

CE

BB5500

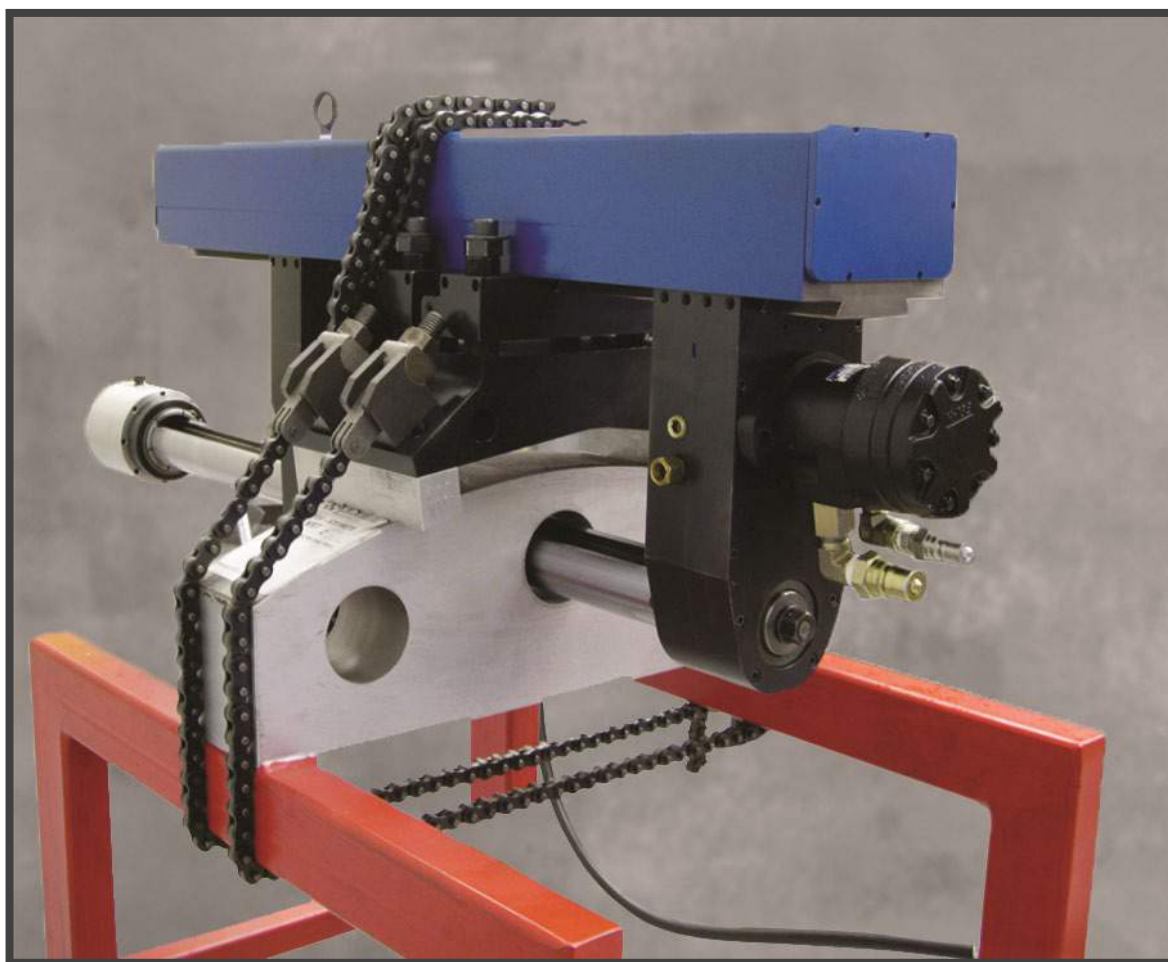
BORING MACHINE

OPERATING MANUAL

SERIAL NUMBER RANGE:

11017900 - 11021000

ORIGINAL INSTRUCTIONS



CLIMAX
Portable Machining & Welding Systems

P/N 29327
May 2019
Revision 3

CLIMAX | **BORTECH** **CALDER** **H&S** TOOL

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LIMITED WARRANTY

CLIMAX Portable Machine Tools, Inc. (hereafter referred to as "CLIMAX") warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. CLIMAX will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

CLIMAX warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping pre-paid, to the factory. CLIMAX will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from CLIMAX.

About this manual

CLIMAX provides the contents of this manual in good faith as a guideline to the operator. CLIMAX cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

General Safety

The primary challenge for most on-site maintenance is that repairs are often done under difficult conditions.

Climax Portable Machining & Welding Systems leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. As the operator of this machine, you are expected to do your part by scrutinizing the job site and closely following the operating procedures outlined in this manual, your own company rules, and local regulations. Save all warnings and instructions for future reference.



WARNING

For maximum safety and performance, read and understand this entire manual and all other related warnings and safety instructions before using this equipment. Failure to follow the warnings, instructions and guidelines in this manual could cause personal injury, fatalities, electric shock, fire and/or property damage.

QUALIFIED PERSONNEL

Before operating this machine, you must receive training specific to this machine from a qualified trainer. If you are not familiar with the proper and safe operation, do not use the machine.

OBEY WARNING LABELS

Obey all warnings and warning labels. Failure to follow instructions or heed warnings could result in injury, or even be fatal. Proper care is your responsibility. Contact Climax immediately for replacement of damaged or lost manuals or safety decals. 1-800-333-8311

INTENDED USE

Only use the machine according to the instructions in this operating manual. Do not use this machine for any purpose other than the intended use as described in this manual. When using the tools, machine, accessories and/or tool bits, you must determine the proper working conditions and the work to be performed.

STAY CLEAR OF MOVING PARTS

Keep clear of the machine during operation. Never lean toward or reach into the machine to remove chips or to adjust the machine while it is running. Keep bystanders away while operating this machinery.

ROTATING MACHINERY

Rotating machinery can seriously injure an operator. Lock out all power sources before you interact with the machine.

KEEP YOUR WORK AREA CLEAN AND TIDY

Keep all cords and hoses away from moving parts during operation. Do not clutter the area around the machine. Keep the work area clean and well lit.

AMBIENT LIGHTING

Do not operate this machine in ambient lighting that is less than normal intensity.

SECURE LOOSE CLOTHING AND LONG HAIR

Rotating machinery can seriously injure an operator as well as others close by. Don't wear loose fitting clothing or jewelry. Tie back long hair or wear a hat.

HAZARDOUS ENVIRONMENTS

Do not use the machine in a hazardous environment, such as near explosive chemicals, flammable liquids, gasses, toxic fumes, or inappropriate radiation hazards.

HOSES, PENDANT AND ELECTRICAL CABLES

Do not abuse the pendant cable as this can damage the cable and pendant. Never use the cord for carrying, pulling or unplugging. Remove any and all kinks before straightening the cable. Keep cords and hoses away from heat, oil, sharp edges or moving parts. Plugs must match the outlet. Never modify the plugs in any way. Do not use an adapter plug with grounded power tools. Do not expose the machine to rain or wet conditions. Always examine hoses and cables for damage before use. Be cautious and never drop electrical equipment, this will damage the components.

REPETITIVE MOTION

Individuals can be susceptible to disorders of the hands and arms when exposed to tasks that involve highly repetitive motions and/or vibration.

STAY ALERT

Stay alert, watch what you are doing and use common sense when operating machinery. Do not operate machinery while you are tired or under the influence of drugs, alcohol or medication.

Machine Specific Safety

All aspects of the machine have been designed with safety in mind. Following are safety practices that you should keep in mind when using the Climax BB7000 Boring Bar Machine.

PERSONAL PROTECTIVE EQUIPMENT

Eye and hearing protection must be worn while using the machine. These safety items do not impose constraints to the safe operation of the machine.

OPERATING CONDITIONS

Do not operate the machine if it is not mounted to the workpiece as described in this manual.

TOOLING

The machine is provided with all the tools for the setup and operation of the machine. Remove all adjustment tools before starting the machine.

LIFTING

Most of the machine components are heavy and must be moved or lifted with approved rigging and practices. Climax accepts no responsibility for the selection of lifting equipment. Always follow your plant's procedures for lifting heavy objects. Do not lift heavy objects by yourself as serious injury can result.

CUTTING TOOLS AND FLUIDS

There are no cutting or cooling fluids supplied with this machine. Keep cutting tools sharp and clean.

CONTROLS

The machine controls are designed to withstand the rigors of normal use and external factors. The on-off switches are clearly visible and identifiable. If hydraulic power supply failure occurs, be sure to turn off the supply before leaving the machine.

DANGER ZONE

The operator and other persons can be anywhere in the vicinity of the machine. The operator must make sure there are no other persons in danger from the machine.

METAL FRAGMENT HAZARD

The machine produces metallic fragments during normal operation. You should wear eye protection at all times when working with the machine. Only remove fragments with a brush after the machine has stopped completely.

HAZARDOUS ENVIRONMENTS

Do not use the machine in a hazardous environment, such as near explosive chemicals, toxic fumes, or a radiation hazard.

RADIATION HAZARDS

There are no systems or components on this machine that are capable of producing hazardous EMC, UV or other radiation hazards. The machine does not use lasers nor does it create hazardous materials such as gasses or dust.

ADJUSTMENTS AND MAINTENANCE

All adjustments, lubrication and maintenance should be done with the machine stopped, and locked out from all power sources. The shut-off valves should be locked and tagged out before performing any maintenance. Do not operate the machine if moving parts are misaligned, binding or broken. If the machine or parts are damaged, have the machine repaired before use.

WARNING LABELS

Warning labels are already attached to your machine. Contact Climax immediately if replacements are required.

MAINTENANCE

Be sure the machine components are free of debris and properly lubricated prior to use. Have your machine serviced by a qualified repair person using only identical replacement parts

STORED ENERGY

Hydraulic fluids could still be under pressure! Make sure the HPU is shut off and locked out properly.

MSDS

Material Data Safety Sheets are included in the maintenance manual.


UNINTENTIONAL STARTING


Prevent unintentional starting. The machine must be properly locked out and/or shut down before maintenance.


Labeling Guidelines


The purpose of product safety signs and labels is to increase the level of awareness to possible dangers.


Safety alert symbols indicate **DANGER**, **WARNING** or **CAUTION**. These symbols may be used in conjunction with other symbols or pictographs. Failure to obey safety warnings can result in serious injury. Always follow safety precautions to reduce the risk of hazards and serious injury:

	DANGER
	Indicates a hazardous situation that could be fatal or cause serious injury.

	WARNING
	Indicates a potentially hazardous situation that could be fatal or cause serious injury.

	CAUTION
	Indicates a potentially hazardous situation that could result in minor to moderate injury, damage to the machine or interruption of an important process.

	IMPORTANT
	Provides critical information for the completion of a task. There is no associated hazard to people or the machine.

	TIP
	Provides important information regarding the machine.

Risk assessment and hazard mitigation

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure attached to it become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool and the workpiece as a whole.

Risk assessment checklist

Use these checklists as part of your on-site risk assessment and include any additional considerations that may pertain to your specific application.

TABLE 1. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

Before Set-up	
<input type="checkbox"/>	I took note of all the warning labels on the machine.
<input type="checkbox"/>	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
<input type="checkbox"/>	I considered the need for personnel safety guarding and installed any necessary guards.
<input type="checkbox"/>	I read the Machine Assembly instructions and took inventory of all the items required but not supplied.
<input type="checkbox"/>	I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine.
<input type="checkbox"/>	I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.
<input type="checkbox"/>	I considered how this machine operates and the best placement for the controls, cabling, and the operator.
<input type="checkbox"/>	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 2. RISK ASSESSMENT CHECKLIST AFTER SET-UP

After Set-up	
<input type="checkbox"/>	I checked that the machine is safely installed and the potential fall path is clear. If the machine is elevated, I checked that the machine is safeguarded against falling.
<input type="checkbox"/>	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
<input type="checkbox"/>	I planned for containment of any chips or swarf produced by the machine.
<input type="checkbox"/>	I followed the Maintenance Intervals with the recommended lubricants.
<input type="checkbox"/>	I checked that all affected personnel have the recommended personal protective equipment, as well as any equipment required by the site or other regulations.
<input type="checkbox"/>	I checked that all affected personnel understand the danger zone and are clear of it.
<input type="checkbox"/>	I evaluated and mitigated any other potential risks specific to my work area.

Warning Labels

The following labels are affixed to the machine. If these are damaged or lost, call Climax immediately for replacements.



CE Mark

The Declared **Sound Power** Level is:

$L_{WA} = 72.6$ dBA

The Declared **Operator Sound Pressure** Level is:

$L_{pA} = 64.0$ dBA

The Declared **Bystander Sound Pressure** Level is:

$L_{pA} = 62.0$ dBA

Sound levels are under 85 dBA, hearing protection not required.

The preceding sound information is for the BB5500 machine only. The power supply which is used with the BB5500 machine will increase the sound levels and may necessitate the use of hearing protection.



Name of manufacturer:

Climax Portable Machining and Welding Systems

Full postal address including country of origin:

2712 E. Second St., Newberg, OR 97132, USA

This declaration of conformity is issued under the sole responsibility of the manufacturer (stated above).

Object of the declaration:

Boring bar

Name, type or model, batch or serial number

BB5500

13000444 to 20000000

[Click here to enter text.](#)

Standards used, including number

EN349-Safety of Machinery; Min Gaps

EN953- Safety for Machinery; Guards

EN982+A1-Safety of Machinery Fluid

Power

EN3744-Acoustics Determination of Sound

EN4414-Pneumatic Fluid Power

EN3744-Acoustics Determination of Sound

EN11201-Acoustics; Noise Emitted

EN12100-1-Safety for Machinery; General

Principals

EN12100-2-Safety for Machinery; General

EN13732-CE Marking

EN13857-Safety of Machinery-safety distances

EN13849-1-Safety of Machinery-Control Systems

EN61000-6-2 Electromagnetic compatibility

EN61000-6-4-Electromagnetic compatibility

Full postal address if different from manufacturers

Climax GmbH

Am Langen Graben 8

52353 Duren, Germany

Declaration

I declare that as the Manufacturer, the above information in relation to the supply / manufacture of this product, is in conformity with the stated standards and other related documents following the provisions of the above Directives and their amendments.

Signature of Manufacturer: 

Position Held: VP of Engineering

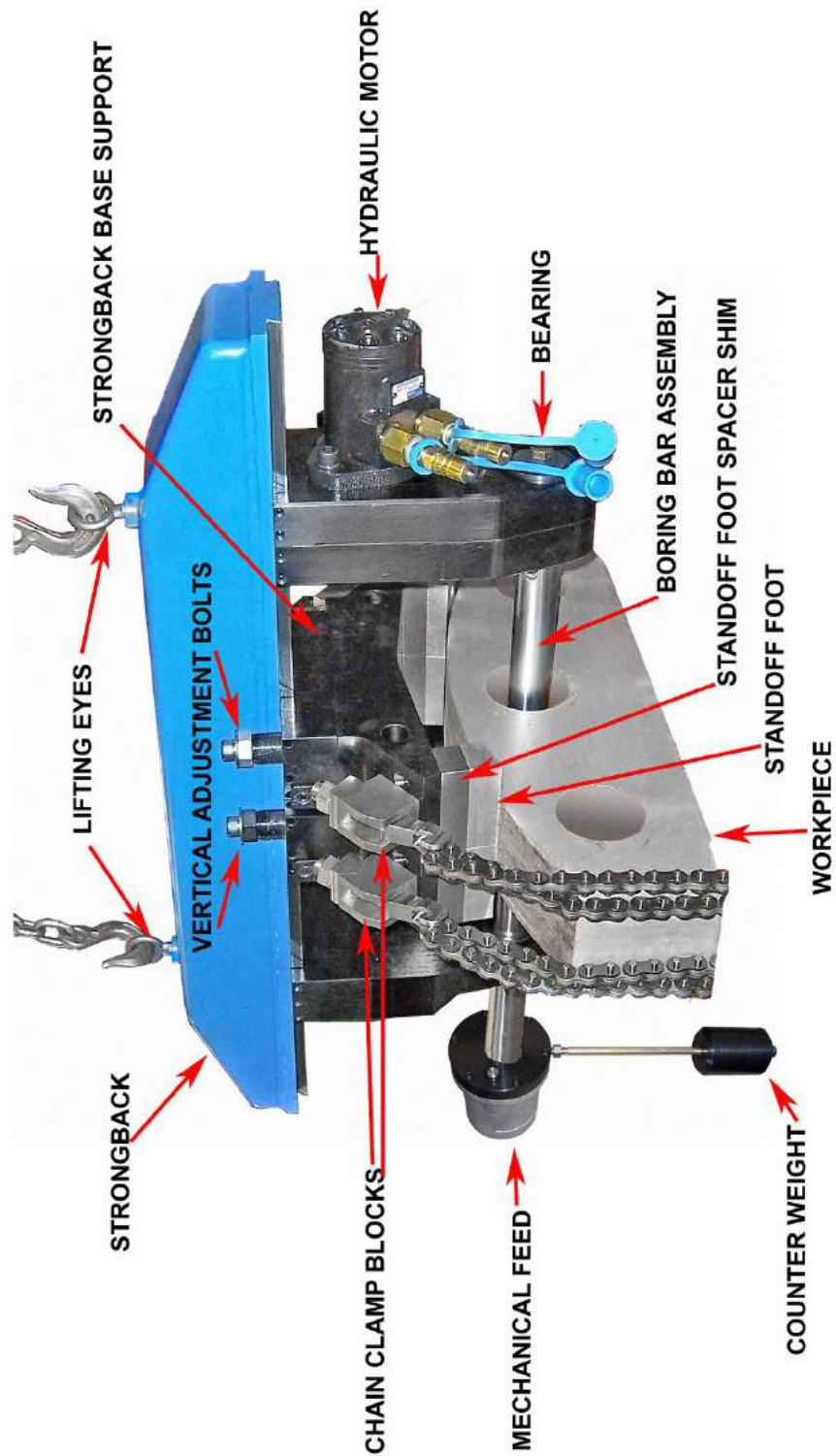
Date: 



Introduction

The Climax Model BB5500 Turbine Coupling Boring Machine is an ID-(Inside Diameter) machine designed to bore precision coupling bolt holes on turbines or other coupling applications. The extremely rigid and compact BB5500 enables just one operator to set up the machine and quickly bore precisely aligned bolt holes the first time. The feed bar removal feature enables the operator to measure and inspect the bore without the need to re-set the machine.

Climax BB5500 Components



Receiving Your Machine

The Climax Model BB5500 was run tested and thoroughly inspected before leaving the factory. When leaving the factory, the machine is packaged well for the demands of normal transportation. Climax cannot, however, guarantee the condition upon arrival of the machine.

Inspect your machine upon receipt.

1. Inspect the machine for shipping damage.
2. Check the items you received against the items listed on the invoice.
3. Contact Climax immediately should there be damage or for any questions you have about the machine.



WARNING

A crane, or hoist, is required to remove the machine from the crate. Before lifting the machine, be sure the crane, or hoist, has a steady hold. Uncontrolled swinging or falling of the machine can cause serious injury, death and damage to the machine.

Setup

Setup of the BB5500 Turbine Coupling Machine consists of the following steps:

1. Remove the machine from the crate.
2. Inspect the machine and perform routine maintain as necessary.
3. Remove the motor: Do not install the motor to the machine until you are ready to begin machining the work piece. This will ease your setup process.
4. Remove the lower bearing hanger and boring bar.
5. Center the strongback supports..
6. Attach the block feet. The machine needs to be spaced properly from the coupling/workpiece.
7. Set the machine on the workpiece.
8. Install the RDU.
9. Roughly position the machine onto the workpiece.
10. Install the bearing hanger.
11. Slide the boring bar into the machine.
12. Align the boring bar within the workpiece.
13. Prepare the machine for hydraulic power use.
14. Install the axial feed box.
15. Setup the tooling.

Remove the Machine from the Crate

The machine is equipped with a form fitted container for storage and shipping. With a modular design, the machine can be broken down into components to ease setup.

Climax recommends using a sling or other suitable lifting device. The machine is fitted with two lifting eyes which serve as stable lift points.

To remove the machine from the crate

	<p style="text-align: center;">WARNING</p> <p>Before lifting the machine, be sure the crane, or hoist, has a steady hold. Uncontrolled swinging or falling of the machine can cause serious injury, death and damage to the machine.</p>
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1. Use the lifting eyes to lift the machine with a crane or hoist out of the crate.
2. Keep the machine in the air to perform necessary setup procedures as indicated in the following.

Inspect the Machine

To maximize the life of the machine, keep all components of the machine in clean, working order. Make sure parts such as each mounting surface, the lead screw, hydraulic fittings, and the tool bit itself are free of metal chips, nicks or burrs.

For detailed information about machine maintenance, see “Maintenance.”

Remove the Motor

Do not install the motor to the machine until you are ready to begin machining. The motor mounted to the machine can make setup of the machine unnecessarily complicated.

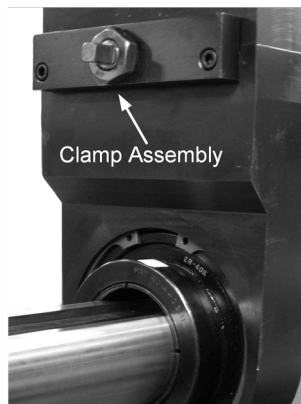
To remove the motor

Undo the motor's mounting bolts and slide it from the rotational drive assembly.

Remove the Lower Bearing Hanger and Boring Bar

Do the following to remove the lower bearing hanger and boring bar.

1. Loosen the clamp assembly.



2. Remove the lower bearing hanger assembly and the boring bar at the same time.





CAUTION

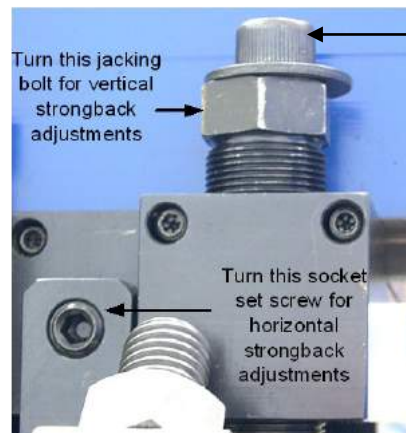
Use caution when handling the lower bearing hanger assembly and boring bar. These assemblies are heavy. Dropping them can cause damage to the machine and personal injury.

Centering the Strongback Supports

Center the strongback supports before mounting the machine onto the work piece. Centering the strongback supports to make sure you have the maximum amount of room to properly adjust the boring bar within the work piece.

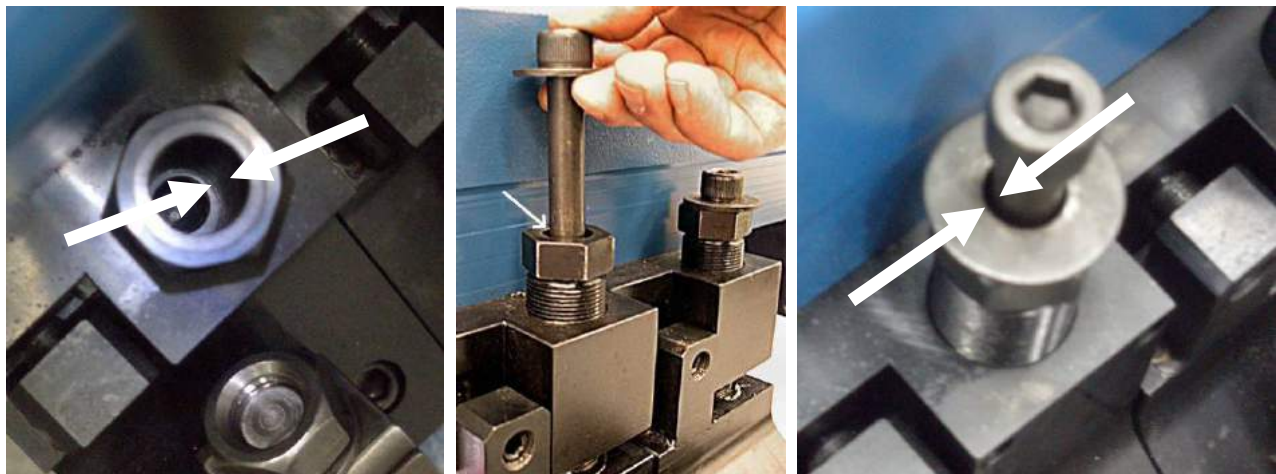
Center the strongback supports using the following adjustment points:

- Use the jacking bolts to make vertical adjustments
- Use the 1/2-20 socket set screws (round nose) to adjust the strongback side to side.



Jacking bolt detail

When making horizontal adjustments, the limiting factor in the machine is the space between the 1/2-20 x 4-1/2 SHCS screw (part 27550) and the jacking bolts, as shown below.



Horizontal adjustment limit



Adjust the strongback supports vertically.

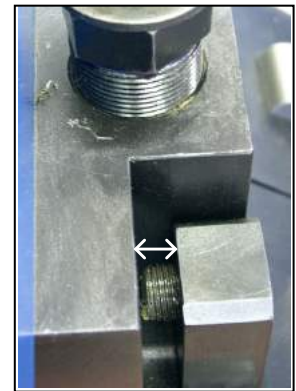
Loosen the socket head cap screw locking bolt.

Turn the jacking bolts on both sides of the strongback base support so that the number of threads above and below the support strongback (P 25591) is equal. Repeat the procedure for the other strongback base support.

Center the machine vertically.

Adjust the strongback supports horizontally.

Turn the socket set screws out on either side of the support. The amount of space between the set screw and the strongback support should be equal on both sides. Repeat the procedure for the other support.

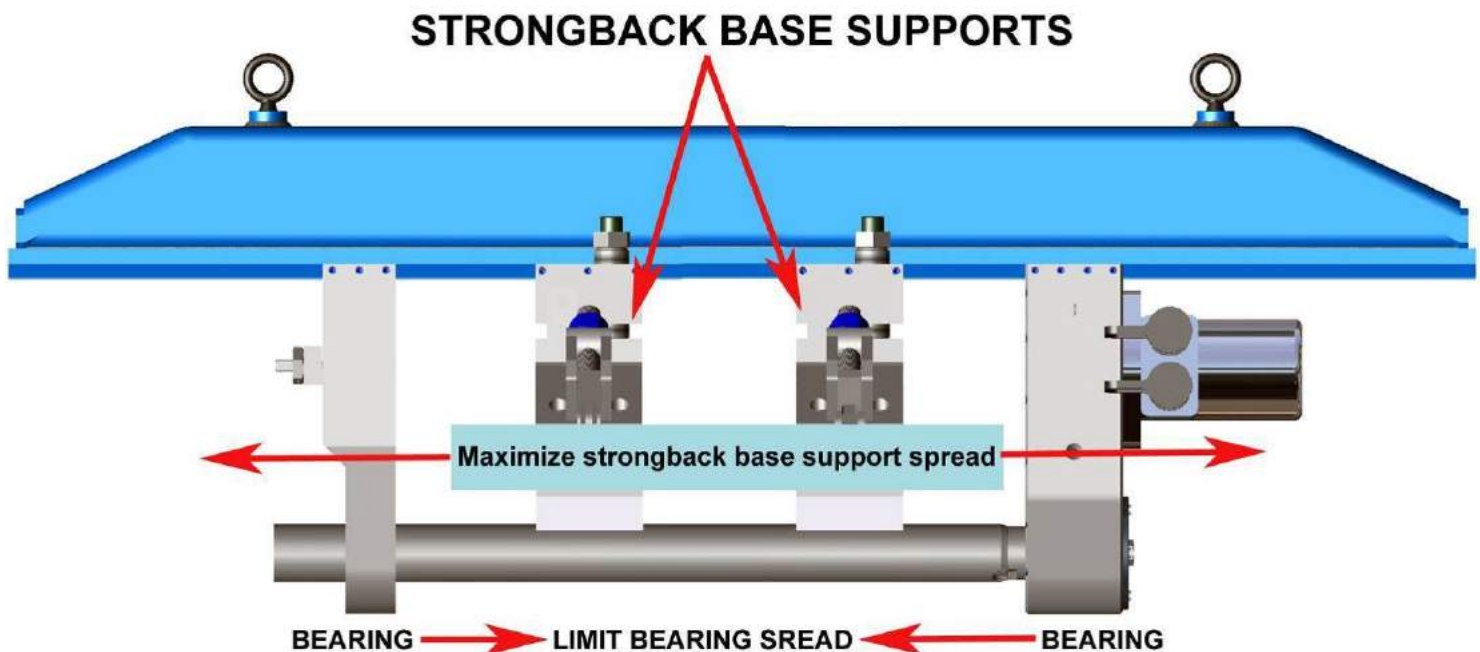


Center the machine horizontally.

Prepare the Machine for Work Piece Mounting

Your primary goal when positioning the strongbacks is to support the boring bar itself as rigidly as possible. Use the following guidelines to maximize bar rigidity.

- Positioning the strongback base supports: Position the supports as far apart from each other as possible. They should remain in full contact with the work piece. The edges of each standoff should line up with the outer edges of the work piece.
- Positioning the bearings: Position the boring bar bearings as close together as possible. Always keep enough room for:
 - the tool head to fit outside of the work piece without hitting either bearing assembly
 - an indicator or other measuring instrument to help you align the bar later on during setup.



IMPORTANT



For optimum results, Climax recommends the following bearing spacing:

- 1-3/8 inch diameter bar up to 11 inches with a bore diameter of 1-1/2 inch
- 1-5/8 inch diameter bar up to 13 inches with a bore diameter of 1-3/4 inch
- 1-7/8 inch diameter bar up to 15 inches with a bore diameter of 2 inch
- 2-1/2 inch diameter bar up to 20 inches with a bore diameter of 2-5/8 inch

Spacing the Machine from the Coupling

To set up the machine correctly it must be spaced off of the coupling using the correct shims. Use the table and graphic below to select the correct shim.

Do the following to select the correct shim.

1. Find the coupling outer diameter in the left-hand column of the table.
2. Moving right, match the coupling diameter with the bolt circle diameter that most closely matches the bolt circle.
3. The shim will equal the number at the top of the table. The shim you choose will allow up to 1/4 inch of play, which can be compensated for by other machine adjustments.

Coupling Diameter	0 shim	0.25	0.5	3. Shim Size = 1.25"	1.25	1.5	1.75	
27	18.7	19.2	19.8	20.3	20.8	21.3	21.9	22.4
28	19.8	20.3	20.9	21.4	21.9	22.4	23.0	23.5
29	20.9	21.4	21.9	22.5	23.0	23.5	24.0	24.6
30	22.0	22.5	23.0	23.5	24.1	24.6	25.1	25.6
31	23.1	23.6	24.1	24.6	25.1	25.7	26.2	26.7
32	24.1	24.7	25.2	25.7	26.2	26.7	27.3	27.8
33	25.2	25.7	26.2	26.8	27.3	27.8	28.3	28.8
34	26.3	26.8	27.3	27.8	28.4	28.9	29.4	29.9
35	27.3	27.9	28.4	28.9	29.4	29.9	30.5	31.0
36	28.4	28.9	29.4	30.0	30.5	31.0	31.5	32.0
37	29.5	30.0	30.5	31.0	31.5	32.0	32.6	33.1
38	30.5	31.0	31.6	32.1	32.6	33.1	33.6	34.1
39	31.6	32.1	32.6	33.1	33.6	34.1	34.7	35.2
40	32.6	33.2	33.7	34.2	34.7	35.2	35.7	36.3
41	33.7	34.2	34.7	35.2	35.8	36.3	36.8	37.3
42	34.7	35.3	35.8	36.3	36.8	37.3	37.8	38.4
43	35.8	36.3	36.8	37.3	37.9	38.4	38.9	39.4
44	36.8	37.4	37.9	38.4	38.9	39.4	39.9	40.4

Spacer Shim Example with 40" coupling outer diameter and 35" bolt circle diameter

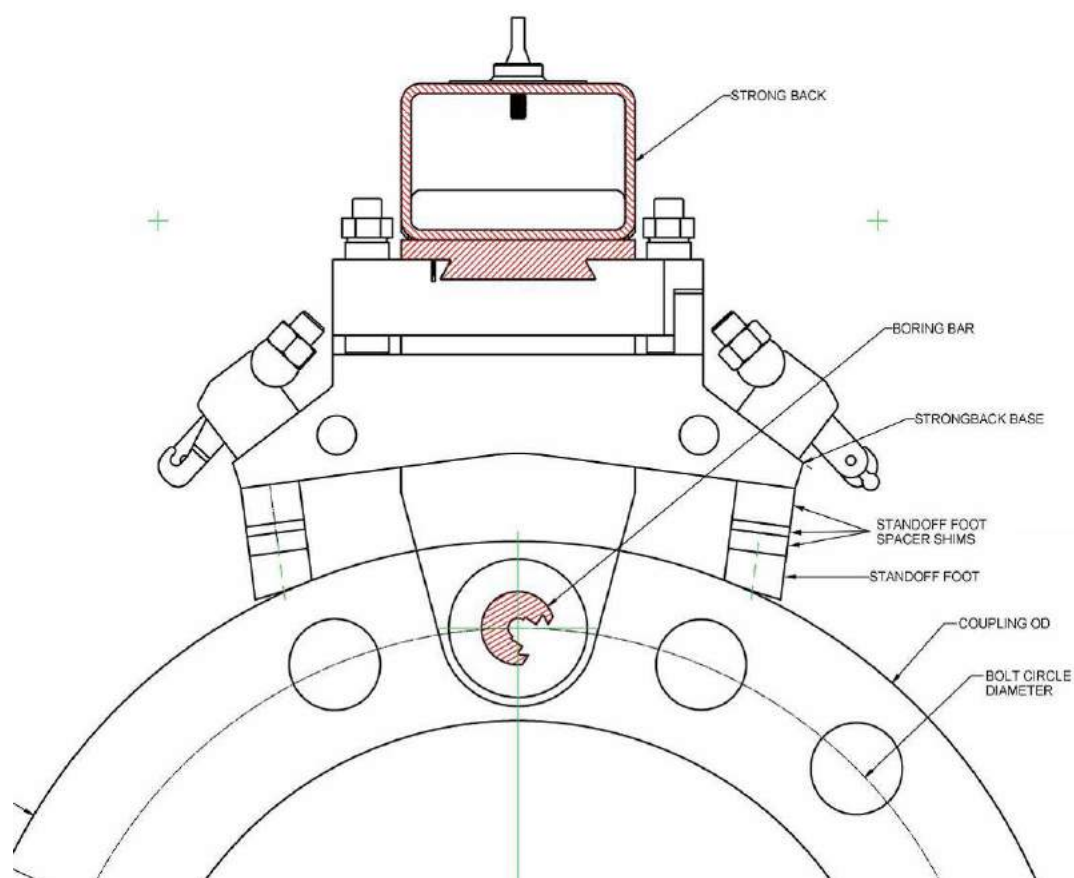
Coupling Diameter	0 shim	0.25	0.5	0.75	1	1.25	1.5	1.75
27	18.7	19.2	19.8	20.3	20.8	21.3	21.9	22.4
28	19.8	20.3	20.9	21.4	21.9	22.4	23.0	23.5
29	20.9	21.4	21.9	22.5	23.0	23.5	24.0	24.6
30	22.0	22.5	23.0	23.5	24.1	24.6	25.1	25.6
31	23.1	23.6	24.1	24.6	25.1	25.7	26.2	26.7
32	24.1	24.7	25.2	25.7	26.2	26.7	27.3	27.8
33	25.2	25.7	26.2	26.8	27.3	27.8	28.3	28.8
34	26.3	26.8	27.3	27.8	28.4	28.9	29.4	29.9
35	27.3	27.9	28.4	28.9	29.4	29.9	30.5	31.0
36	28.4	28.9	29.4	30.0	30.5	31.0	31.5	32.0
37	29.5	30.0	30.5	31.0	31.5	32.1	32.6	33.1
38	30.5	31.0	31.6	32.1	32.6	33.1	33.6	34.1
39	31.6	32.1	32.6	33.1	33.6	34.2	34.7	35.2
40	32.6	33.2	33.7	34.2	34.7	35.2	35.7	36.3
41	33.7	34.2	34.7	35.2	35.8	36.3	36.8	37.3
42	34.7	35.3	35.8	36.3	36.8	37.3	37.8	38.4
43	35.8	36.3	36.8	37.3	37.9	38.4	38.9	39.4
44	36.8	37.4	37.9	38.4	38.9	39.4	39.9	40.4
45	37.9	38.4	38.9	39.4	39.9	40.5	41.0	41.5
46	38.9	39.4	40.0	40.5	41.0	41.5	42.0	42.5
47	40.0	40.5	41.0	41.5	42.0	42.5	43.1	43.6
48	41.0	41.5	42.0	42.6	43.1	43.6	44.1	44.6
49	42.0	42.6	43.1	43.6	44.1	44.6	45.1	45.6
50	43.1	43.6	44.1	44.6	45.1	45.7	46.2	46.7
51	44.1	44.6	45.2	45.7	46.2	46.7	47.2	47.7
52	45.2	45.7	46.2	46.7	47.2	47.7	48.2	48.8

53	46.2	46.7	47.2	47.7	48.3	48.8	49.3	49.8
54	47.2	47.7	48.3	48.8	49.3	49.8	50.3	50.8
55	48.3	48.8	49.3	49.8	50.3	50.8	51.3	51.9
56	49.3	49.8	50.3	50.8	51.4	51.9	52.4	52.9
57	50.3	50.8	51.4	51.9	52.4	52.9	53.4	53.9
58	51.4	51.9	52.4	52.9	53.4	53.9	54.4	54.9
59	52.4	52.9	53.4	53.9	54.4	55.0	55.5	56.0
60	53.4	53.9	54.4	55.0	55.5	56.0	56.5	57.0
61	54.5	55.0	55.5	56.0	56.5	57.0	57.5	58.0

Spacer Shim Table

Optional special spacer blocks are available.

Special spacer blocks are available for couplings with large OD's (compared to the bolt circle diameter). These spacers decrease the bolt circle size in the table by 4", 8" or 12" inches, depending on how they are stacked. Call your Climax sales representative for information on this option.



Spacing the Machine off the Coupling

Setting the Machine on the Work Piece


Adjustments to bring the centerlines into precise alignment are made with jacking bolts on the strongback support after the machine is mounted.

Set the machine on the workpiece.

Before you set the machine onto the work piece make sure the strongback supports and bearing assembly are positioned to meet the needs of your application.

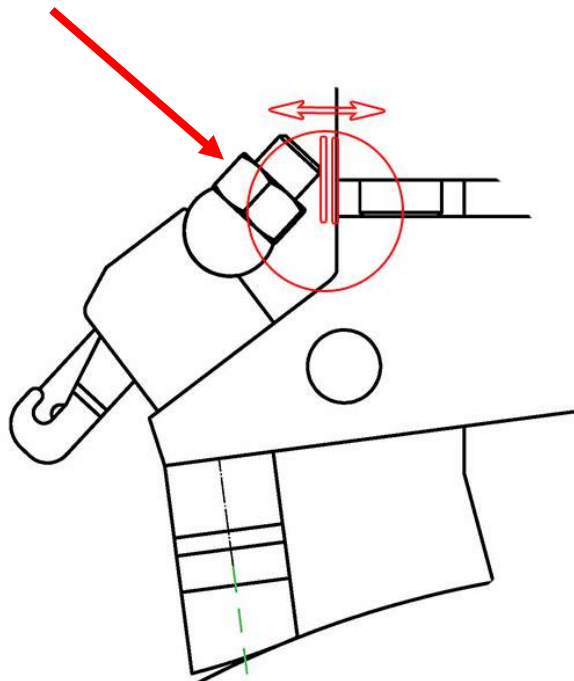
1. Loosen the chain ends as much as possible.
2. Be sure the block feet are attached to the strongback base supports. For more information, see "Spacing the Machine from the Coupling".

Do the following to set the machine onto the work piece.

	WARNING
	Be sure the crane, or hoist, has a steady hold of the machine before lifting it. Uncontrolled swinging or falling of the machine can cause serious personal injury and damage to the machine.

1. Use the lifting eyes to lift the machine with a crane or hoist onto the work piece.
2. Wrap chains around the workpiece.
3. Unscrew the chain clamp nut so that only 2-3 threads of the chain clamp bolt are engaged.
4. While pulling as much slack as possible out of the chain, hook a pin of the chain into the opposite chain clamp block.
5. Evenly tighten the two chain clamp nuts on each side of the machine.

	IMPORTANT
	When tightening the chain onto the rocker and large casting block, make sure the top of the chain assembly does not contact the base strongback support.



Installing the Bearing Hanger

Make sure the gibs on the upper bearing hanger and RDU are both on the same side. Failure to keep the gib on the same side prevents the boring bar from aligning and will cause the bar to bind.

Installing the RDU (Rotational Drive Unit)

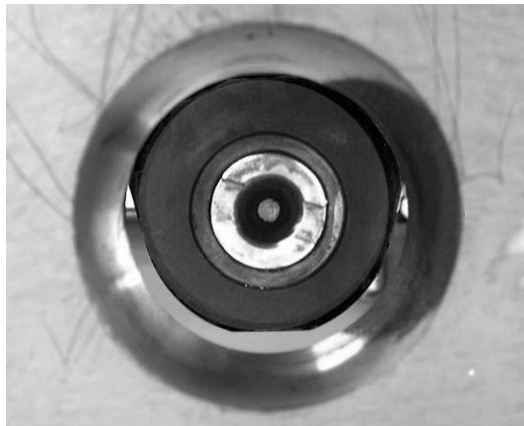
Make sure the gib is on the same side of the strongback supports as the gib on the RDU. Failure to keep the gib on the same side prevents the boring bar from aligning and will cause the bar to bind.

Once these are positioned and spaced to the correct distance from the bore, tighten the gib screws to the lock them to the strongback.

Roughly Positioning the Machine onto the Work Piece

Do the following to roughly center the machine to the workpiece

Position the machine so that the middle of the bearing is centered to the shaft of the workpiece. Look through the work piece at the machine bearing, as shown below, to make sure the machine is centered.



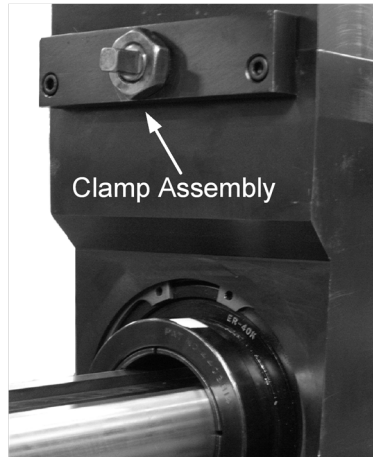
Aligning the machine to the workpiece

Once the machine is roughly centered as shown above, tighten the chains.

Slide the Boring Bar into the Machine

Do the following to slide the boring bar into the machine.

1. Slide the boring bar and lower bearing hanger assembly onto the bearing hanger.
2. Tighten the clamp assembly.



Clamp assembly

3. Clean the bar's tapered end and the taper on the RDU. Failure to keep the tapers on the bar and RDU free from dirt, chips, and other debris will cause damage to the boring bar.
4. Draw the bar's tapered end into the RDU by tightening the draw bolt on the back side of the RDU. Make sure the drive keys are properly engaged with the drive gear and tighten securely.
5. At this point, go over the entire machine and make sure all of the bolts and screws are tight.

Aligning the Boring Bar within the Work Piece

To align the machine to the workpiece, use a scale for preliminary alignment and a dial indicator for a final measurement. Which procedures you follow when aligning the machine to the work piece depends on the level of precision you need. Use a scale (such as a ruler) or a dial indicator depending on your precision needs.

Do the following to check concentricity using a dial indicator.

1. Mount a dial indicator to one end of the bore. Using a second dial indicator mounted to the other end of the bore saves time.



2. Sweep the bore ID.
3. Based on the readings of the dial indicator(s), make fine alignment adjustments as necessary.

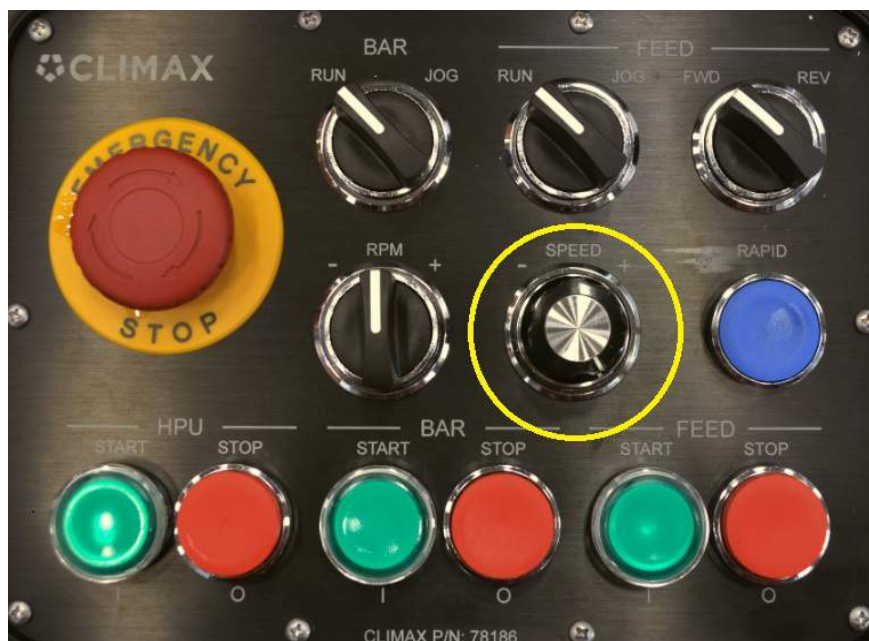
Preparing for Hydraulic Power Use

Do the following to prepare the machine for hydraulic power .

1. Make sure the power unit is OFF.
2. Be sure all fittings are clean.
3. Connect the hydraulic lines between the power unit and the motor.
4. Jog the motor to see which direction the bar is rotating. The bar must rotate clockwise as seen from the axial feed box end looking toward the rotational drive end of the bar. If the bar is rotating the wrong direction: Turn off the power unit, and switch the hoses at the motor.



5. Adjust the speed of bar rotation by turning the motor speed control (a knob located on the operator pendant).



Operator pendant



CAUTION

Connect the motor to the power unit before turning on the power unit. Failure to do so will damage the power unit pump and void all warranties.

Installing the Axial Feedbox

There are three types of feed boxes available.

- The single direction mechanical feed.
- The reversible mechanical feed - PN 47287
- The electric feed. Please see your Climax Sales Representative about details for this option.

Install the Single-Direction Mechanical or Electrical Feed

The axial feed unit can be used with or without the bar rotating in manual mode. To adjust the feed rate while the bar is rotating, use the feed adjustment knob.

The following procedures apply to both mechanical and electrical feedbox installation.

To install the axial feedbox:

1. Place the axial feed box assembly on the end of the bar.
2. Tighten the socket-head cap screws on the axial feed box collar to hold the feed unit securely.
3. For the mechanical feedbox only, tie down the axial feed assembly torque rod.

Install the Reversible Mechanical Feed

The axial feed clamps to the bar with a single clamping screw on the main housing of the feed box.

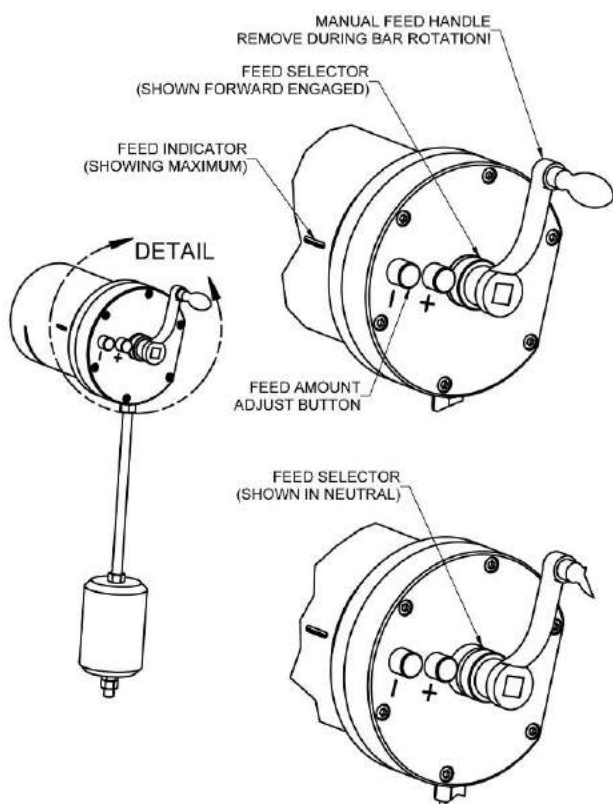
The tool slide position can be adjusted using the manual feed handle.

When standing at the feed box end of the bar looking towards the RDU, turning the crank handle clockwise will retract the tool slide towards the feed box.



CAUTION

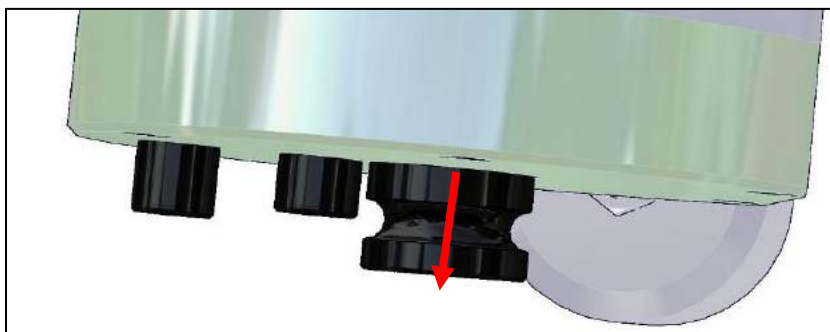
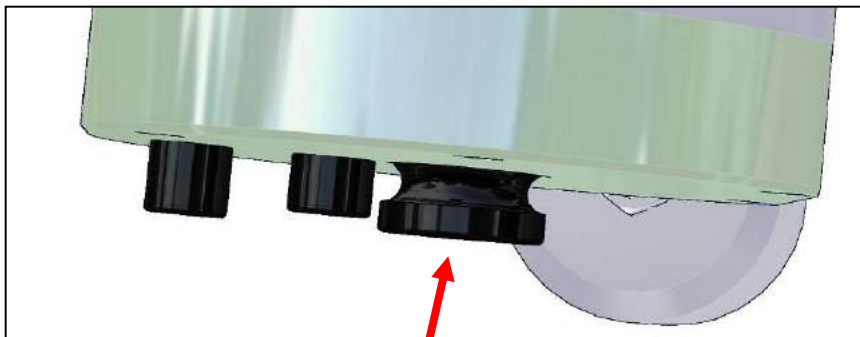
Always remove the feed handle when the machine is operating.



The feed selector has three positions with detent stops. These stops have approximately .3" (8mm) of travel between positions.

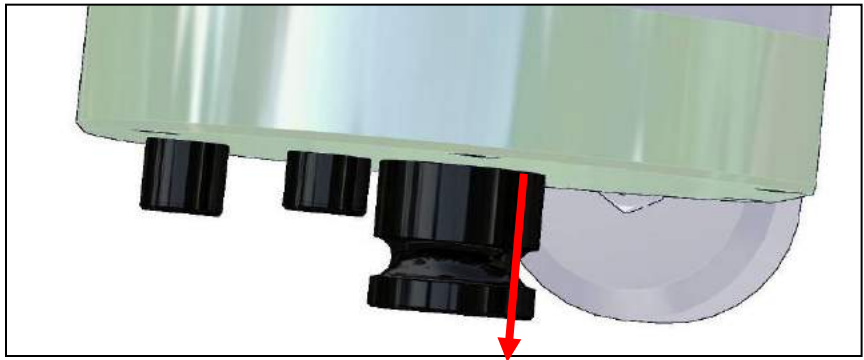
It may be necessary to slightly turn the feed selector knurled knob when engaging the feed or if it becomes jammed.

When the feed selector is pushed IN as shown, forward feed (tool slide moving away from the feed box) is engaged.



When the feed selector is in the neutral position, there will be no feed and the crank handle can be used to position or retract the tool slide.

When the feed selector is in the full retracted position, the tool slide will feed towards the feed box.



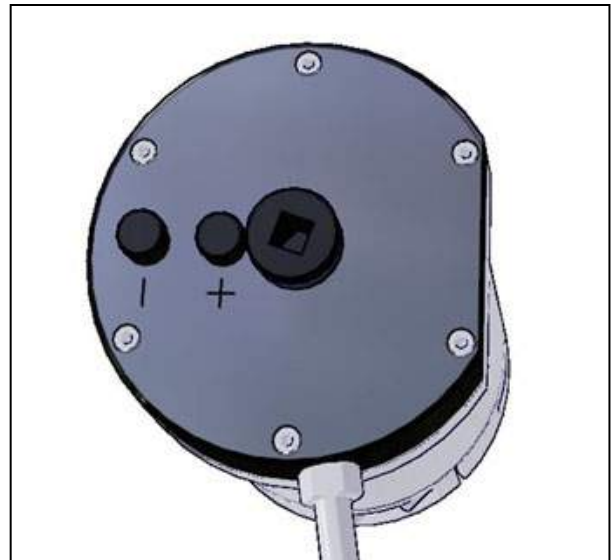
WARNING

You, the operator, must monitor the tool slide position. Over-travel of the tool slide in either direction will result in damage to the machine.

The feed rate is adjusted from zero to approximately .007" (.178 mm) per revolution by pressing and holding the "+" or "-", button while the bar is rotating.

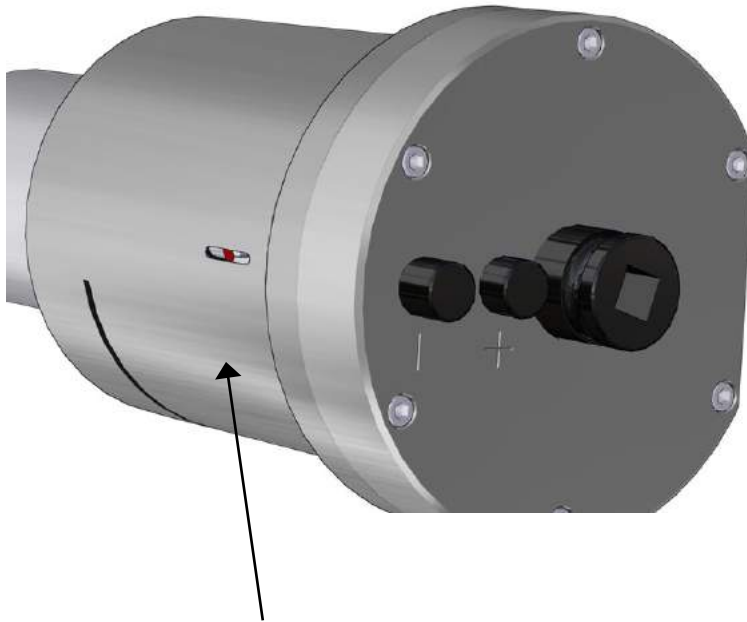
The markings next to the feed adjust buttons are "+" or "-", when the bar is running clockwise, as viewed from the feed box end.

The markings on the feed adjust buttons are reversed if the bar is running counter clockwise, as viewed from the feed box end.



Feed Box Adjust Buttons

Each turn of the bar while the button is pushed increments an internal adjustment about 1/100 of the travel range. 10-15 turns of the bar are necessary to change the feed rate approximately .001" per revolution.



The amount of feed is shown by the feed indicator. The length of the red engraved line on the feed indicator shows the relative feed amount.



MAXIMUM FEED
~0.007" (0.178 mm) / REV

MINIMUM FEED
0.0" / REV

FEED INDICATOR

Tooling Setup

The Climax Model BB5500 has a traveling tool slide controlled by the leadscrew and axial feed unit. The tool slide has a rectangular pocket that accepts a variety of tool holders which are available for different bore diameter ranges and tooling types. The tool holders included are pictured below.



Cartridge



High speed steel bit holder

Figure 1 Tool holders

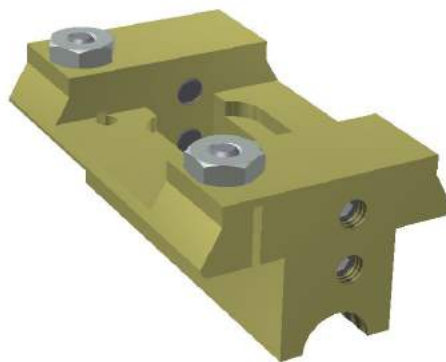


Figure 2 Tool slide

Setting up the tool holder

The 5/16" square bit holder accepts high speed steel, solid carbide or brazed carbide tool bits. The cartridge holder is designed for the sizes 2 and 3 Microbore cartridges and uses supplied replaceable carbide inserts.


The cartridge holder is designed for the size 2 and 3 cartridges and uses supplied replaceable carbide inserts.


Tooling made of high speed steel is recommended for roughing bores. High speed steel cuts more freely and causes less bar deflection for large depth of cut. Carbide has superior wear characteristics and is recommended for light finish passes.

Although the tool holder can be installed so the cutting surface faces either the RDU or the feed end of the bar, always insert the tool holder so it is correctly positioned for clock-wise bar rotation, as shown below. If needed, simply remove the tool holder and rotate the locating key 180 degrees.

Gib Adjustment

Turn the center screw counterclockwise to tighten.

	IMPORTANT
	Always place the tool holder completely in the pocket of the tool slide and secure with the two setscrews provided in the tool slide.

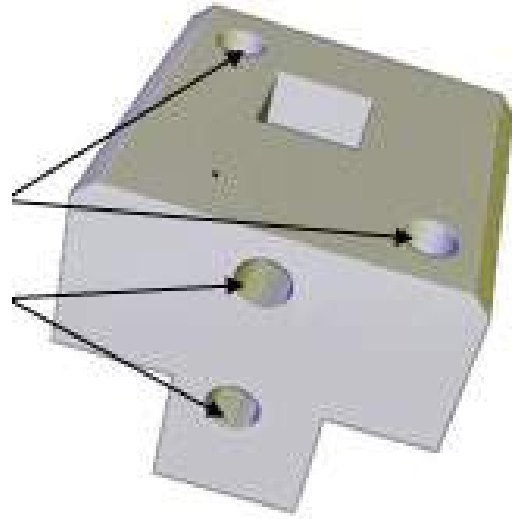
	IMPORTANT
	Excessive clearance in the tool slide can affect final finish and tolerance of the bore.

Setting up the high speed steel tool

There are two setscrews positioned diagonally on the top surface of the high speed steel tool holder. These screws allow the radial position of the tool bit to be micro adjusted.

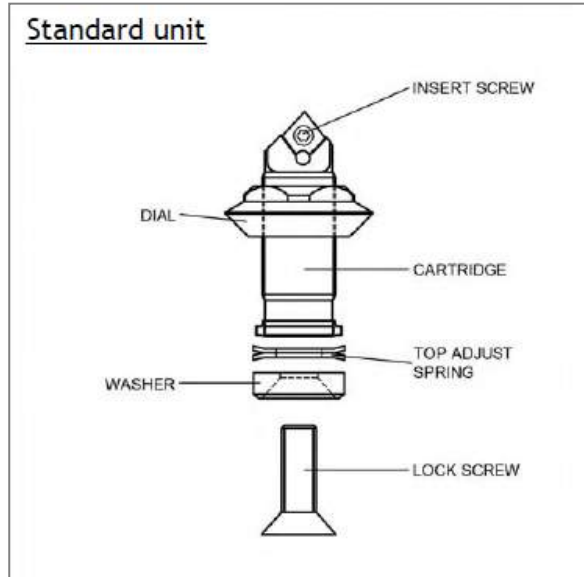
The high speed steel tool holder has two setscrews that clamp the tool bit in the broached hole. Do the following procedure to set up the high speed tool holder.

1. Clamp the tool bit in the holder so that it is approximately 0.040" (1mm) or less under the desired cutting radius.
2. Place the tool holder in the tool slide.
3. Lightly tighten the two setscrews in the tool slide against the tool holder.
4. Place a dial indicator on the tool holder—or the tool slide can be positioned in the bore from the tool slide for reference.
5. The set screw in the top face of the tool holder closest to the tool bit can then be adjusted with reference to a dial indicator reading—or until it just touches the existing coupling bore.
6. Make adjustments until the final depth of cut is set.
7. Tighten the two screws in the end of the tool slide to secure the tool holder and radial setting. The tool holder should never be extended more than 0.080" (2 mm) out of the tool slide as damage to the tool slide may result.



Assembling the cartridge

1. Remove the lock screw, top adjust spring, and washer from the cartridge.
2. Insert the cartridge on the tool holder.
3. Install the lock screw, top adjust spring, and washer back into the cartridge.
4. Turn the dial nut until the cartridge is at the desired position.
5. Turn the lock screw until there is slight spring tension on the washers. Do not over-tighten to allow for further adjustability from the dial nut.
6. Install the tool holder on the tool slide.
7. Turn the dial nut to the desired position.

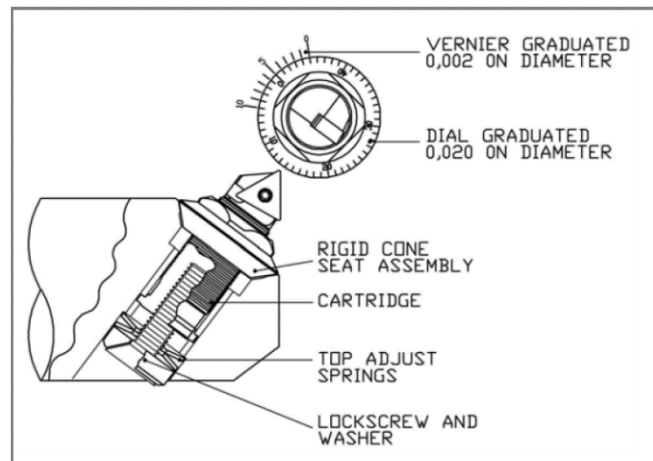


Setting up the cartridge

The cartridge holder includes a tool for changing the inserts and an adjusting wrench for adjusting the radial position of the tool holder.

The Microbore cartridge uses spring tension from washers located underneath the cartridge to hold the cartridge in place. This cartridge needs to have some tension but does not need to be tight.

Once in the holder, there is about a .010" radial travel by manipulating the dial nut from having enough tension on the washers, to locking the cartridge. If this happens, the tool holder needs to be removed from the tool slide.



1. Loosen the lock screw.
2. Feed the cartridge to the desired position with the dial nut to the desired position and apply enough pressure on the washers with the lock screw.

Do the following for maximum repeatability.

1. Make sure all seating surfaces between the tool holder and the tool slide are clean.
2. Set the tool holder in place, pressing down and to the loading side.
3. Start gently tightening the tool holder locking set screws located on the tool slide; it is important to start with almost no torque, and switch between screws increasing the torque. Make sure the set screws always have the same amount of torque so that the tool repeats position.

Choosing the tool holder

Use the following tables to select the appropriate tool holder

TOOL HOLDER TABLE

PN	Tool Type	1-7/8" Bar		2-1/2" Bar	
		Min	Max	Min	Max
46636	5/16" sq HSS (PN 46661)	2.087	2.707	2.520	3.140
		(53.0)	(68.8)	(64.0)	(79.8)
47189		2.660	3.660	2.756	4.056
		(67.6)	(93.0)	(70.0)	(103.0)
78531	No. 2 Microbore (PN 78358) Insert 78420	2.090	2.444	NA	NA
		(53.1)	(62.1)		
78532		2.435	2.789	2.515	2.869
		(61.8)	(70.8)	(63.9)	(72.9)
78342	No. 3 Microbore (PN 78359) Insert 78421	2.650	3.154	2.730	3.234
		(67.3)	(80.1)	(69.3)	(82.1)
78343		3.145	3.649	3.225	3.729
		(79.9)	(92.7)	(81.9)	(94.7)
78344		3.635	4.139	3.720	4.224
		(92.3)	(105.1)	(94.5)	(107.3)

Operation

Pre-start Checks

Before operating the machine, check that:

- All machine parts, including the tool head, tool bit, gib key setscrews, draw bolt, tapered dovetail way clamp and collar clamps are secure.
- The power is connected and turned on.
- The hydraulic lines are properly connected.
- The bore and tool bit are lubricated with cutting oil, if desired.



CAUTION

Do not leave the crank handle on the feed box during machining operations!

To operate the machine

1. Press the START button under the HPU heading on the switchbox to turn the machine on.
2. Set the feed to operate clockwise or counterclockwise (FWD/REV).
3. Turn the BAR RPM to zero by holding the switch at the “-” position.
4. Set the BAR and FEED RUN/JOG switches to the RUN position.
5. Press START under the BAR heading to start the bar turning.
6. Adjust the RPM to the desired speed.
7. Advance the tool FEED to just before the workpiece.
8. Turn the SPEED dial to the desired speed.
9. Press START under the FEED heading to start the feed.
10. As boring begins, adjust the RPM and SPEED as needed.

To retract the tool carrier

1. Press STOP under the FEED heading to stop the feed.
2. Press STOP under the BAR heading to stop the bar.
3. Use the rapid button, or turn the manual crank handle to retract the tool carrier toward the axial feed box.
4. Press STOP under the HPU heading to stop the machine.

The speed controller consists of an electrical enclosure which houses the DC motor controller, operator pushbuttons and switches. The control functions are as follows:



1. EMERGENCY STOP—press down to stop the machine, then twist and pull up to reset.
2. HPU—Hydraulic power unit start and stop buttons.
3. BAR—start and stop the bar rotation.
4. RPM—increase or decrease the RMP of the bar.
5. RUN/JOG—in RUN mode, the bar turns continuously. In JOG mode, the bar can be turned by pressing the BAR start button and will stop when the button is released.
6. FEED—controls the movement of the cutting tool.
7. SPEED—increase or decrease the speed of the tool feed.
8. RAPID—maximum speed of the tool feed as long as the button is pressed.
9. RUN/JOG—in RUN mode, the feed moves automatically. In JOG mode, the feed can be advanced by pressing the FEED start button and will stop when the button is released.
10. FWD/REV—changes the direction of the tool feed.

Disassembly

Do the following to disassemble the machine.

1. Turn off the hydraulic power unit.
2. Remove the axial feed box assembly.
3. Retract the tool holder.
4. Loosen the bearing cartridge collar.
5. Loosen the rotational drive draw bolt.
6. Loosen the bearing hanger clamp assembly from the tapered dovetail way.
7. Pull the bar assembly and lower bearing hanger assembly from the bore as a unit.
8. Inspect the bore.
9. If the bore is not to specifications, reinstall the machine and re-machine the bore.

Maintenance

Maintenance Items

Follow the list below when maintaining your BB5500 Portable Boring Machine.

- Mounting assembly: Inspect the dovetail ways, clean, lubricate, and carefully remove any burrs.
- Boring bars: Handle boring bars carefully to prevent damage. Inspect the taper and carefully remove any burrs. For long-term storage, keep the bar in a vertical position

	<p style="text-align: center;">CAUTION</p> <p>Protruding setscrews will damage mating parts. Be sure the setscrew holding the tool bit in place does not protrude beyond the outer surface of the bar.</p>
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- Axial feed box: Under normal conditions, the axial feed box is maintenance-free.
- Hydraulic power unit: After each 72 hours of operation replace the filter cartridge, check the heat exchanger for leaks, clean the filler/breather.
- Hydraulic Motor: The hydraulic motor is maintenance-free. Fluid passing through the motor lubricates the internal moving parts. To make sure long life and dependable operation, use high-quality, clean hydraulic fluid.
- Hydraulic Filter and Fluid: Periodic replacement of the filter and fluid is required for proper operation. Initially, change the filter after 72 hours of operation to remove any impurities in the system. Thereafter, replace every 150-200 hours. Use only a high-quality filter. Climax recommends a 10-micron, industrial-grade filter. If the system includes a change-warning gauge, change the filter as often as indicated. Clean hydraulic fluid will help keep the power unit and motor running properly.
- Maintain proper fluid level. Do not allow the level to drop below the red line at the bottom of the level/temperature gauge.
- Maximum recommended oil operating temperature is 150° F (66° C).

Storage

Proper storage protects the machine from damage and corrosion.

1. Before storing, clean the machine with solvent to remove grease, metal chips, and moisture.
2. Spray with a light oil for short-term storage or use diesel for long-term storage to prevent corrosion.
3. Place the boring bar with all tools and accessories in the case provided.
4. Include desiccant or wrap with metal protection to protect from moisture.

Specifications

All specifications are dependent on experienced operators, proper machine setup, and correct bearing spacing.

Bearing Spacing: Cutting should take place no further from a bearing than 4 times the bar diameter. Distance between bearings should not exceed 8 times the bar diameter.

1-3/8" boring bar: Maximum recommended bearing spacing to achieve specs 11"

1-7/8" boring bar: Maximum recommended bearing spacing to achieve specs 15"

2-1/2" boring bar: Maximum recommended bearing spacing to achieve specs 20"

Specification	Detail
Surface finish	125 Ra (micro-inch) can be achieved when using a carbide insert or a suitably hand ground tool bit with appropriate nose radius and correct feed and speed
Cylindricity	0.001 inch (0.025 mm) per 12 inches, at or below recommended bearing spacing
Axial feed rate	0 - 0.007 inch (0 – 0.178 mm) per revolution
Gear / Drive ratio	1.13:1
Torque produced	2.2 cubic inch HPU: 22 ft. lbs. 3.6 cubic inch HPU: 40 ft. lbs. 5.9 cubic inch HPU: 65 ft. lbs.

Perpendicularity and alignment are dependant on operator setup.

Exploded Views and Parts

The following diagrams and parts lists are for your reference purposes only. The machine Limited Warranty is void if the machine has been tampered with by anyone who has not been authorized in writing by Climax Portable Machining & Welding Systems to perform service on the machine.

27294 HANGER BEARING ASSEMBLY LOWER 1-7/8 DIA BAR		
BALLOON NO	PART	DESCRIPTION
1	26483	RING SNAP 3.543 ID (90 mm)
2	26446	BEARING CARTRIDGE 1-7/8 ID 3.543 OD
3	26447	HANGER BEARING LOWER
4	25625	CLAMP ASSEMBLY BEARING HANGER
5	10160	SCREW 1/4-20 X 3/4 SHCS

29043 HANGER BEARING ASSEMBLY LOWER 2-1/2 DIA BAR STRAIGHT		
BALLOON No	PART	DESCRIPTION
1	29045	RING SNAP 5 ID
2	29042	BEARING CARTRIDGE 2-1/2 ID X 4.9213 OD (STRAIGHT)
3	29044	HANGER BEARING LOWER 2-1/2 DIA STRAIGHT
4	25625	CLAMP ASSEMBLY BEARING HANGER
5	10160	SCREW 1/4-20 X 3/4 SHCS

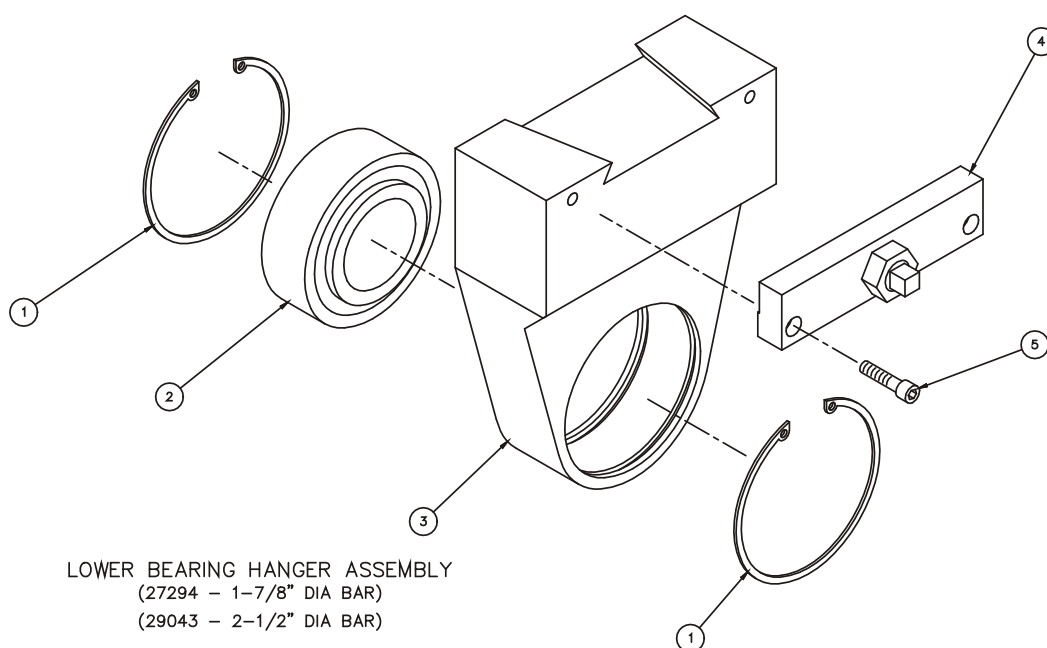
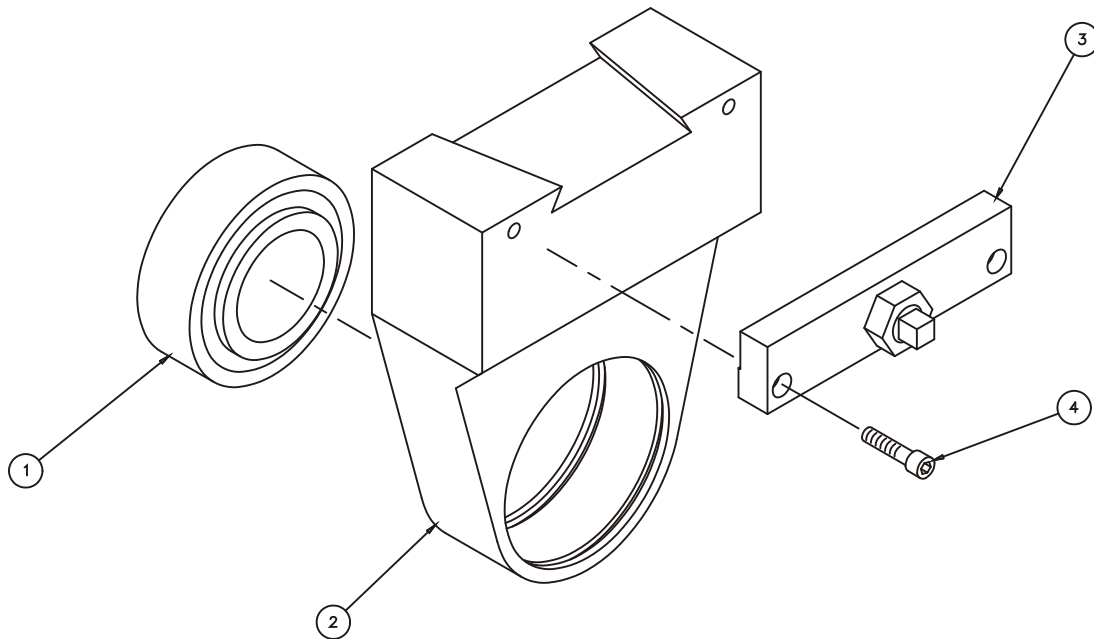


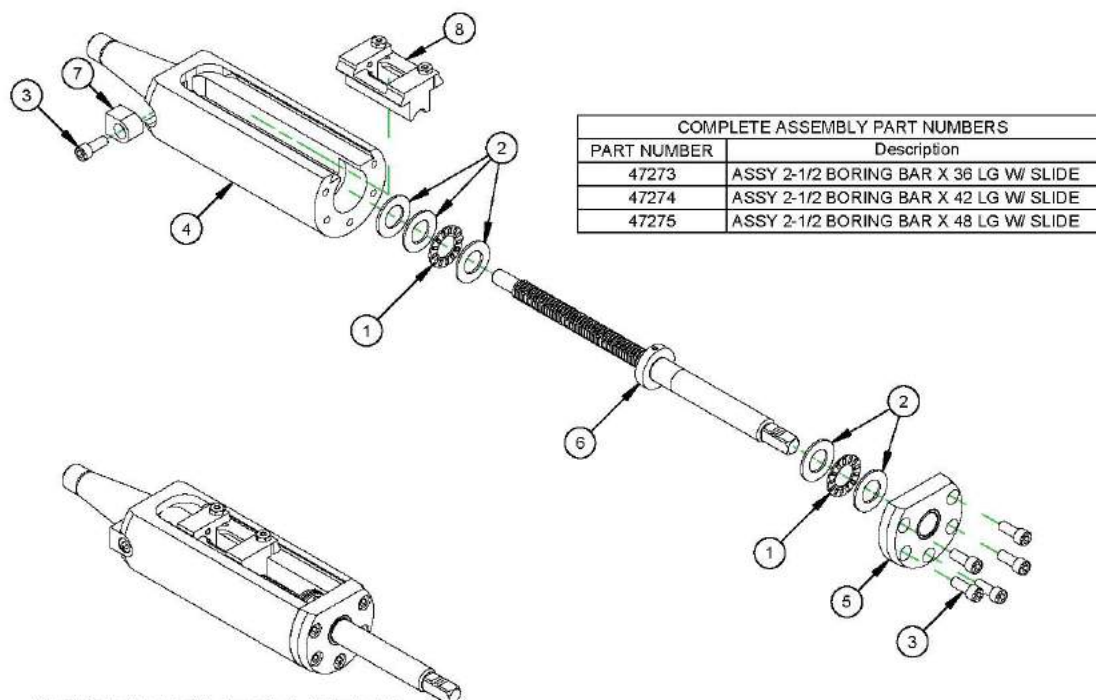
Figure 3 - Hanger Bearing Lower
1-7/8 Dia Bar 27294
2-1/2\" Dia Bar 29043

27295 HANGER BEARING ASSEMBLY LOWER 2-1/2 DIA BAR SPHERICAL		
BALLOON NO	PART	DESCRIPTION
1	25502	BEARING CARTRIDGE 2-1/2 ID X 4.9213 OD SPHERICAL
2	25624	HANGER BEARING LOWER 2-1/2 DIA SPHERICAL
3	25625	CLAMP ASSEMBLY BEARING HANGER
4	10160	SCREW 1/4-20 X 3/4 SHCS



LOWER BEARING HANGER ASSEMBLY
27295-M

Figure 4 - 27295 Hanger Bearing Lower 2-1/2 Dia Bar Spherical



ASSEMBLED VIEW
SCALE 1 : 4

PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	10538	BRG THRUST .625 ID X 1.125 OD X .0781
2	5	11165	WASHER THRUST .625 ID X 1.125 OD X .060
3	7	12418	SCREW 1/4-20 X 5/8 SHCS
4	1	25461	BAR BORING ASSY 2-1/2 DIA X 36 LONG
		28767	BAR BORING ASSY 2-1/2 DIA X 42 LONG
		32809	BAR BORING ASSY 2-1/2 DIA X 48 IN LG
5	1	25467	CAP BAR END BB5500
6	1	25532	LEADSCREW ASSY 2-1/2 DIA X 36 BORING BAR
		28769	LEADSCREW ASSY 2-1/2 DIA X 42 BORING BAR
		32814	LEADSCREW ASSY 2-1/2 DIA X 48 BORING BAR
7	2	25631	KEY BORING BAR BB5500
8	1	47187	ASSY TOOL SLIDE 2-1/2 DIA BB5500

2-1/2 DIA BORING BAR ASSY'S WITH TOOL HOLDER BB5500

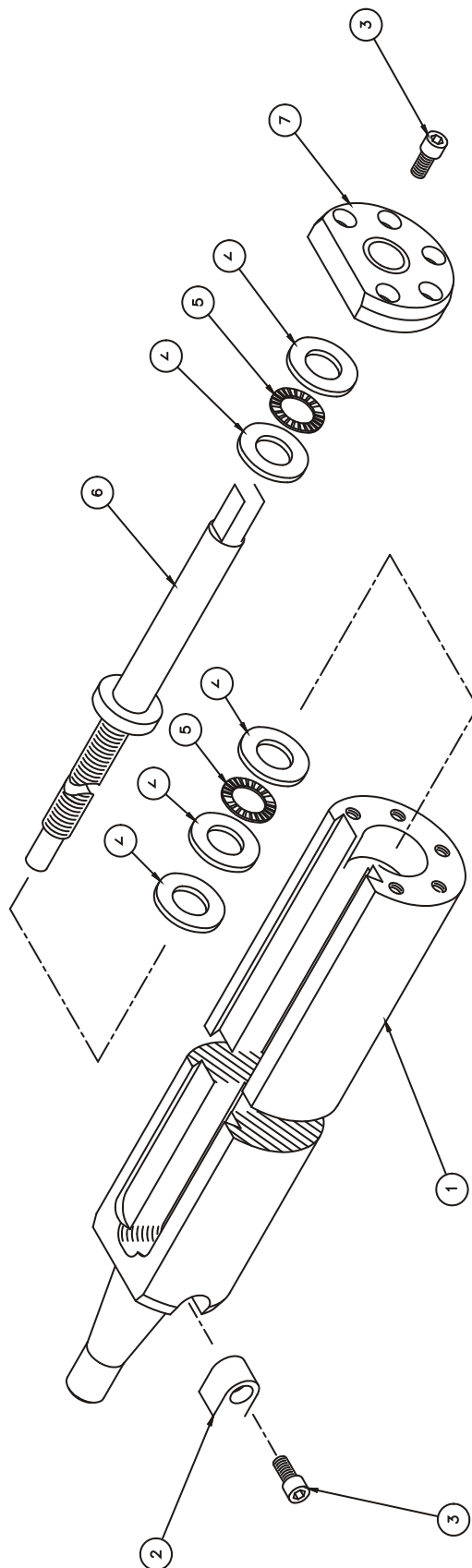
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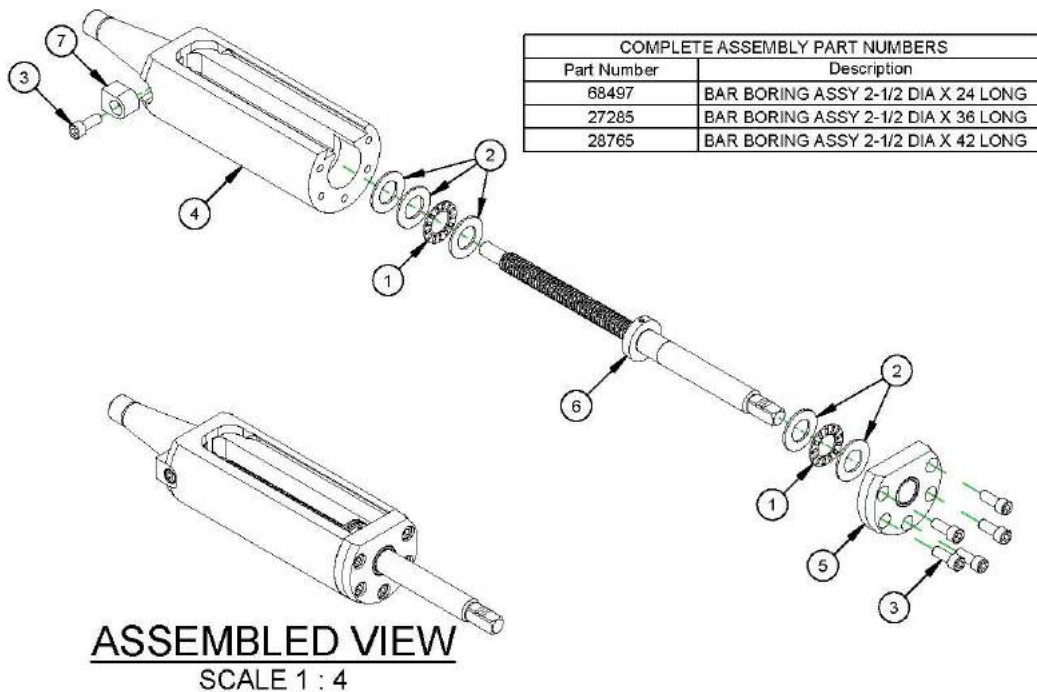
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27285 BAR BORING ASSEMBLY 2-1/2 DIA X 36 LONG		
BALLOON NO	PART	DESCRIPTION
1	25461	BAR BORING 2-1/2 DIA X 36 IN. LG.
2	25631	KEY BORING BAR
3	12418	SCREW 1/4-20 X 5/8 SHCS
4	11165	WASHER THRUST .625 ID X 1.125 OD X .060
5	10538	BEARING THRUST .625 ID X 1.125 OD X .0781
6	25532	LEADSCREW
7	25467	CAP END



2-1/2" DIAMETER BORING BAR ASSEMBLY
(27285 - 36" LONG)
(28765 - 42" LONG)



PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	10538	BRG THRUST .625 ID X 1.125 OD X .0781
2	5	11165	WASHER THRUST .625 ID X 1.125 OD X .060
3	7	12418	SCREW 1/4-20 X 5/8 SHCS
4	1	68495	BAR BORING 2-1/2 DIA X 24 LONG
		25461	BAR BORING 2-1/2 DIA X 36 LONG
		28767	BAR BORING 2-1/2 DIA X 42 LONG
5	1	25467	CAP BAR END BB5500
6	1	26473	LEADSCREW ASSY 2-1/2 DIA X 24 BORING BAR
		25532	LEADSCREW ASSY 2-1/2 DIA X 36 BORING BAR
		28769	LEADSCREW ASSY 2-1/2 DIA X 42 BORING BAR
7	2	25631	KEY BORING BAR BB5500

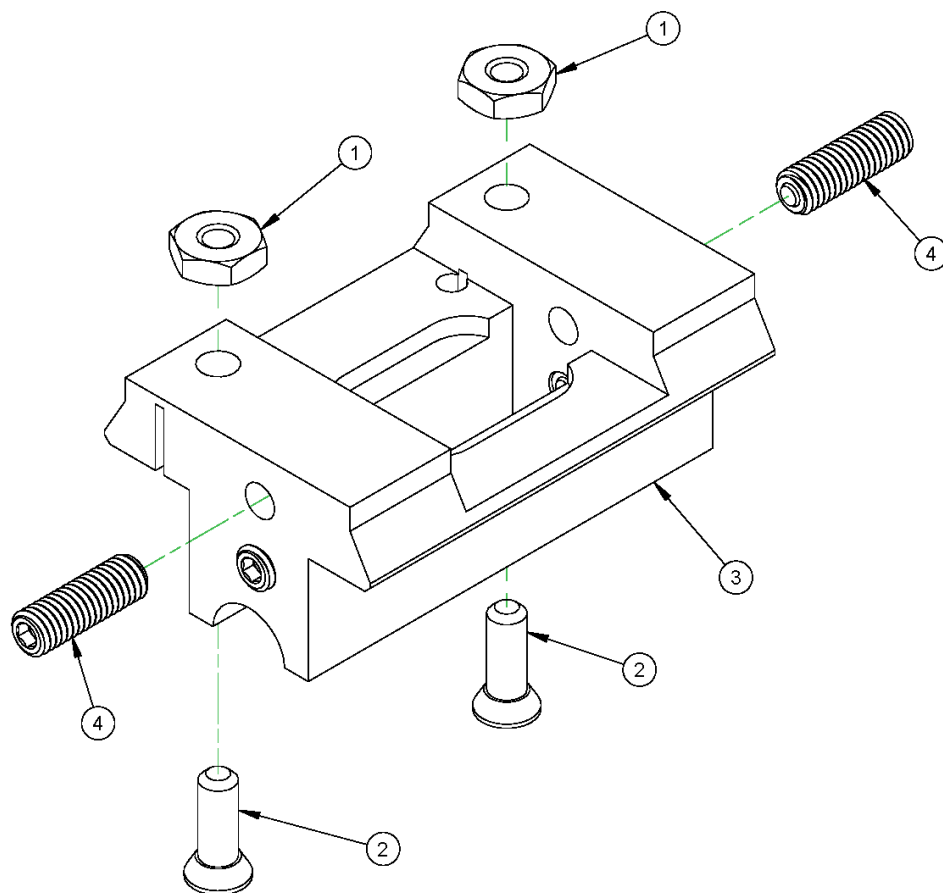
2-1/2 DIAMETER BORING BAR ASSEMBLIES BB5500

27285-M



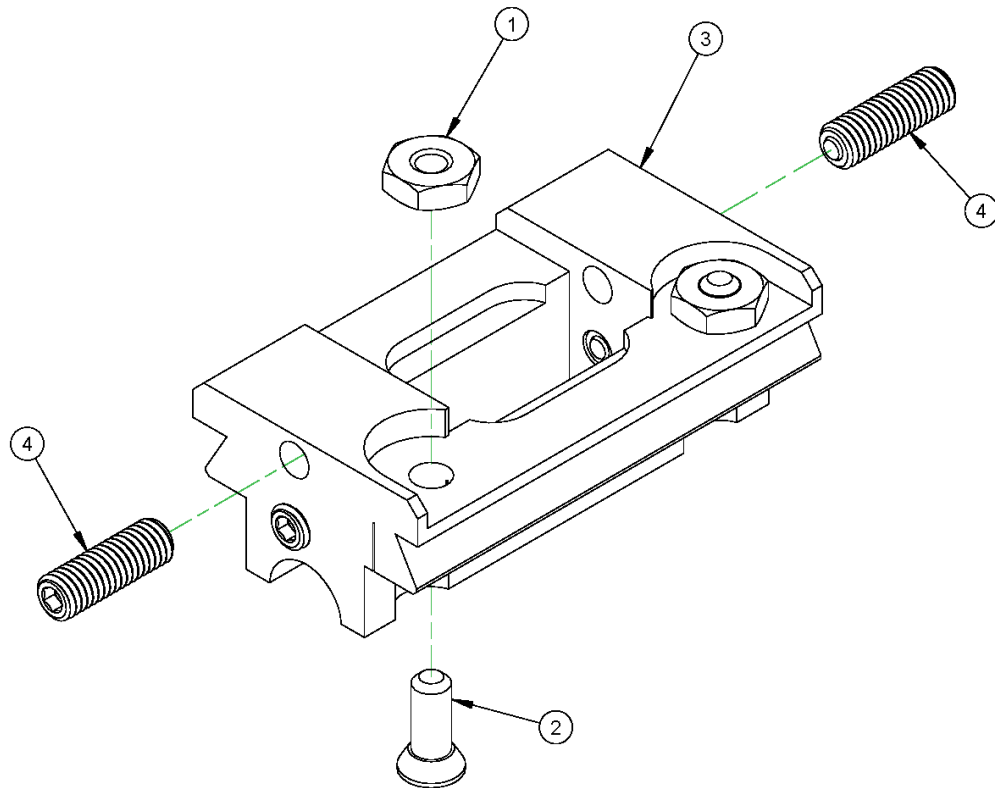
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PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10343	NUT 8-32 STDN ZINC PLATED
2	2	25634	PIN TAPERED LOCK
3	1	47188	SLIDE TOOL 2-1/2 DIA BB5500
4	4	81371	SCREW M5 X .8 X 15.5mm BALL SWIVEL FLAT POINT SET SCREW

47187 - ASSY TOOL SLIDE 2-1/2 DIA BB5500 - REV A
FOR REFERENCE ONLY



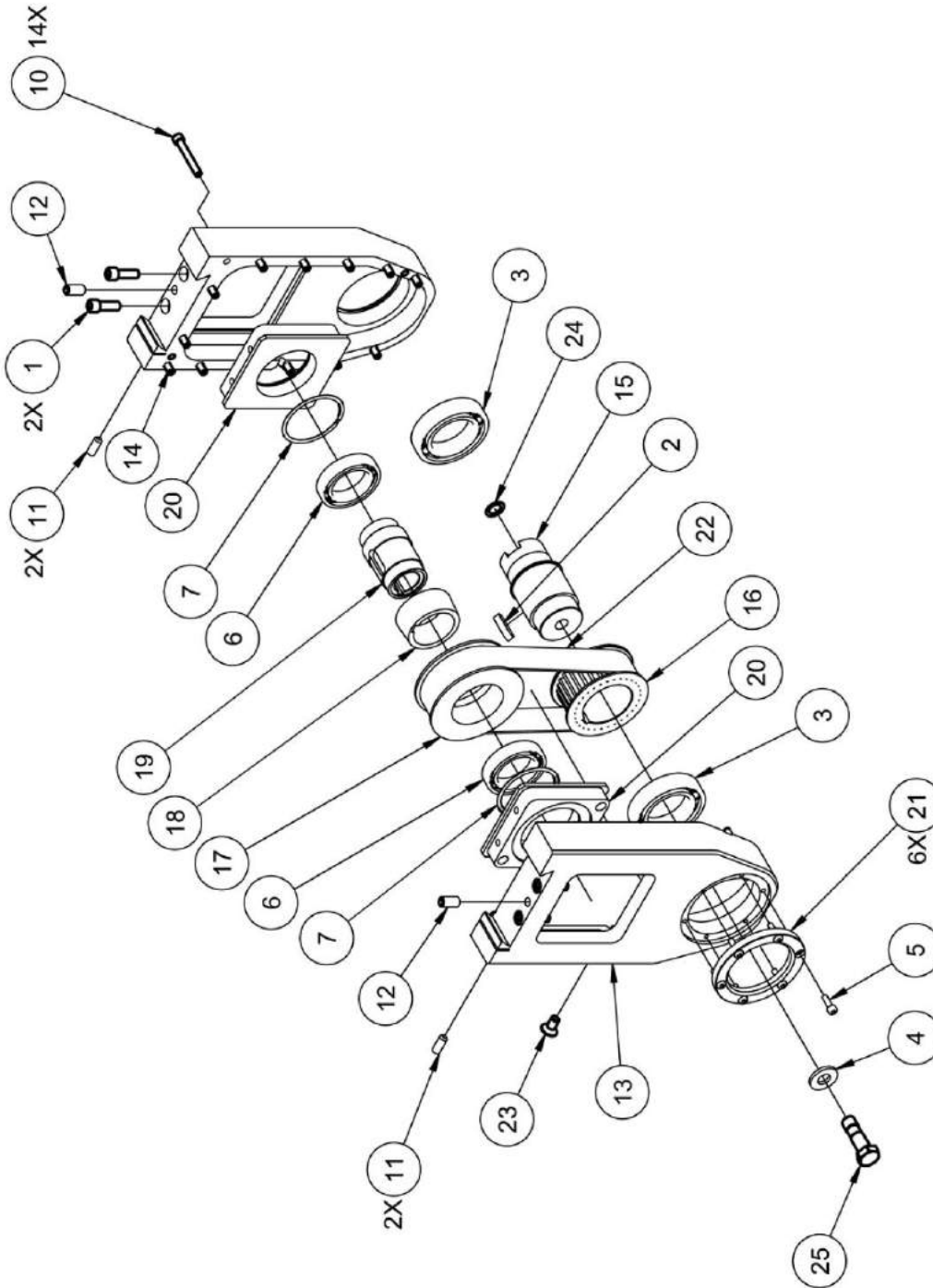
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	10343	NUT 8-32 STDN ZINC PLATED
2	2	26482	PIN TAPERED LOCK
3	1	46634	TOOL SLIDE 1-7/8 DIA BAR BB5500
4	4	81371	SCREW M5 X .8 X 15.5mm BALL SWIVEL FLAT POINT SET SCREW

46633 - ASSY TOOL SLIDE 1-7/8 DIA BAR - REV A
FOR REFERENCE ONLY

PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	10431	SCREW 5/16-18 X 1 SHCS
2	11054	KEY 1/4 X 3/8 X 1.20 RADIUS BOTH ENDS
3	16111	BRG BALL 1.7717 ID X 2.9528 OD X .6299 SEALS
4	22662	WASHER 1/2 FLTW HARDENED 1-1/8 OD X 1/8 THK
5	35113	SCREW M5 X .8 X 16 SHCS
6	46198	BRG BALL 1.5748 ID X 2.4409 OD X .4724
7	46458	RING SNAP 2.440 ID SPIRAL MEDIUM DUTY
8	46459	HOUSING RDU BB5500
9	11729	PIN DOWEL 1/4 DIA X 3/4
10	13252	SCREW 1/4-20 X 1-3/4 SHCS
11	35290	SCREW M8 x 1.25 x 20mm SSSCP
12	35332	SCREW M10 X 1.5 X 20 SSSFP
13	46459-1	HOUSING RDU OUTBOARD HALF
14	46459-2	HOUSING RDU INBOARD HALF
15	46460	SPINDLE RDU OUTPUT BB5500
16	46462	SPROCKET MODIFIED LOWER RDU
17	46463	SPROCKET 8mm X 34T HT
18	46464	BUSHING TAPER LOCK 1610 X 1-11/16 BORE
19	46465	SHAFT KEYED INPUT RDU BB5500
20	46466	BLOCK INPUT SHAFT TENSIONING
21	46467	RETAINER BRG OUTPUT RDU BB5500
22	46468	BELT 8mm X 30mm X 560mm HTD
23	46471	SCREW M8 X 1.25 X 16mm FHSLMS NYLON
24	46715	RING RETAINER GROOVELESS 1/2 DIA STUD .025 HIGH
25	46716	SCREW MOD 1/2-20 X 2 HHCS 1.25 1-5/8 THD LGTH

ASSY RDU DRIVE 4TH 2 IN RADIUS CLEARANCE

46470



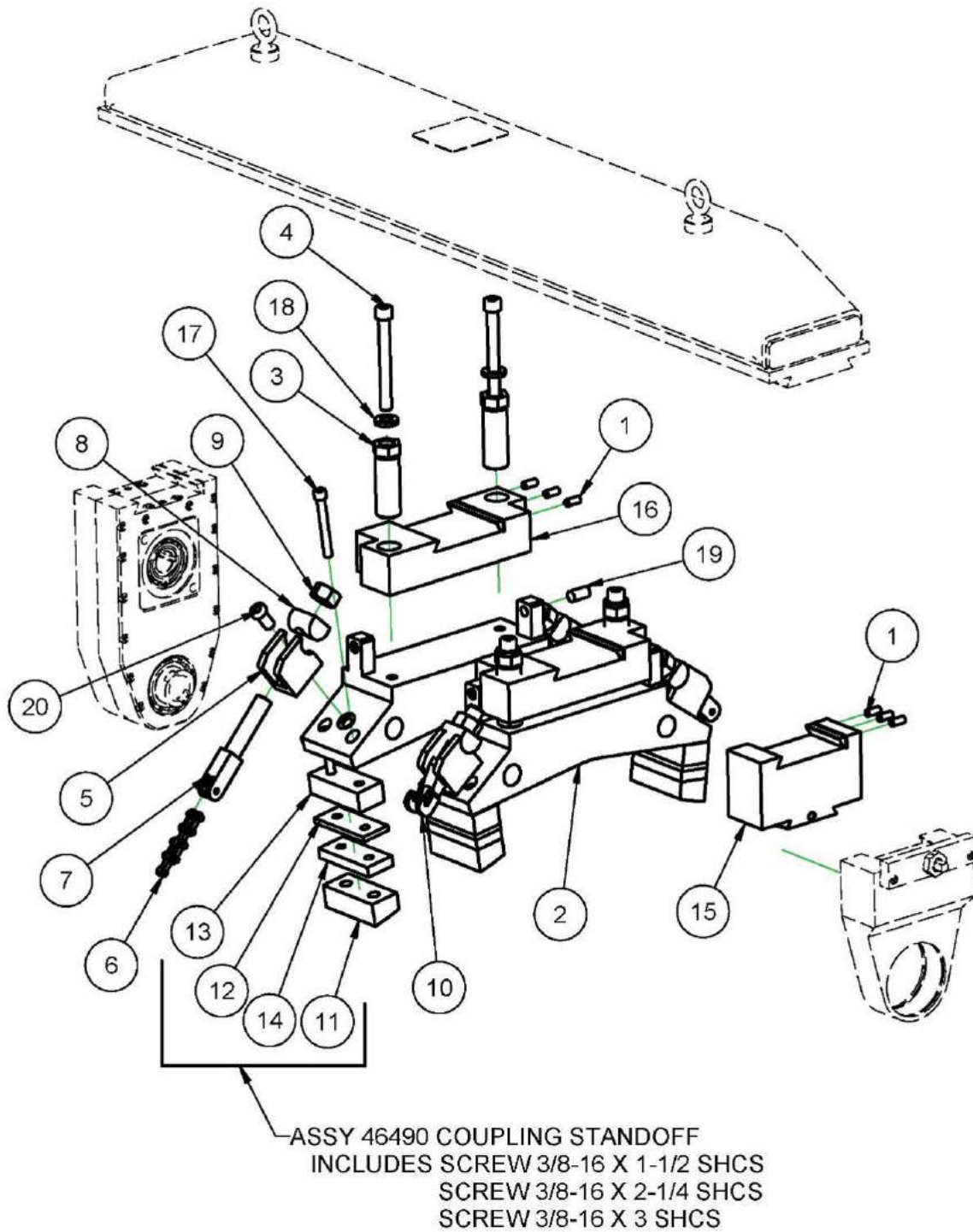
ASSY RDU DRIVE 4TH 2 IN RADIUS CLEARANCE

46470

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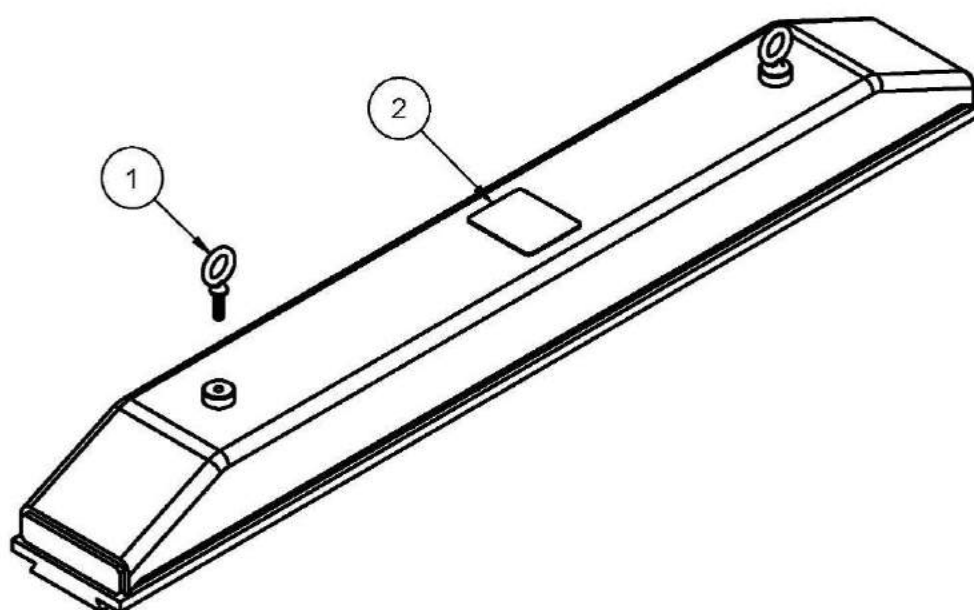
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PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	35290	SCREW M8 x 1.25 x 20mm SSSCP
2	25588	BASE STRONGBACK SUPPORT
3	25590	BOLT JACKING
4	27550	SCREW 1/2-20 x 4-1/2 SHCS
5	15835	CASTING -BLOCK CLAMP
6	27366	CHAIN WRENCH 3/4 PITCH .240 DIAM PIN
7	27385	BOLT - CHAIN CLAMP
8	10206	ROCKER
9	10197	NUT 3/4-10 STDN
10	45271	BOLT CHAIN CLAMP WITH HOOK
11	46477	STANDOFF UNIVERSAL COUPLING MOUNT
12	46483	SPACER 1/4 COUPLING STANDOFF
13	46481	SPACER 1 IN COUPLING STANDOFF
14	46482	SPACER 1/2 COUPLING STANDOFF
15	46488	HANGER BRG UPPER
16	46489	SUPPORT STRONGBACK
17	10568	SCREW 3/8-16 X 3
18	15209	WASHER 1/2 ID X 1-3/8 OD HARDENED
19	12836	SCREW 1/2-20 X 1 SSSRN
20	15670	SCREW 1/2-13 X 1 LHSCS



46490

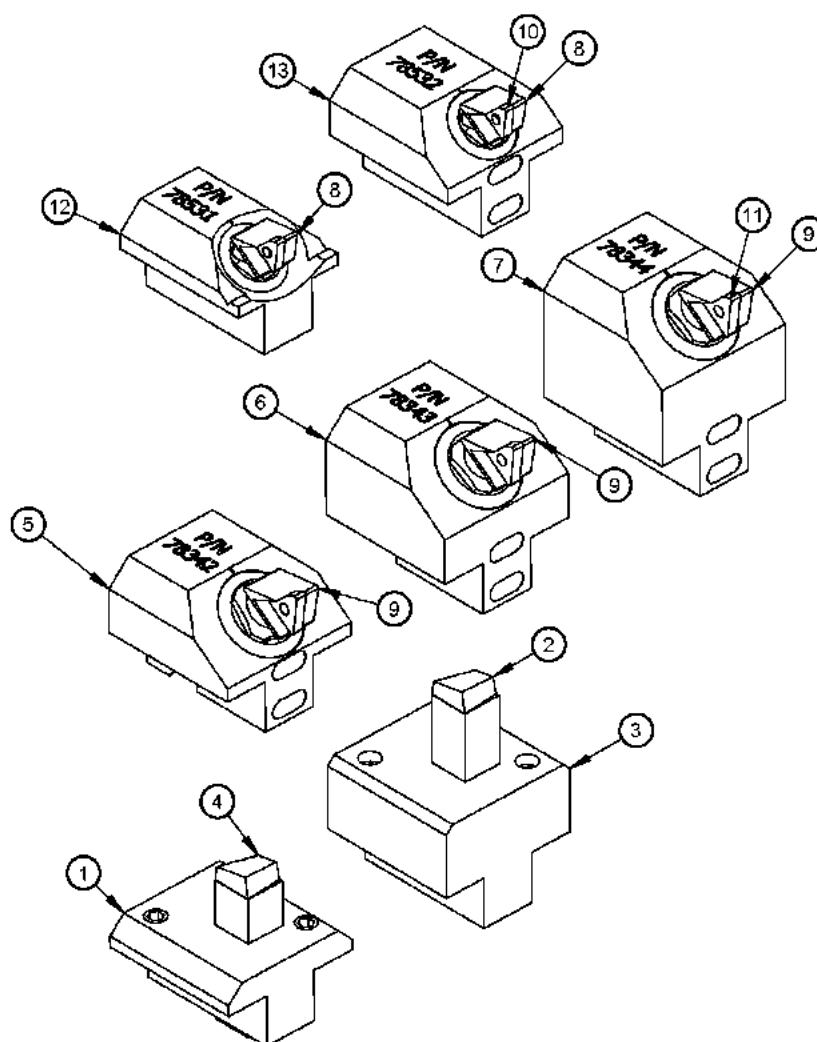
PARTS LIST		
ITEM	PART No.	DESCRIPTION
1	10460	EYE LIFTING 3/8 -16 UNC
2	27305	LABEL WARNING SINGLE POINT MACHINES



STRONG BACK ASSEMBLIES

46486 48" LONG STRONG BACK
46493 36" LONG STRONG BACK
46530 24" LONG STRONG BACK

STRONG BACK BB5500



PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	1	46636	TOOL INSERT HOLDER 5/16 SQ BIT
2	1	46661	BIT TOOL HSS 5/16 X 1.25 LH 15 DEG LEAD (NOT INCLUDED)
3	1	47189	TOOL INSERT HOLDER 5/16 SQ BIT
4	1	50413	BIT TOOL HSS 5/16 X .78 LH 15 DEG LEAD (NOT INCLUDED)
5	1	78342	HOLDER TOOL NO 3 MICROBORE SMALL
6	1	78343	HOLDER TOOL NO 3 MICROBORE MEDIUM
7	1	78344	HOLDER TOOL NO 3 MICROBORE LARGE
8	1	78358	KIT NO 2 METRIC MICROBORE CARTRIDGE (NOT INCLUDED)
9	1	78359	KIT NO 3 METRIC MICROBORE CARTRIDGE (NOT INCLUDED)
10	1	78420	INSERT TCM-06 FOR NO 2 MICROBORE (NOT INCLUDED)
11	1	78421	INSERT TCM-09 FOR NO 3 MICROBORE (NOT INCLUDED)
12	1	78531	HOLDER TOOL NO 2 MICROBORE SMALL
13	1	78532	HOLDER TOOL NO 2 MICROBORE MEDIUM

81374 - KIT ALL TOOL HOLDERS FOR MICROBORE AND HSS BB5500 - REV -
FOR REFERENCE ONLY

PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	4	10058	WASHER THRUST .375 ID X .812 OD X .030
2	1	10829	RING SNAP 1/2 OD
3	1	10848	PLUNGER DETENT SPRING STUBBY 1/4-20 X .531
4	2	11199	BRG NEEDLE 1/2 ID X 11/16 OD X .5 OPEN
5	4	11253	BRG NEEDLE 3/8 ID X 9/16 OD X .312 OPEN
6	2	11736	WASHER THRUST .500 ID X .937 OD X .030
7	1	11808	RING EXTERNAL SNAP 3/8 ID X .03 THK
8	4	11823	WASHER THRUST .625 ID X 1.125 OD X .030
9	1	11844	BRG THRUST .375 ID X .812 OD X .0781
10	1	12600	SCREW 6-32 X 1/4 FHSCS
11	1	12853	KEY 1/8 SQ X .25 SQ BOTH ENDS
12	1	13018	SCREW 7/16 - 14 X 1-1/4 SHCS
13	4	13987	NUT 3/8-16 STDN
14	1	15414	PIN DOWEL 1/8 DIA X 1/4
15	2	15418	BUSHING OILITE 1 ID X 1-1/8 OD X 1/2
16	1	16377	BUSHING OILITE 3/8 ID X .5 OD X 1/2
17	2	17071	BEARING ROLLER CLUTCH 5/8 ID X 7/8 OD X .625
18	6	17985	SCREW 8-32 X 1-1/4 SHCS
19	2	19180	RING SNAP 7/32 ID E-RING
20	2	22480	PIN DOWEL 1/8 DIA X 1/2
21	2	23008	WASHER #4 STAR LOCK
22	1	25810	ROD TORQUE
23	1	25811	COUNTERWEIGHT
24	4	27092	SCREW 1/4-20 X 3 SHCS
25	2	28650	SCREW 2-56 X 3/32 SSSCP
26	2	37397	SCREW 4-40 X 1/4 BHSCS
27	8	42846	WASHER #4 FLAT
28	1	44970	SPRING EXT .187 OD X .023 WIRE X 1.00 LONG
29	1	48475	GEAR SPUR 16DP 16T 20PA 1.0 X .300 LG STEEL
30	1	48476	SHAFT CAM AXIAL FEED
31	1	48510	BRG BALL 3.000 ID X 3.625 OD X .3125 2 SEAL
32	1	48522	SELECTOR FEED
33	2	48535	GEAR SPUR 16DP 20T 20PA HEX HOLE 9 LG STEEL
34	2	48537	SHAFT GEAR CLUTCH DRIVEN
35	2	48540	ARM CLUTCH HOLDBACK
36	2	48542	BEARING ROLLER CLUTCH 5/8 ID X 7/8 OD X 1.00
37	2	48544	CLUTCH ARM FEED
38	1	48561	FEED WHEEL
39	1	48585	STOP NUT FEED LEFT
40	1	48588	STOP NUT FEED RIGHT
41	1	48605	HOUSING MAIN REVERSIBLE AXIAL FEED
42	1	48610	CAM AXIAL FEED
43	1	48611	INDICATOR FEED AMOUNT
44	2	48615	BUTTON ASSEMBLY
45	1	48615-1	BUTTON CORE
46	1	48615-2	BUTTON BODY
47	2	48635	SPRING COMP .36 OD X .026 WIRE X .75
48	2	48643	SCREW 8-32 X 1/4 SSSDPPL
49	1	48781	HOUSING BRG RETAINER
50	1	48789	HSG INTERMEDIATE SECTION
51	1	48795	RETAINING RING 2.877 ID
52	1	48799	HANDLE CRANK ASSY
53	1	11707	SCREW 8-32 X 1/4 SSSCR
54	1	48727	KEY CRANK HANDLE
55	1	48798	HANDLE CRANK
56	1	48837	HOUSING REAR COVER AXIAL FEED
57	1	49716	WASHER .156 OD X .563 OD MODIFIED
58	1	54141	SPRING FLAT ANTI ROTATE

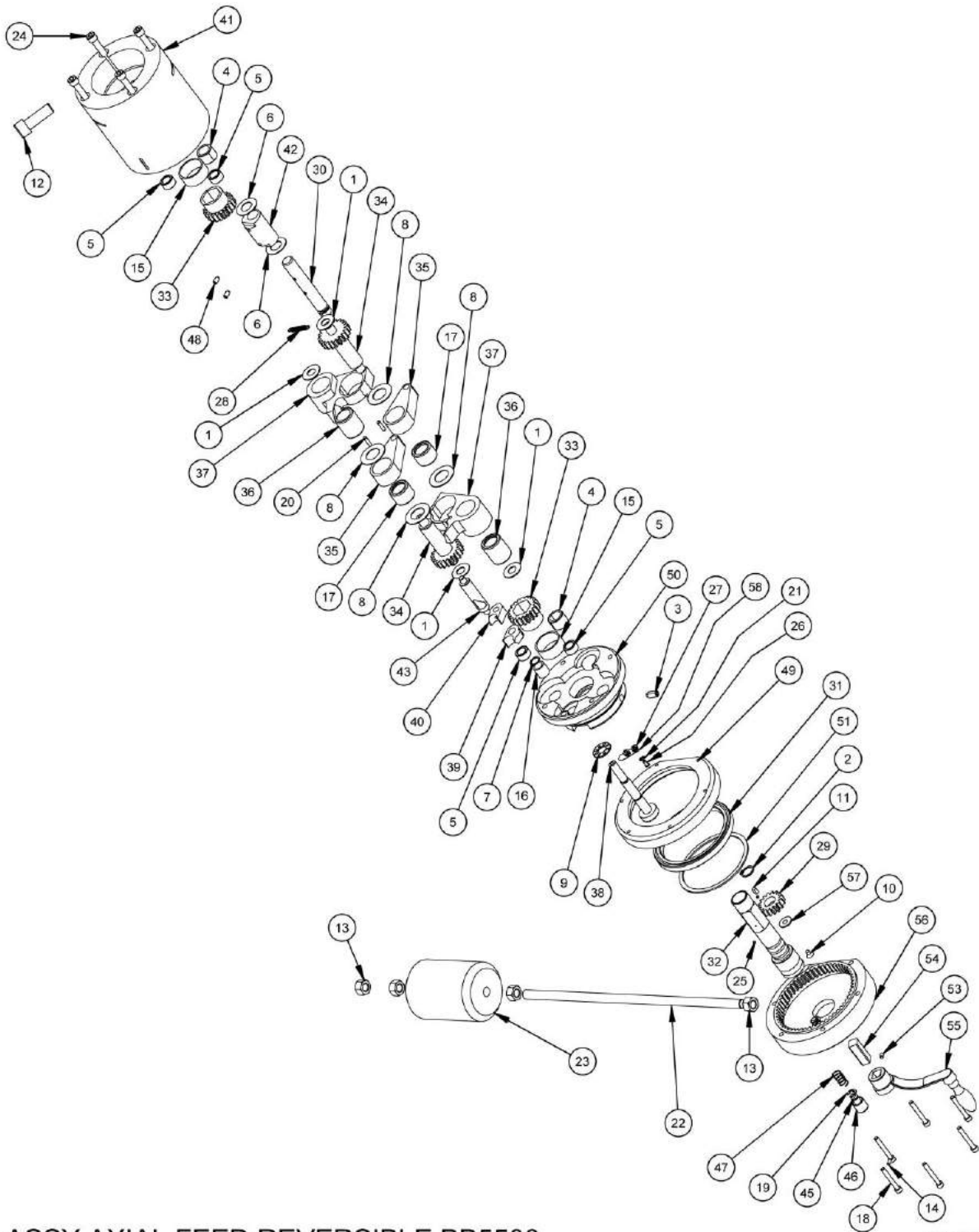


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ASSY AXIAL FEED REVERSIBLE BB5500

47287

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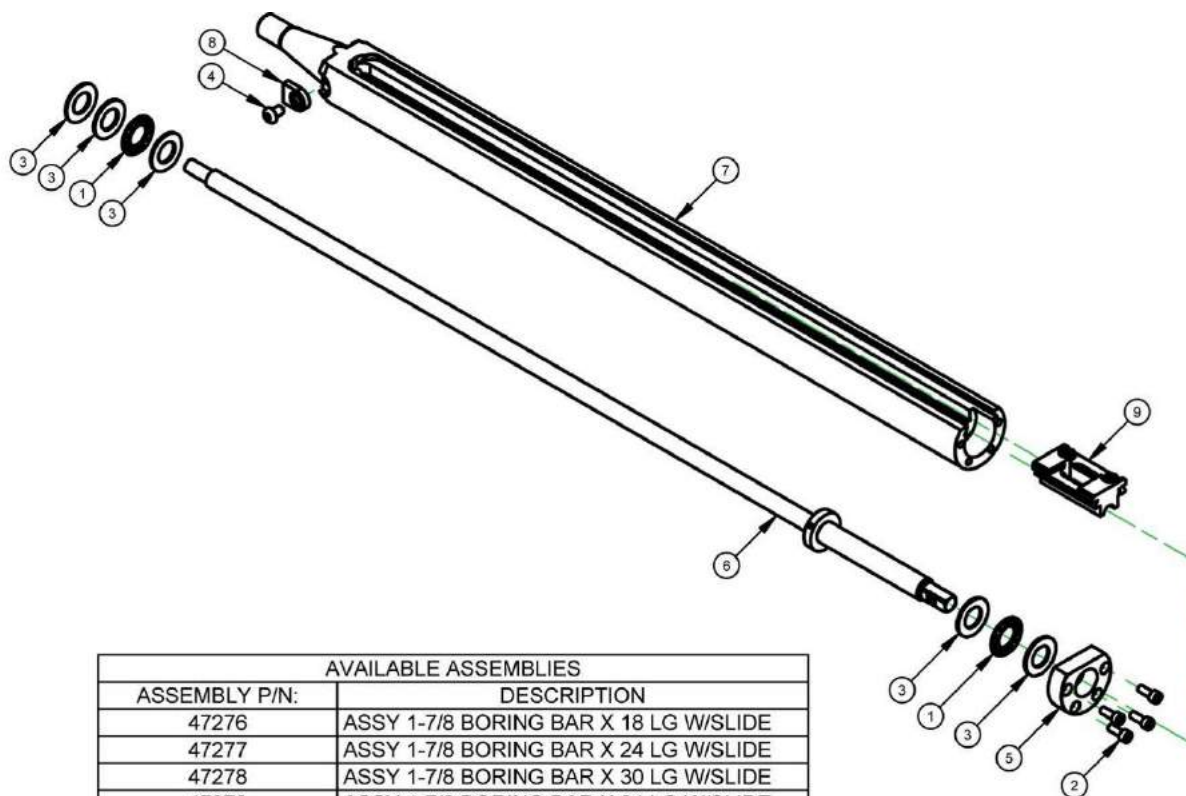
ASSY AXIAL FEED REVERSIBLE BB5500

47287



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PARTS LIST			
ITEM	QTY	PART No.	DESCRIPTION
1	2	10538	BRG THRUST .625 ID X 1.125 OD X .0781
2	4	10877	SCREW 10-32 X .5 SHCS
3	5	11165	WASHER THRUST .625 ID X 1.125 OD X .060
4	2	18286	SCREW 1/4-20 X 3/8 BHSCS
5	1	26450	CAP END 1-7/8 DIA BAR BB5500
6	1	28176	LEADSCREW ASSY 1-7/8 DIA X 18 BORING BAR
		26473	LEADSCREW ASSY 1-7/8 DIA X 24 BORING BAR
		26676	LEADSCREW ASSY 1-7/8 DIA X 30 BORING BAR
		41508	LEADSCREW ASSY 1-7/8 DIA X 34 BORING BAR
7	1	28175	BAR BORING 1-7/8 DIA X 18 BB5500
		26445	BAR BORING 1-7/8 DIA X 24 BB5500
		26674	BAR BORING 1-7/8 DIA X 30 BB5500
		41507	BAR BORING 1-7/8 DIA X 34 BB5500
8	2	27400	KEY BORING BAR
9	1	46633	ASSY TOOL SLIDE 1-7/8 DIA BAR

ASSEMBLIES 1-7/8 BORING BAR BB5500

47277 SHOWN



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 **CLIMAX**



BORTECH



CALDER

H&S TOOL