/4" Long Gr 8	6
2	001AE0037351	Socket Head Cap Screw 3/8" - 16 UNC x 1-1/4" Long Gr 8	1
3	001AE0037473	Socket Head Cap Screw 3/8"-16 UNC x 1" Long Gr 8	2
4	001CF0044837	Button Head Cap Screw 10-32 UNF X 3/8	2
5	001DE0044912	Socket Set Screw - Cup Point 5/16-18 UNC X 1	4
6	001DT0037475	Socket Set Screw (Grub) 3/8"- 16UNC x 3/8" Long - Flat Tip	10
7	001LN0044792	Hex Jam Nut 5/16-18 UNC, 1/2 A/F, 0.188H IN	4
8	001NB0050821	Hex Lock Nut - 5/8-18UNF,.938 A/F,.468W, Security, GR 5	1
9	006AK0085008	Feedscrew - Z Feed 3/4-6 ACME	1
10	006AL0085009	Feed Nut - Z Feed 3/4-6 ACME BDF	1
11	006AP0075364	Tool Holder - Swivel BDF Z Feed	1
12	006AR0075366	Slide - Swivel BDF	1
13	006AT0075369	GIB - BDF Tool Block	1
14	006BD0075361	Bracket - Z Feed, BDF	1
15	006BH0075362	Ring - Tool Holder Clamp, BDF Z Feed 4in	1
16	006BH0075367	Plate - BDF Swivel	1
17	006BP0075368	Retainer - Swivel Lock, BDF	1
18	006BV0075363	Block - BDF Tool	1
19	023AA0038942	Bearing - Sealed Ball Single Race .625ID x 1.375OD x 0.344W in	2

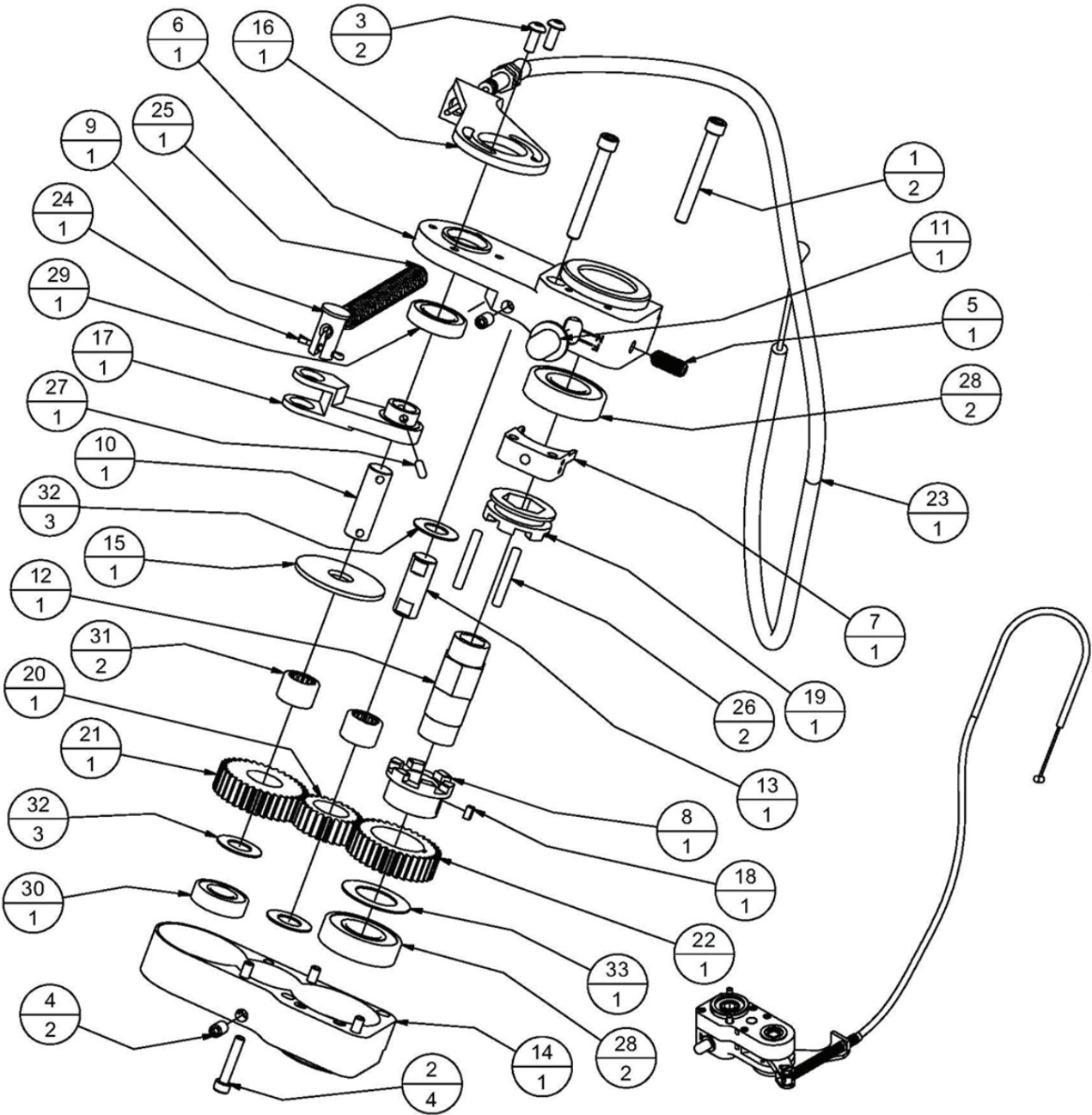
9.35 F0442A0104XX Radial Slide Assembly Exploded View



9.36 F0442A0140XX Radial Slide Assembly Table of Parts

Item Number	Part Number	Description	QTY
1	001AB0000582	Socket Head Cap Screw M4 x 12mm Long Gr 12.9	16
2	001AB0000585	Socket Head Cap Screw M4 x 20mm Long Gr 12.9	18
3	001AE0039241	Socket Head Cap Screw 3/8"-16UNC x 1-1/2" Long Gr 8	8
4	001AE0039330	Socket Head Cap Screw 1/4"-20UNC x 3/4" Long Gr 8	6
5	001AF0050242	Socket Head Cap Screw 10-32 UNF X 3/8 Gr 8	2
6	001AT0047648	Low Head Cap Screw 1/4"-20 UNC X 1/2" Long Gr 8	4
7	001CE0044262	Button Head Cap Screw 1/4-20 UNC X 3/8	2
8	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	28
9	001NB0050090	Hex Lock Nut - 3/4-16 UNF, 1.125A/F, 0.578W, Security, GR5	2
10	006AK0085006	Feedscrew - BDF 24in -1-6 LH ACME	1
11	006BB0053575	Handle - Adjustable Carr Lane CL-515-AH-2	1
12	006BH0075387	Plate - Saddle Top Linear Rail Mill, BDF	1
13	006BH0075388	Block - Saddle Bottom Linear Rail Mill	1
14	006BH0075389	Plate - Front Bearing, Linear Rail Mill - Z Axis	2
15	006BH0075392	Carriage Block Retainer	10
16	006BH0075394	Base - Plate For Linear Rail Mill	1
17	006BL0075154	Clamp - Linear Rail Mill Backlash Nut Retainer	4
18	006BL0075396	Brake Shoe Threaded - Mill Slide Saddle - Front	1
19	006BL0075397	Brake Shoe Threaded - Mill Slide Saddle - Back	1
20	006BL0075398	Brake Body - Mill Slide Saddle - BDF	1
21	006BS0075393	Rail - Linear, HSR15 X 520 MM	2
22	006BS0075395	Carriage - Linear Rail THK HSR15R 1 ZZ PB1021B	4
23	006HF0085007	Feed Nut - LH 1in-6 ACME - 1.25 Hex Drive	2
24	017AA0053556	Dowel Pin - 5/32" x 1-1/2	2
25	023CA0053574	Bearing - Ball-Angular Contact 20mm ID x 47mm OD x 14 mm thk	2

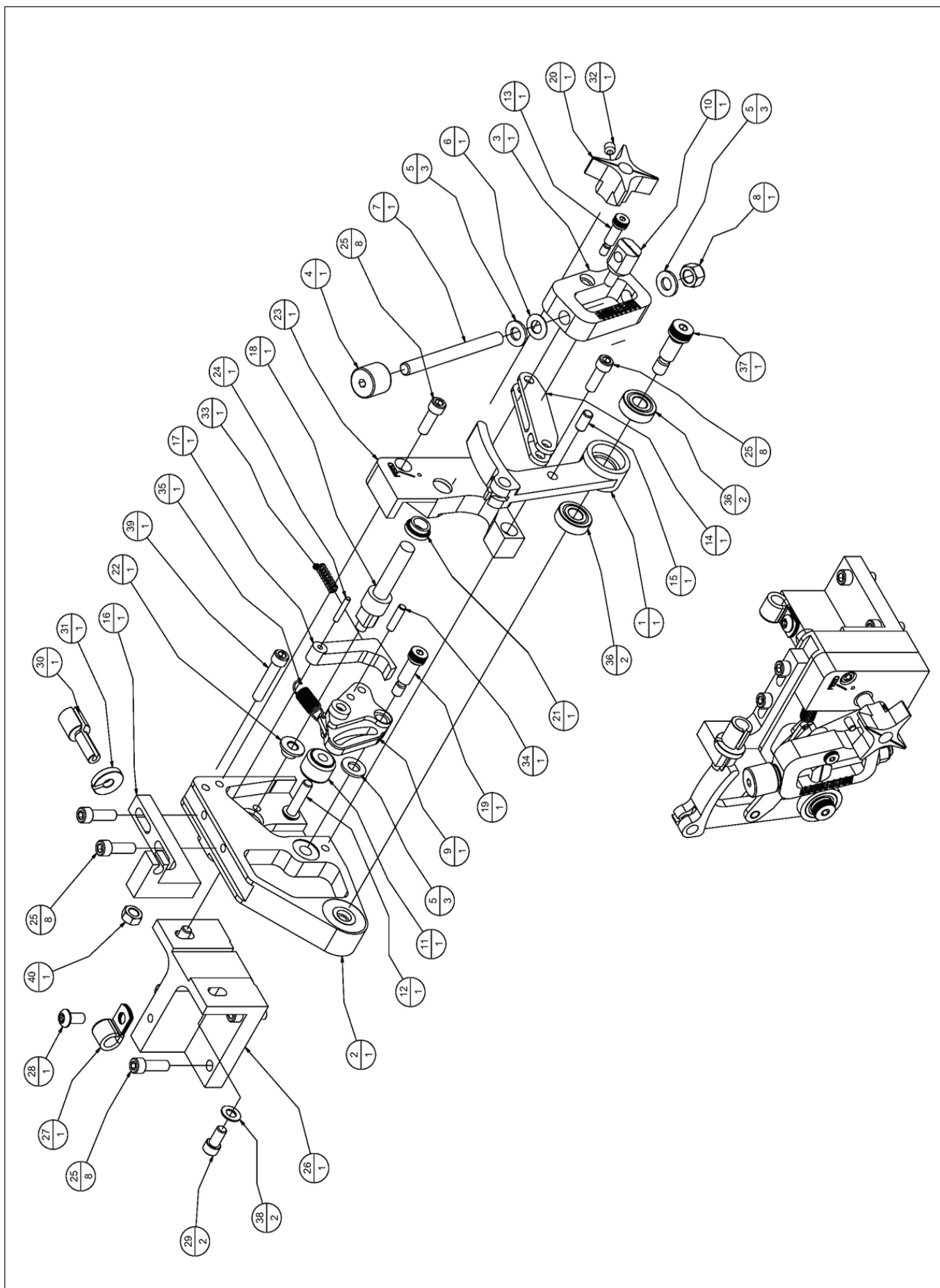
9.37 F0448A0001XX Gearbox Feed Assembly Exploded Views



9.38 F0448A0001XX Gearbox Feed Assembly Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0044237	Socket Head Cap Screw 1/4-20 UNC X 2	2
2	001AE0044828	Socket Head Cap Screw 10-32 UNF X 1	4
3	001CF0044829	Button Head Cap Screw 10-32 UNF X 1/2	2
4	001DE0044918	Socket Set Screw - Cup Point 1/4-20 UNC X 1/2	2
5	003AB0051756	Spring Plunger - Locking 5/16-18 X .72" Long	1
6	006AD0075374	Housing - Profile Slide Z-Feed	1
7	006AD0075378	Shifter - BDF, Cable Feed	1
8	006AF0075384	Hub - BDF, Shifter Gear Short	1
9	006AJ0054311	Pin - Profile Slide Cable	1
10	006AJ0054312	Shaft - Profile Slide Z-Feed Drive	1
11	006AJ0075377	Lever - Shifting, BDF Cable Feed	1
12	006AJ0075379	Shaft - BDF, Clutch - Cable Feed	1
13	006AJ0075383	Shaft - BDF Z Feed Idler	1
14	006AU0075373	Cover - Profile Slide Z-Feed Cap	1
15	006AX0075385	Washer - 0.52"ID X 1.875"OD X 0.091"THK Thrust	1
16	006BA0075375	Bracket - Cable Feed, BDF	1
17	006BA0075376	ARM - Profile Slide Z-Feed	1
18	006BD0045523	KEY - 1/8 X 1/8X 1/4	1
19	006BM0075386	HUB - Shifter, - BDF	1
20	006BN0054307	Gear - Profile Slide Z-Feed Idler	1
21	006BN0075381	Gear - BDF Hex Drive (35T) 3/4 Bore	1
22	006BN0075382	Gear - BDF Z Feed Screw	1
23	006KA0054661	Cable - Black Vinyl Clutch	1
24	014AS0047379	Cotter Pin - 3/32" DIA X 3/4" Long	1
25	016AA0085638	Spring - Feed Gearbox Retract	1
26	017AA0047303	Dowel Pin - 3/16" DIA X 1-1/4" Long	2
27	017AA0054310	Dowel Pin 4mm DIA x 16mm LG	1
28	023AA0043244	Bearing - Ball Single Race 0.750ID X 1.625OD X 0.4375W in	2
29	023AA0052521	Bearing - Ball Single Race 17ID X 30OD X 7W mm Sealed	1
30	023AA0075380	Bearing - Ball Single Race 0.50 X 1.125 X 0.3125, Shielded	1
31	023AL0054296	Clutch - Roller, .5" ID, .75" OD, .5" W	2
32	023BD0043241	Washer - Thrust 0.500ID X 0.937OD X 0.0312W IN	3
33	023BD0043243	Washer - Thrust 0.875ID X 1.437OD X 0.0312W IN	1

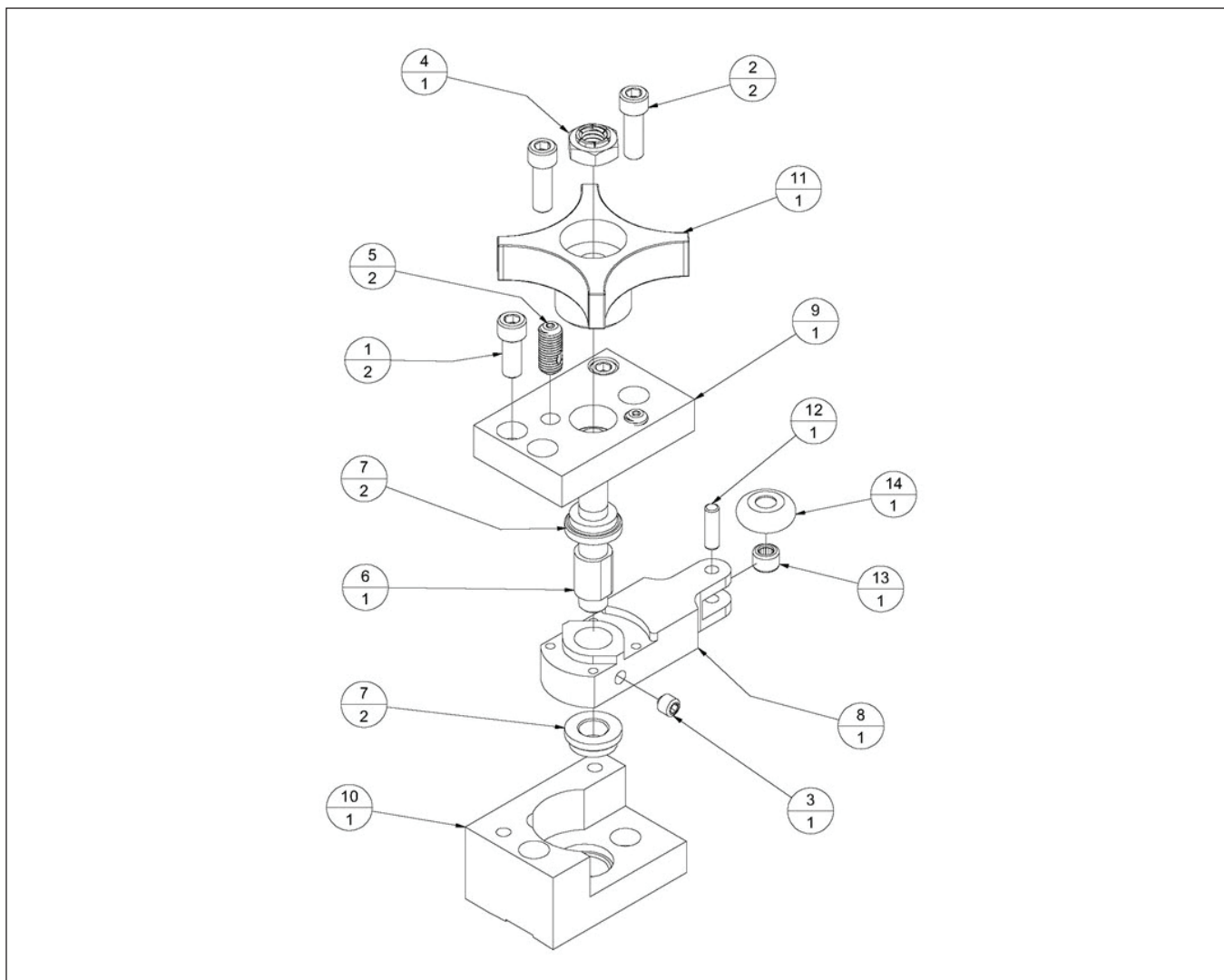
9.39 F0448A0003XX Cable Mount Assembly Exploded View



9.40 F0448A0003XX Cable Mount Assembly Table of Parts

Item Number	Part Number	Description	QTY
1	006BA0077071	Arm - BDF Feed Cable	1
2	006BA0077068	Bracket - BDF Cam Support	1
3	006BA0077070	Bracket - BDF Feed Adjust	1
4	006BB0085049	Knob - Continuous Feed Adjustment	1
5	023DC0075999	Thrust Bearing - Bronze, 0.313 X 0.625 X 0.063THK	3
6	016AC0076000	Spring - Belleville Disc, 0.317 X 0.625 X 0.022THK	1
7	006BB0077079	Screw - BDF Feed Adjustment	1
8	001NB0044852	Hex Lock Nut - 5/16-18 UNC, 1/2 A/F, 11/32H Nyloc Grade 8 zinc plated	1
9	006BA0077073	Linkage - BDF Feed Adjustment	1
10	006BA0077078	Pin - BDF Feed Indicator	1
11	023AN0043283	Cam Follower - (YOKE) 0.2500ID X 0.7500 X 0.5625W in Sealed	1
12	001CE0044848	Button Head Cap Screw 1/4-20 UNC X 1	1
13	001BE0044853	Shoulder Screw 1/4 X 5/8 Long X 10-24 UNC	1
14	006BA0077074	Linkage - BDF Feed Cable	1
15	017AA0050551	Dowel Pin 1/4 X 1/2	1
16	006BA0077069	Bracket - BDF Cable Adjust	1
17	006BA0077075	Lock - BDF Feed	1
18	006AJ0077076	Shaft - BDF Feed Lock	1
19	001BE0047622	Shoulder Screw 5/16" X 3/4" Long X 1/4"-20 UNC	1
20	006BA0077077	Star Wheel - BDF Feed	1
21	006AW0077080	Bushing - Bronze Flange 3/8ID X 5/8OD X 1/4W	1
22	006AW0043464	Bushing - Bronze Flange 1/4ID X 3/8OD X 1/4W IN	1
23	006AU0077072	Cover - BDF Cable Feed	1
24	017AA0044858	Dowel Pin - 1/8 X .750	1
25	001AE0039330	Socket Head Cap Screw 1/4"-20UNC x 3/4" Long Gr 8	8
26	006BA0077067	BRACKET - BDF CAM MOUNT	
27	006BP0076012	Retainer - Vibration Damping Loop Clamp	1
28	001CE0044263	Button Head Cap Screw 1/4-20 UNC X 1/2	1
29	001AE0035255	Socket Head Cap Screw 1/4" - 20 UNC x 1/2" Long Gr 8	2
30	006AL0075816	Retainer - Cable Feed Adjustment	1
31	006AL0075817	Nut - Cable Feed Adjustment	1
32	001DE0044909	Socket Set Screw - Cup Point 1/4-20 UNC X 1/4	1
33	016AA0085050	Spring - Compression .24OD X .038 X .75 Long	1
34	017AA0044266	Dowel Pin 3/16 X 3/4	1
35	016AB0085048	Spring - Extension .36 OD X .037 X 1.25 Loop Ends	1
36	023AD0085102	Bearing - Ball Single Race 0.375ID X 0.875OD X 0.281W in Sealed	2
37	001BE0050840	Shoulder Screw 3/8 X 3/4 Long X 5/16-18 UNC	1
38	001HA0049067	WASHER, 1/4 NOM ID, .500 OD, THICK .032	2
39	001AE0036526	Socket Head Cap Screw 1/4-20 UNC x 1-1/4 Long Gr 8	1
40	001NC0028446	HEX NUT - ZINC PLATED, 1/4-20 UNC, 7/16 A/F, 7/32 H	1

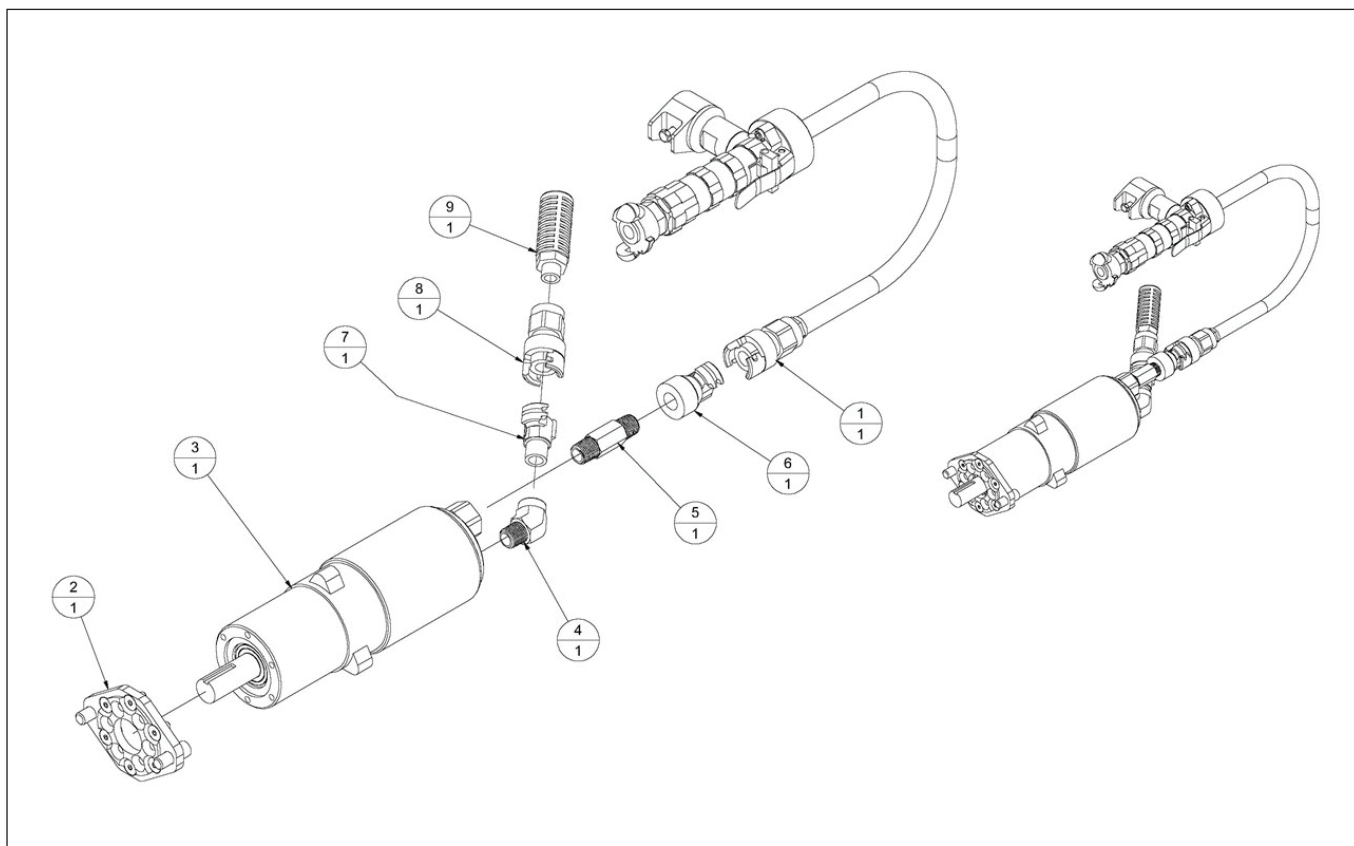
9.41 F0444A0002XX Tripper Assembly Exploded View



9.42 F0444A0002XX Tripper Assembly Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0035257	Socket Head Cap Screw 1/4" - 20 UNC x 5/8" Long Gr 8	2
2	001AE0039330	Socket Head Cap Screw 1/4"-20UNC x 3/4" Long Gr 8	2
3	001DE0044909	Socket Set Screw - Cup Point 1/4-20 UNC X 1/4	1
4	001NB0044860	Hex Lock Nut-Extra Wide Cadmium 3/8-16 UNC, 5/8 A/F, 9/32H	1
5	003AB0051756	Springing Plunger - Locking 5/16-18 X .72" Long	2
6	006AJ0075341	Shaft - Tripper ODM Engagement	1
7	006AW0043462	Bushing - Bronze Flange 3/8ID X 5/8OD X 1/4W in	2
8	006BA0085129	Bracket - Roller Tripper, BDF	1
9	006BA0085130	Bracket - Tripper Cover Mount, BDF	1
10	006BA0085131	Bracket - Tripper Mount, BDF	1
11	006BB0044508	Knob - Flip Style Tripper	1
12	017AA0049072	Dowel Pin 3/16 X 5/8" Long (Standard)	1
13	023AL0052522	Needle Roller Bearing 3/16" ID X 11/32" OD X 1/4" LG	1
14	023AN0052523	Roller - 2250 Facing Tripper	1

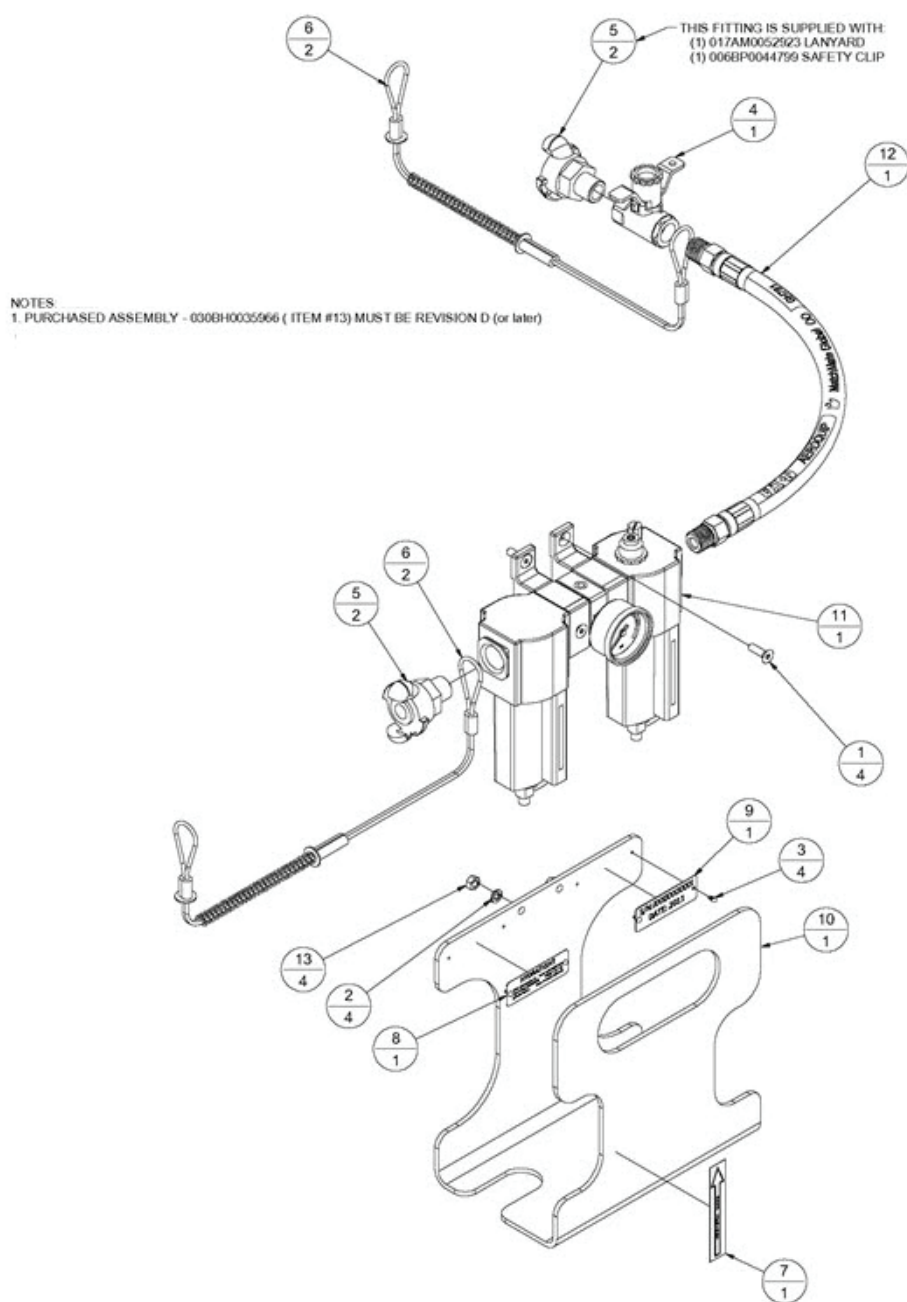
9.43 F4022A1282XB Motor Mount - IR 4840U Reversible Exploded Views



9.44 F4022A1282XB Motor Mount - IR 4840U Reversible Table of Parts

Item Number	Part Number	Description	QTY
1	F4021A1861XX	Deadman's Handle (USA) 2 Hand Start - All Pneumatic Machines	1
2	F4022A1282XX	Motor Mount, BU Facer For Air 4800 Series	1
3	F4023A2017XX	Motor, AIR - Ingersoll Rand 4840U Reversible	1
4	006KC0050686	Fitting - Elbow 45 M/F 1/2 NPT	1
5	006KC0050682	Fitting - Nipple Hex M/M 1/2 NPT X 3" Long	1
6	006BM0050301	Coupling - Thor Grip-Lock Plug - Female End	1
7	006BM0034430	Fitting, Coupling - Thor Grip-Lock Plug	1
8	006BM0034429	Coupling - Thor Female Socket	1
9	030AW0050302	Muffler - Noise Reducing 1/2" NPT male	1

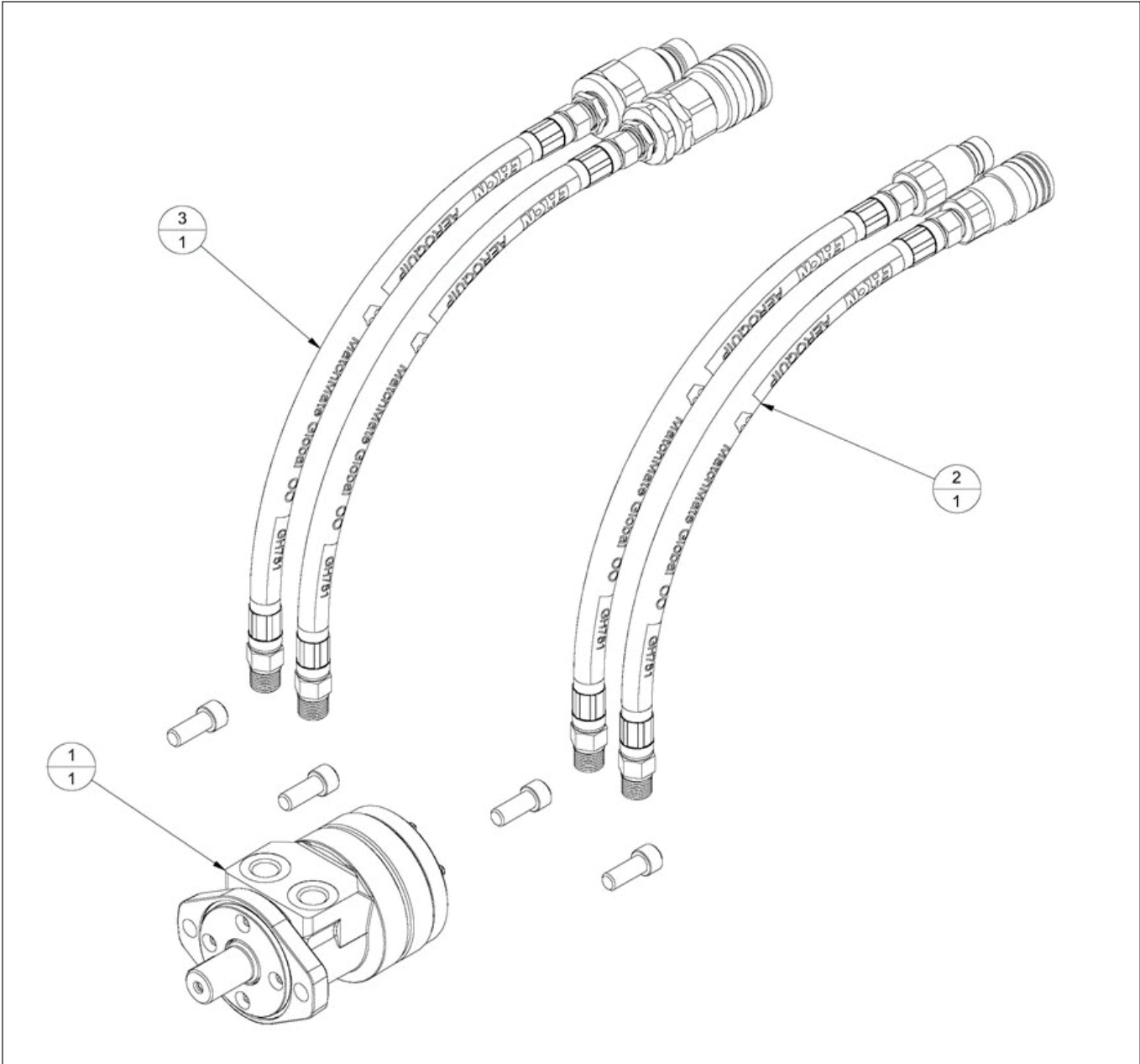
9.45 F4024X1130XX Air Caddy Exploded Views



9.46 F4024X1130XX Air Caddy Table of Parts

Item Number	Part Number	Description	QTY
1	001BT0039328	Countersunk/Flat Head Screw 1/4" -20UNC x 7/8" Long	4
2	001HC0039329	Washer - Spring/Lock - 1/4"	4
3	001TE0044545	Drive Screw VM - #4-7X3/16"	4
4	002PJ0041519	Ball Valve Assembly	1
5	002RG0027859	Universal Adapter Claw Fitting.(1/2" MNPT)	2
6	006AU0045562	Whip Check - 1/2 Hose To Tool	2
7	006BY0045233	Label - "UP" Arrow	1
8	006BY0045270	TAG - Air Caddy Information	1
9	006BY0045271	TAG - Air Caddy Serial Only	1
10	030AH0043961	Air Caddy Stand	1
11	030BH0035966	Lube Filter Sub Assembly	1
12	D2200G0183AB	Hydraulic Hose - 1/2" NPT x 6'	1
13	001NC0028446	Hex Nut - Zinc Plated, 1/4-20 UNC, 7/16 A/F, 7/32 H	4

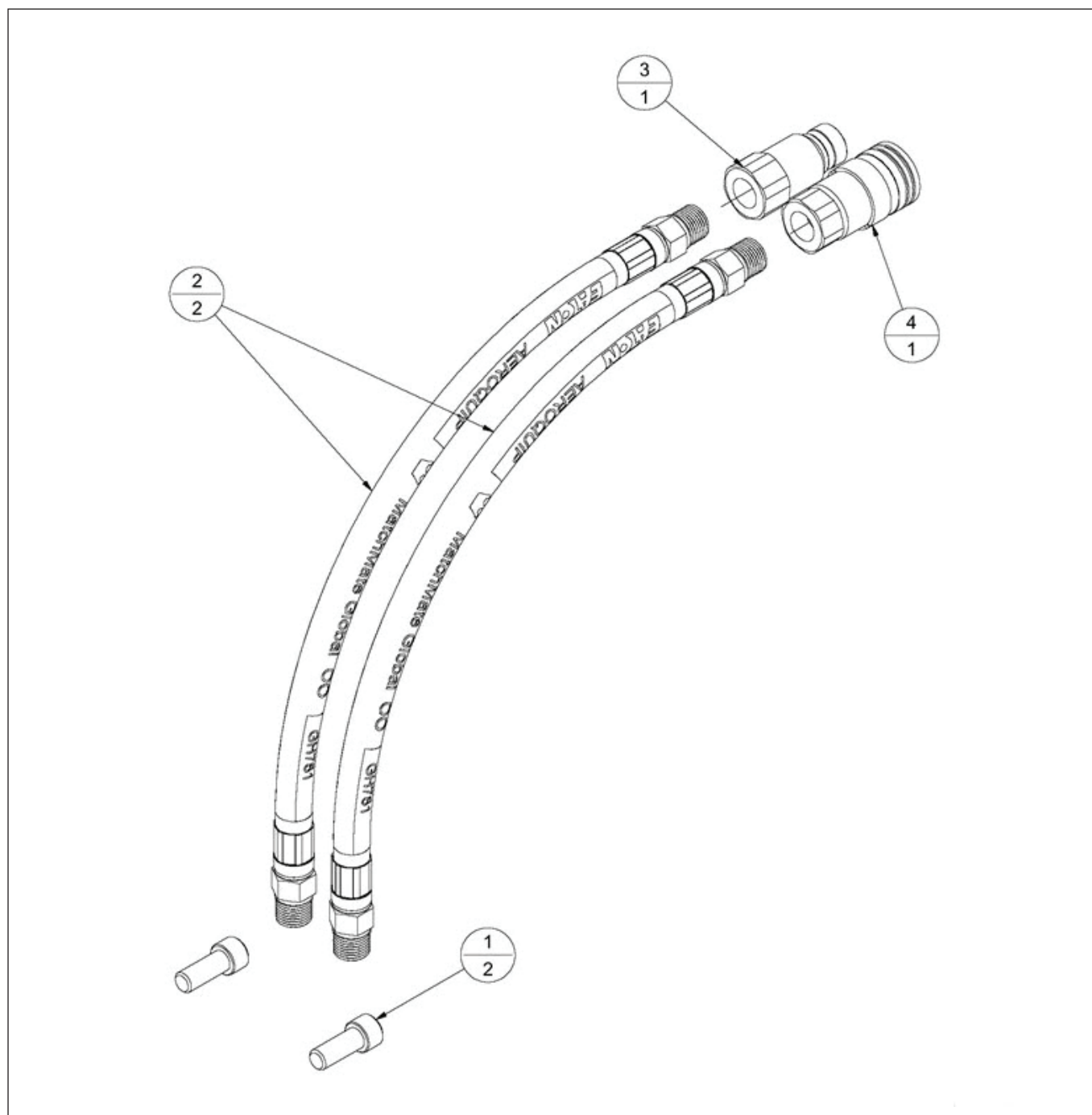
9.47 F4023H0053XX Hydraulic Motor - Eaton S166, 2-Bolt Exploded View



9.48 F4023H0053XX Hydraulic Motor - Eaton S166, 2-Bolt Table of Parts

Item Number	Part Number	Description	QTY
1	F4023H0053XX	Motor, Hydraulic - Eaton S166, Woodruff, 2-Bolt	1
2	F4027X0074HA	Hose Assembly - 2x1/2 Flat Face Couplings - 6ft Long	1
3	F4027X0075HA	Hose Assembly - 2x3/4 Flat Face Couplings - 6ft Long	1

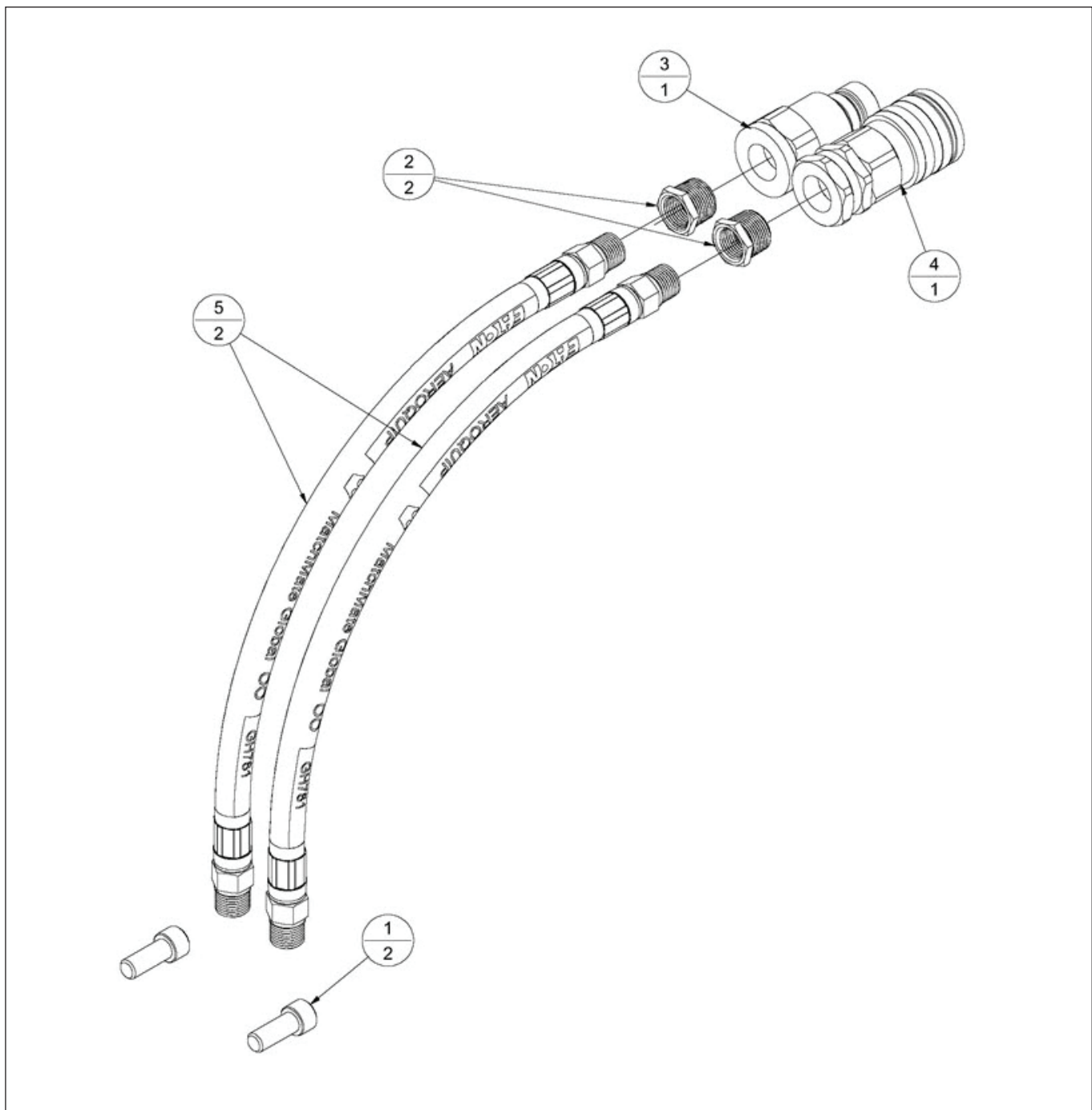
9.49 F4027X0074HA Hose Assembly - 2x1/ 2 Flat Face Coupling - 6ft Long Exploded Views



9.50 F4027X0074HA Hose Assembly - 2x1/ 2 Flat Face Coupling - 6ft Long Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4 Gr8	2
2	D2200G0183AB	6" Hydraulic Hose	2
3	006KC0050691	Fitting - Coupler, Male Quick Disconnect to 1/2-14NPT	1
4	006KC0050122	Fitting - Coupler, Female Quick Disconnect to 1/2-14NPT	1

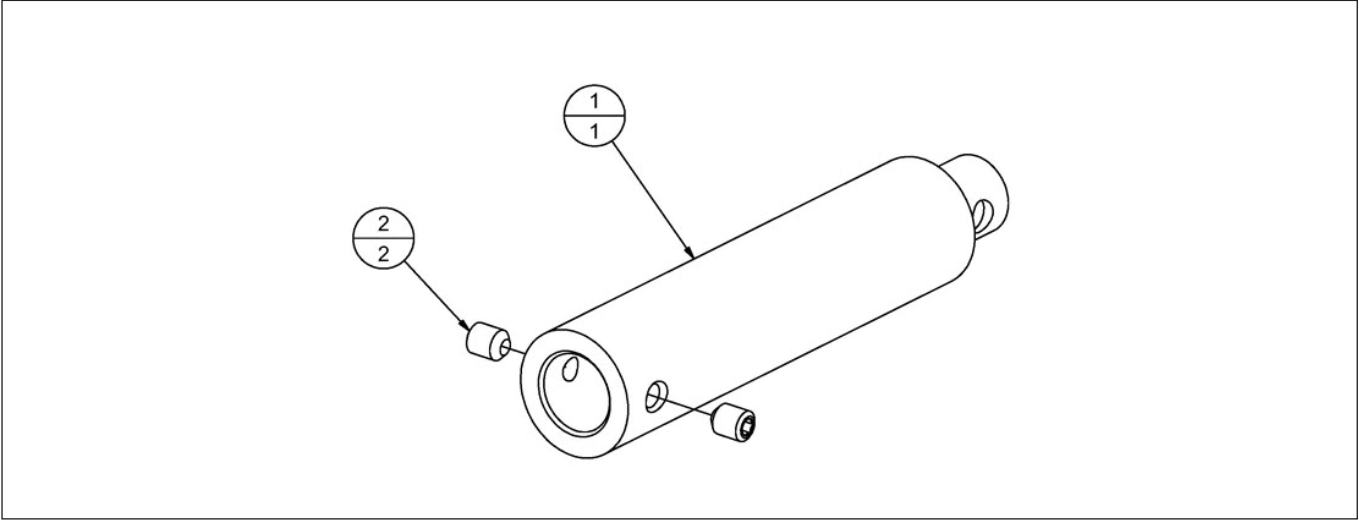
9.51 F4027X0075HA Hose Assembly - 2x3/ 4 Flat Face Coupling - 6ft Long Exploded Views



9.52 F4027X0075HA Hose Assembly - 2x3/ 4 Flat Face Coupling - 6ft Long Table of Parts

Item Number	Part Number	Description	QTY
1	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4 Gr 8	2
2	006KC0045168	Reducer - 3/4"-1/2" NPT	2
3	006KC0045403	Fitting - Coupler, Male Quick Disconnect To 3/4-14 FNPT	1
4	006KC0045404	Fitting - Coupler, Female Quick Disconnect To 3/4-14 FNPT	1
5	D2200G0183AB	6" Hydraulic Hose	2

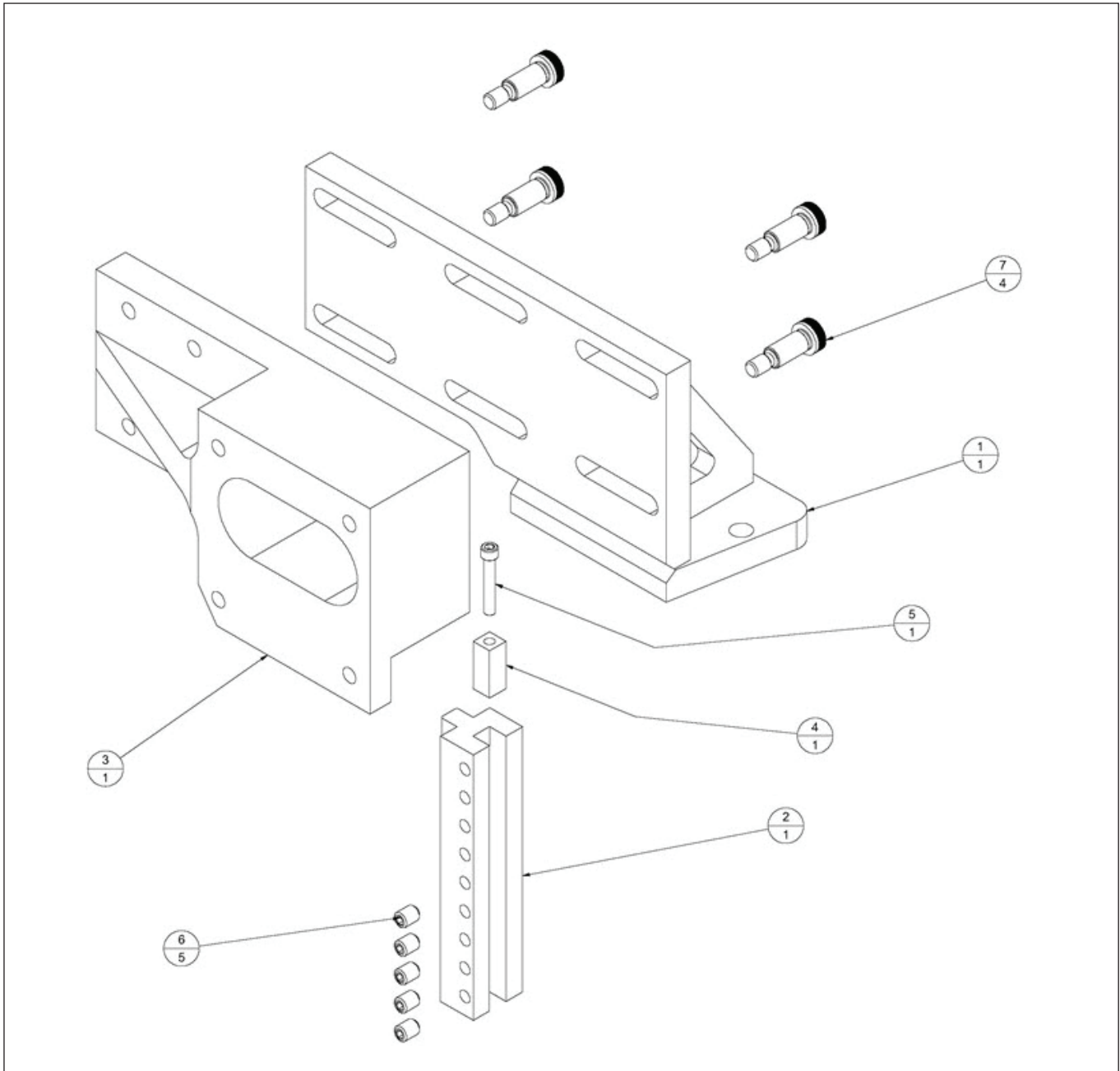
9.53 F0411A0005XX Locator Extension - BDF Exploded Views



9.54 F0411A0005XX Locator Extension - BDF Table of Parts

Item Number	Part Number	Description	QTY
1	006AJ0085264	Shaft - BDF, Locator Extension	1
2	001DT0047717	Socket Set Screw 1/4"-20 UNC X 5/16" Long - Flat Point	2

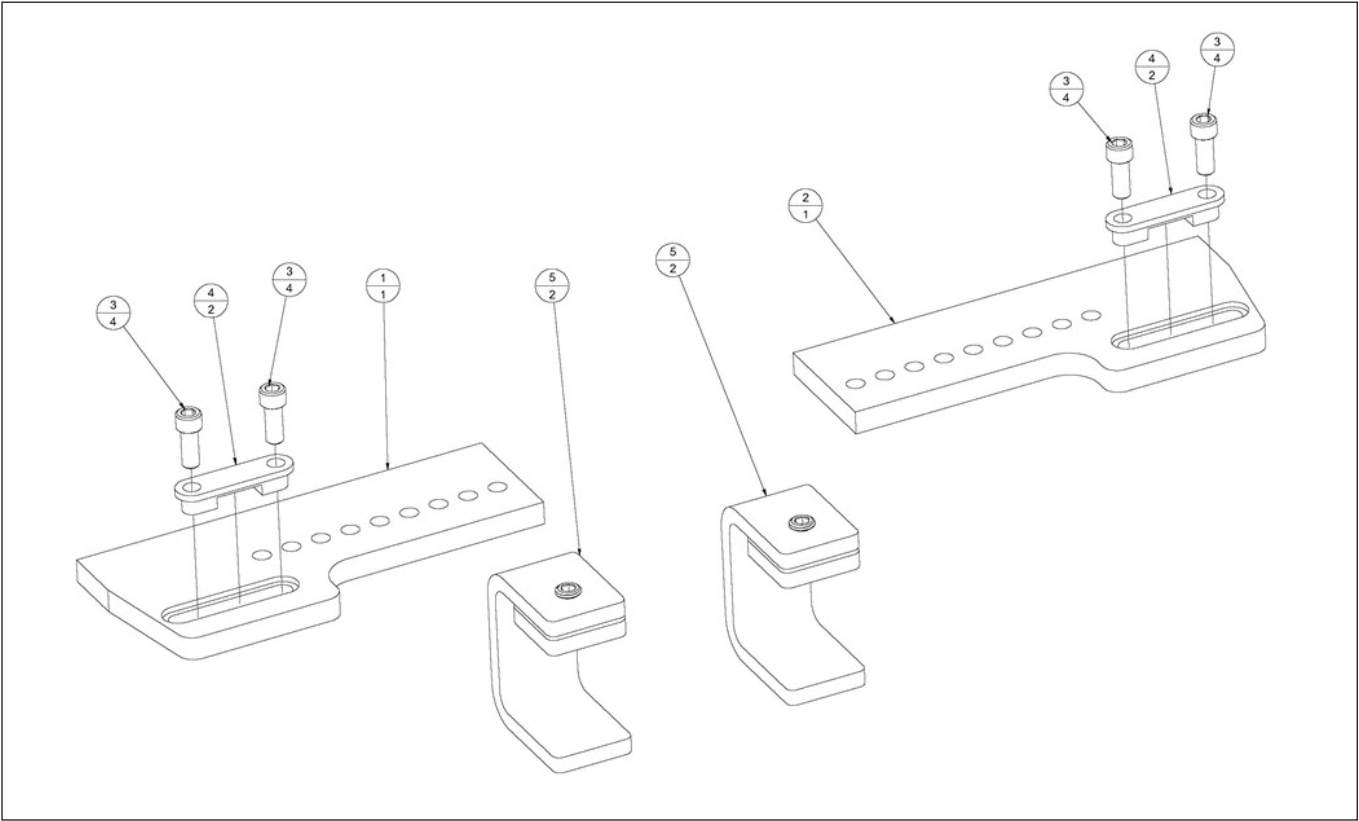
9.55 F0442C0001XX MME Series Back Facing Attachment Exploded View



9.56 F0442C0001XX MME Series Back Facing Attachment Table of Parts

Item Number	Part Number	Description	QTY
1	006BX0085408	Bracket - Back Facing MMe Series	1
2	006BV0085383	Extension - 1/2" Tooling 7" Long	1
3	006BH0085382	Spacer - BDF Back Facing	1
4	006BB0085384	Adjuster Block - 1/2 X 1/2 X 1.25	1
5	001AE0044235	Socket Head Cap Screw 1/4-20 UNC X 1-1/2 Gr 8	1
6	001DE0040318	Socket Set Screw (Grub) 3/8"-16UNC x 1/2" Long - Cup Point	5
7	001BE0047550	Shoulder Screw 1/2" X 1"	4

9.57 F0442D0002XX MME Series Heat Exchanger Milling Kit Exploded Views



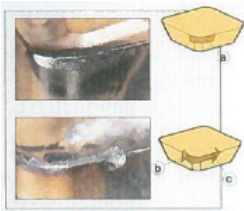
9.58 F0442D0002XX MME Series Heat Exchanger Milling Kit Table of Parts

Item Number	Part Number	Description	QTY
1	006BH0085412	Plate - Milling Mount LH	1
2	006BH0085413	Plate - Milling Mount RH	1
3	001AE0044220	Socket Head Cap Screw 1/2-13 UNC X 1-1/4	4
4	006BA0085414	Clamp - MMe Series Milling Rail	2
5	F0442D0001XX	Clamp Assembly - MMe Series	2

10. Troubleshooting



NO MACHINE ADJUSTMENTS SHOULD BE MADE WHILE THE MACHINE IS IN OPERATION. TURN AND LOCK OFF THE ISOLATION VALVE ON THE PNEUMATIC SUPPLY BEFORE MAKING ANY ADJUSTMENTS.

Issue	Reason for wear		
Flank & notch wear 	a) Rapid flank wear	a) Cutting speed too high or insert has insufficient wear resistance.	Reduce cutting speed. Select more resistant grade of insert.
		a) Feed too low	Increase feed rate
	b)/c) Notch wear causing poor surface finish & risk of edge breaking.	b)/c) Material work hardens	Reduce cutting speed. Select tougher grade
			Increase cutting speed.
Frittering 	Small cutting edge fractures (frittering) causing poor surface finish and excessive flank wear.	Grade too brittle.	Select tougher grade.
		Insert geometry too weak.	Select insert with tougher geometry
		Built up edge	Increase cutting speed or select a positive geometry.
			Reduce feed at beginning of cut.
Poor Surface finish 	Wavy, rough or inconsistent finish on work piece.	Feed too high	Reduce feed.
		Wrong insert position	Change position
		Deflection	Check overhang
		Bad stability	Check stability
Thermal cracks 	Small cracks perpendicular to the cutting edge causing frittling and poor surface finish.	Thermal cracks due to temperature variations caused by: Intermittent machining	Select a tougher grade with better resistance to thermal shocks
		Varying coolant supply	Coolant should be applied copiously or not at all.
Built up edge (B.U.E) 	Built up edge causing poor surface finish and cutting edge frittling when the B.U.E. is torn away	Work piece material is welded to the insert due to : Low cutting speed	Increase cutting speed
		Low feed	Increase feed
		Negative cutting geometry.	Select a positive geometry

Issue	Reason for wear		
Vibrations	Machine vibrates badly causing poor surface finish/accelerated machine wear.	Wrong cutting data	Reduce cutting feed
			Increase cutting feed
			Change cutting depth
		Bad stability	Reduce overhang
		Cable feed running out of stroke	Make cable adjustments

Symptom	Possible Cause	Corrective Action
The machine will not rotate	1. Hydraulic/Pneumatic/Electric supply not available	Check supply
	2. Hydraulic/Pneumatic/Electric supply is below the minimum required to operate the machine	Check supply
	3. Drive motor faulty	Remove motor and check operation
	4. Drive belt is broken	Replace with new belt
	5. Drive belt is slipping	Tighten drive belt
	6. Faulty valve or emergency shut off operational	Check supply to motor
The machine does not traverse	1. The feed gearbox or tripper is not engaged	Place in engaged position
	2. Feed Cable is broken	Replace feed cable
	3. Depth of cut too deep	Remove cut and check rotation
Poor surface finish on the face	1. Machine out of balance	Check balance
	2. Machine base incorrectly installed	Check installation
	3. Machine installation bolts not tightened	Check bolts
	4. Tool inserts worn or damaged	Check tool & replace
	5. Depth of cut too deep	Reduce depth of cut
	6. Too much play in tool post gib strip or carriage	Adjust tool post & carriage
	7. Too much play in cutting head bearings	Adjust bearing eccentrics
	8. Worn drive motor	Check motor
	9. Poorly adjusted surfacing arm	Check and adjust
	10. General poor machine condition	Refer to the manufacturer

Appendix - Additional Reference Material

A- Additional Technical Data

A1 Recommended general torque settings for fasteners

Thread Ø	Tensile Strength		Torque Setting		
	kN	lbs	Nm	in – lbs	ft-lbs
#10 - 32	13	3,000	6.78	60	5
1/4 - 20	21	4,770	14.97	133	11
1/4 - 28	24	5,460	17.23	153	13
5/16 - 18	35	7,860	31.35	278	23
5/16 - 24	39	8,700	34.74	308	26
3/8 - 16	52	11,625	56.21	498	41
3/8 - 24	59	13,170	63.27	560	47
7/16 -14	71	15,945	89.54	793	66
7/16 - 20	79	17,805	98.86	875	73
1/2 - 13	95	21,285	137.56	1,218	101
1/2 - 20	107	23,985	155.35	1,375	115
5/8 - 11	151	33,900	257.04	2,275	190
5/8 - 18	135	30,450	290.94	2,575	215
3/4 -10	223	50,100	451.94	4,000	333
3/4 - 16	249	55,950	508.43	4,500	375

B2 Cutting feed and speed calculations

To find	Using	Metric		English	
Cutting speed	RPM, Dia	m/min	$V = \text{RPM} \times 0.00314 \times \text{Dia}$	Ft / min	$V = \text{RPM} \times \text{Dia} \times 3.82$
RPM	V , Dia	Revs/min	$\text{RPM} = \frac{V}{3.14 \times \text{Dia}} \times 1000$	Revs /min	$\text{RPM} = \frac{V}{\text{Dia} \times 3.82}$
Feed rate	RPM, FPT, NT	mm/min	$\text{FR} = \text{RPM} \times \text{FPT} \times \text{NT}$	Inches/min	$\text{FR} = \text{RPM} \times \text{FPT} \times \text{NT}$
Feed per Tooth	FR, RPM, NT	mm/tooth	$\text{FPT} = \frac{V}{\text{RPM} \times \text{NT}}$	Inches/tooth	$\text{FPT} = \frac{V}{\text{RPM} \times \text{NT}}$
Feed / Rev	RPM, FR	mm/Rev	$\text{FRR} = \text{FR} / \text{RPM}$	Inches/Rev	$\text{FRR} = \text{FR} / \text{RPM}$
Metal removal	DC, RC, FR	cm ³ /min	$\text{MR} = \text{DC} \times \text{RC} \times \text{FR} \times 1,000$	Inches ³ /min	$\text{MR} = \text{DC} \times \text{RC} \times \text{FR}$
Horse Power	MR, C, WC,PC	HP	$\text{HP} = \text{MR} \times \text{C} \times \text{WC} \times \text{PC} \times 0.015$	HP	$\text{HP} = \text{MR} \times \text{C} \times \text{WC} \times \text{PC}$

V = cutting speed (m/min or Ft/min)

Dia = Diameter of cutting tool

RPM = spindle revs /min

FPT = Feed per tooth (mm or Inches)

NT = Number of teeth

FR = Feed rate (mm/min or inches/min)

FRR = Feed rate per revolution

DC = axial depth of cut

RC = radial engagement of cut (mm or inches)

MR = Metal removal rate (cm³/min or inches³/min)

HP = horse power (estimate of the power required at the motor assumes 75% efficiency)

C = cutting edge constant (from table 1)

WC = wear constant (from table 2)

PC = power constant (from table 3)

Table 1 (Use FPT number in feed rate calculation to obtain cutting edge constant C)							
Feed in	C	Feed in	C	Feed mm	C	Feed mm	C
0.002	1.40	0.018	0.94	0.02	1.40	0.45	0.94
0.004	1.25	0.020	0.90	0.10	1.25	0.50	0.90
0.006	1.15	0.025	0.86	0.15	1.15	0.60	0.86
0.008	1.08	0.030	0.83	0.20	1.08	0.75	0.83
0.010	1.04	0.035	0.80	0.25	1.04	0.90	0.80
0.012	1.00	0.040	0.78	0.30	1.00	1.00	0.78
0.014	0.97	0.050	0.75	0.35	0.97	1.25	0.75
0.016	0.94	0.060	0.72	0.40	0.94	1.50	0.72

Table 2 (Determine the type of operation to obtain constant W)	
Type of operation	W
Turning – finishing cuts	1.00 – 1.10
Turning – roughing cuts	1.60 – 2.0
Milling – finishing cuts	1.10 – 1.25
Milling – Heavy metal removal face milling	1.30 – 1.60
Drilling – normal to hard to drill materials	1.30 – 1.50

Table 3 (Determine material to obtain constant PC)				
Material Type	Hardness - HB	Tensile Strength – n/mm ²	PC (inch)	PC (metric)
Plain carbon steels	<200	< 700	0.51 – 0.62	1.39 – 1.69
Free machining and stainless steels	< 260	< 850	0.74 – 0.92	2.02 – 2.51
Alloy steels	< 340	< 1200	0.80 – 1.00	2.18 – 2.73
High alloy steels and castings	< 450	< 1500	1.00 - 1.20	2.73 – 3.28
Aluminium		< 300	0.25 – 0.33	0.68 – 0.90
Cast iron	< 300		0.63 – 0.86	1.72 – 2.35
Stainless steel	< 340	< 1200	0.80 – 1.00	2.02 – 2.51
Heat resistant super alloys		< 1250	1.00 – 1.10	2.73 – 3.00

B3 Flange face surface finish

ANSI / ASME 16.5, 16.47, 16.42 - ISO 7005-1

Finish	Surface Finish	Feed Rate
RF - Stock finish	125-500 μ in	0.032"
	3.2-12.5 μ m	0.80mm
RF - Smooth	125-250 μ in	0.012"
	3.2-6.3 μ m	0.30mm
Hydrogen	79-125 μ in	0.008"
	2-3.2 μ m	0.20mm
RTJ	32-63 μ in	0.008"
	0.8-1.6 μ m	0.20mm

Micrometer μ m	Micro - inch μ in	Roughness Grade N	Roughness Grade ∇
12.5	500	N10	∇
6.3	250	N9	$\nabla\nabla$
3.2	125	N8	$\nabla\nabla$
1.6	63	N7	$\nabla\nabla$
0.8	32	N6	$\nabla\nabla\nabla$
0.4	16	N5	$\nabla\nabla\nabla\nabla$

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