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SAFETY PRECAUTIONS

IN GENERAL:

When using rotating head cutting equipment, basic safety precautions should always be followed to reduce the risk of personal injury.

Operate this tool only in accordance with specific operating instructions.

WARNING:

Do not override the deadman switch on the power unit. Locking down, obstructing, or in any way defeating the deadman switch on the power drive unit may result in serious injury.

DRESS CONSIDERATIONS:

Use standard safety equipment. Hard hats, safety shoes, safety harnesses, protective clothes, and other safety devices should always be used when appropriate.

Use safety glasses. Do not operate cutting tools without eye protection.

Dress properly. Do not wear loose clothing or jewelry. They can be caught in rotating and moving parts. Avoid slippery floors or wear nonskid footwear. If you have long hair, wear protective hair covering to contain it.

WORK AREA:

Keep the work area clean. Cluttered work areas and benches invite injuries.

Consider the work area environment. Keep the area well lit. Keep electrical cords, cables, rags, rigging straps, etc. clear of rotating equipment. Do not use power cutting in the presence of flammable liquids and gasses.

Keep visitors away. Do not let visitors or untrained personnel at or near operating tools. Enforce eye protection requirements for all observers.

Do not over reach. Keep proper footing at all times.

Stay alert. Watch what you are doing. Use common sense. Do not operate tools when you are tired.

TOOL CARE:

Maintain tools with care. Keep tools in good operating condition. Sharp tool bits perform better and safer than dull tool bits. Well maintained tools function properly when needed.

Check for damaged parts. If a tool has malfunctioned, been dropped or hit, it must be checked for damage. Run no-load tests and feed function checks. Do a complete visual inspection.

Electric motors. Use only with proper AC voltage power sources and observe all normal electric shock hazard procedures.

Do not abuse power and control cords. Pulling or running over cords and cables can result in electrical shock hazards and malfunctions. Keep control and power cords out of all cutting fluids and water.

Hydraulic drives. Observe proper procedures for electrically driven power sources. Avoid damage to hydraulic lines. Keep quick-disconnects clean. Grit contamination causes malfunctions.

Air tools. Check the exhaust muffler. Broken or damaged mufflers can restrict air flow or cause excessive noise. Use air motors only with a filtered, lubricated and regulated air supply. Dirty air, low pressure air or over pressure air will cause malfunctions, including delayed starting.

AREA EQUIPMENT:

Secure work. Whenever possible use clamps, vises, chains and straps to secure pipe.

Make sure the tool is secured; it is safer to have both hands free to operate the tool.

TOOL USE:

Use the right tool and tool bit for the job. Do not use a tool which is incorrect for the job you are doing.

Keep the tool bits fully engaged in the tool bit holders. Loose bits are a safety hazard.

Disconnect power supply during setup and maintenance. Use all stop or shut-off features available when changing or adjusting tool bits, maintaining the tool, or when the tool is not in use.

Remove adjusting keys and wrenches before applying power to the equipment. Develop a habit of checking the tool before turning it on to make sure that all keys and wrenches have been removed.

Do not force tools. Tools and tool bits function better and safer when used at the feed and speed rate for which they were designed.

Do not reach into rotating equipment. Do not reach into the rotating head stock to clear chips, to make adjustments, or to check surface finish. A machine designed to cut steel will not stop for a hand or an arm.

Handle chips with care. Chips have very sharp edges and are hot. Do not try to pull chips apart with bare hands; they are very tough.

Avoid unintentional starts. Do not carry or handle tools with your hand on the operating switches or levers. Do not lay the tool down in a manner which will start the drive. Do not allow the tool to flip around or move when adjusting or changing tool bits.

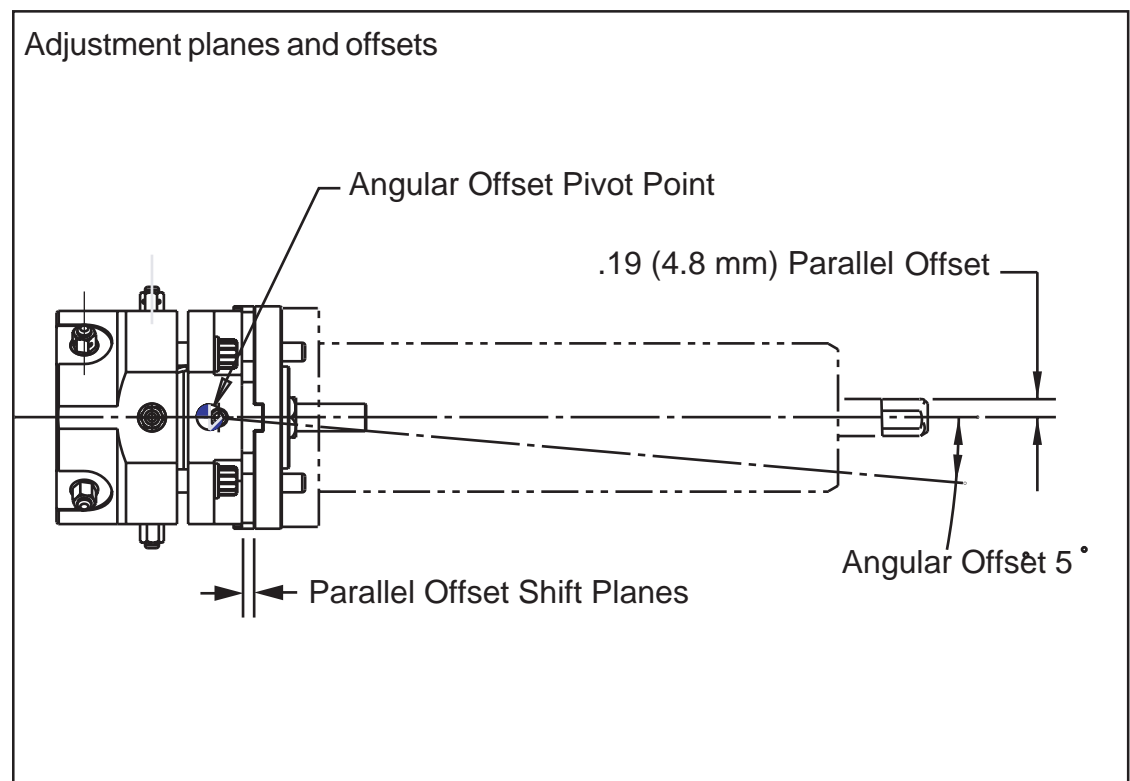
Store idle tools properly. Disconnect tools from the power source and store in a safe place. Remove tool bits for safe handling of the tool.

GENERAL DESCRIPTION

The Model 224B Miter Mandrel Head is an accessory option which is used to expand the versatility of the Model 224B BEVELMASTER™ by allowing in-situ set up on irregular pipe, fittings, and valves.

The Miter Mandrel Head is secured to the ID of the workpiece by way of eight individually adjusted jackscrews in two separate rows.

Once secured, two distinct types of adjustments are easily performed, Angular Offset and Parallel offset.

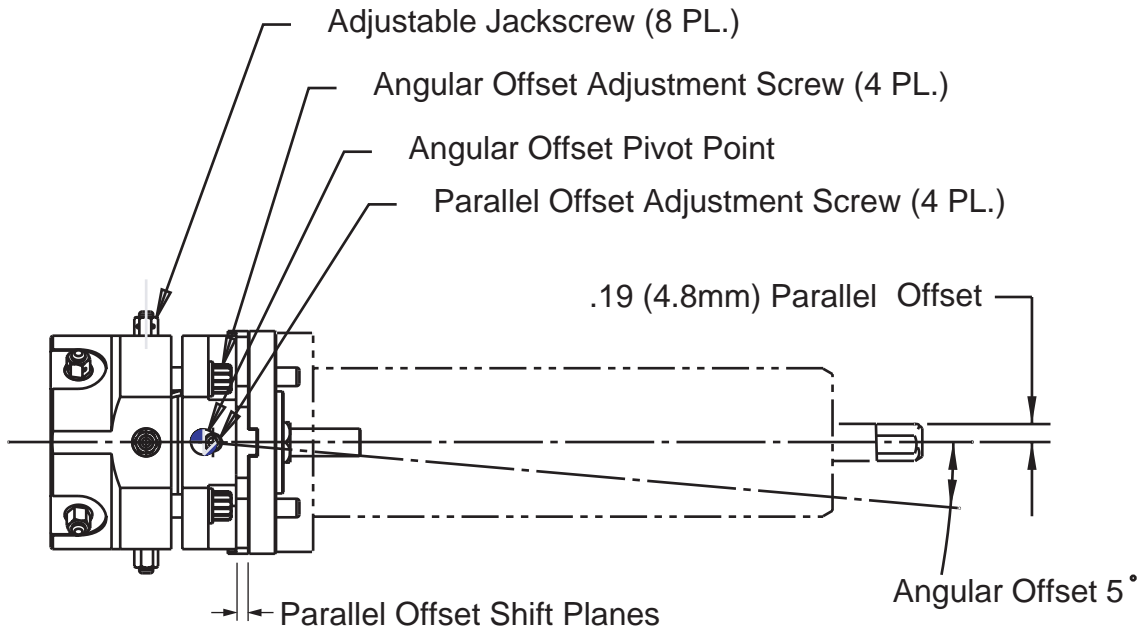


With the Angular Offset Adjustment, the Mandrel Shaft can be precisely aligned with the workpiece (even though the ID of the workpiece might be irregular) or it may be adjusted up to 5° from the centerline in any direction desired to give a mitered prep.

The parallel Offset Adjustment accurately re-centers the Mandrel Shaft after the angular offset adjustment has been made.

Both adjustments are accomplished with the aid of an "Indicating Sleeve" and Dial Indicator Kit.

Location Identifications



MAINTENANCE

Tri Tool Miter Mandrel Heads are precision tools that will perform excellently if they are well maintained.

All Components should be cleaned and coated with a light film of oil prior to use.

Tool Life may be severely shortened, unless chips and/or other debris that have been deposited on or around the Headstock during the machining operation are removed.

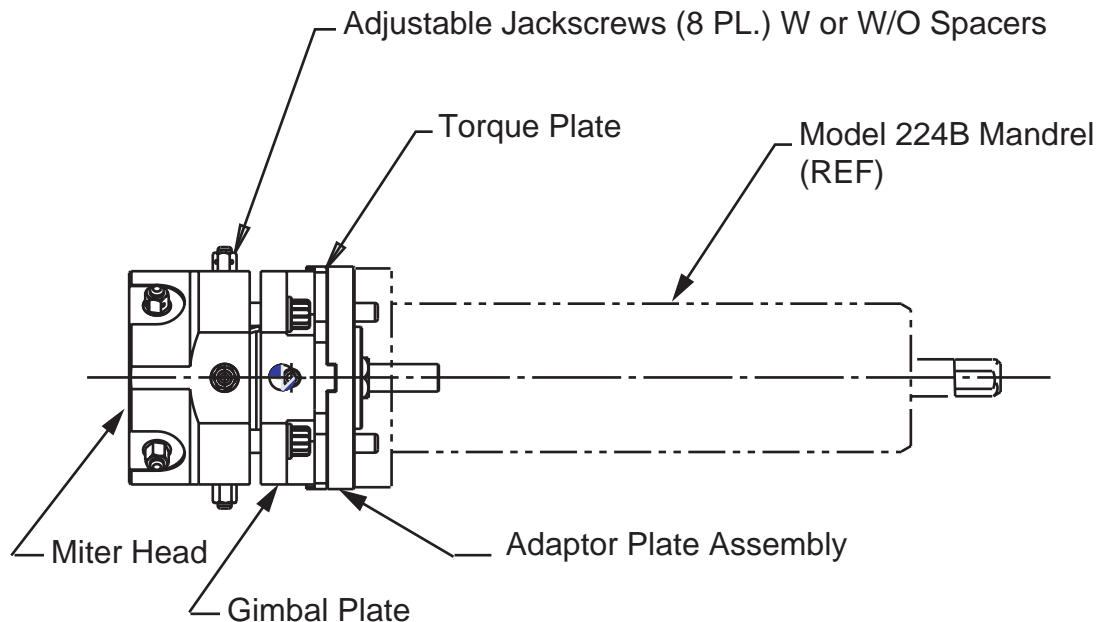
Daily Maintenance should include a visual inspection of all parts for damage due to chips, impact or improper use.

Repair or replace broken or damaged parts as necessary.

Wipe the machine clean of cutting fluids, dirt and grime and then coat it with a light film of oil.

Weekly maintenance should include checking the mandrel and wiping the oil and grime from the surface and then relubricating it with a light film of oil.

Identification of various major parts



Occasionally back off the four parallel offset adjustment screws, remove the Draw Nut, Adaptor Plate Assembly and the Torque Plate.

Check all parts for cracks, burrs, etc.

Remove the four Angular Offset Adjustment Screws and Spherical Washers and separate the Gimbal Plate from the Mandrel Head.

Check the spherical bearing surface for burrs and/or other defects.

Do not reuse any part that shows evidence of cracking, bending or over stressing.

Apply a very thin coat of general purpose grease or anti-seize to the spherical surface of the gimbal plate, two or three drops of light oil on each of the four spherical washers, grease or anti-seize to both sides of the torque plate and grease, anti-seize or oil to all screws, nuts and threads. Reassemble in the reverse order of disassembly.

STANDARD JACKSCREWS AND SPACERS

ID Range	Jackscrews P/N (8 req'd.)	Spacers P/N (8 req'd.)	Spacer Length
7.00" to 8.00" 177.8mm to 230.2mm	33-1415	-	-
9.00" to 9.25" 228.6mm to 235.0mm	33-1416	-	-
9.25" to 10.50" 235.0mm to 266.7mm	33-1417	-	-
10.50" to 11.75" 266.7mm to 298.5mm	33-1415	44--0217	1.87" (47.5mm)
11.75" to 13.00" 298.5mm to 330.2mm	33-1415	44-0218	2.50" (63.5mm)
13.00" to 14.25" 330.2mm to 362.0mm	33-1415	44-0219	3.12" (79.2mm)
14.25" to 15.50" 362.0mm to 393.7mm	33-1415	44-0220	3.75" (95.3mm)
15.50" to 16.75" 393.7mm to 425.5mm	33-1415	44-0221	4.37" (111.0mm)
16.75" to 18.00" 425.5mm 457.2	33-1415	44-0222	5.00" (127.0mm)
18.00" to 19.25" 457.2mm to 489.0mm	33-1415	44-0217 44-0220	1.87" (47.5mm) 3.75" (95.3mm)
19.25" to 20.50" 489.0mm to 520.7mm	33-1415	44-0217 44-0221	1.87" (47.5mm) 4.37" (111.0mm)
20.50" to 21.75" 520.7mm to 552.5mm	33-1415	44-0217 44-0222	1.87" (47.5mm) 5.00" (127.0mm)
21.75" to 23.00" 552.5mm to 584.2mm	33-1415	44-0218 44-0222	2.50" (63.5mm) 5.00" (127.0mm)
23.00" to 24.25" 584.2mm to 616.0mm	33-1415	44-0219 44-0222	3.12" (79.2mm) 5.00" (127.0mm)
Standard Jackscrews and Spacers			

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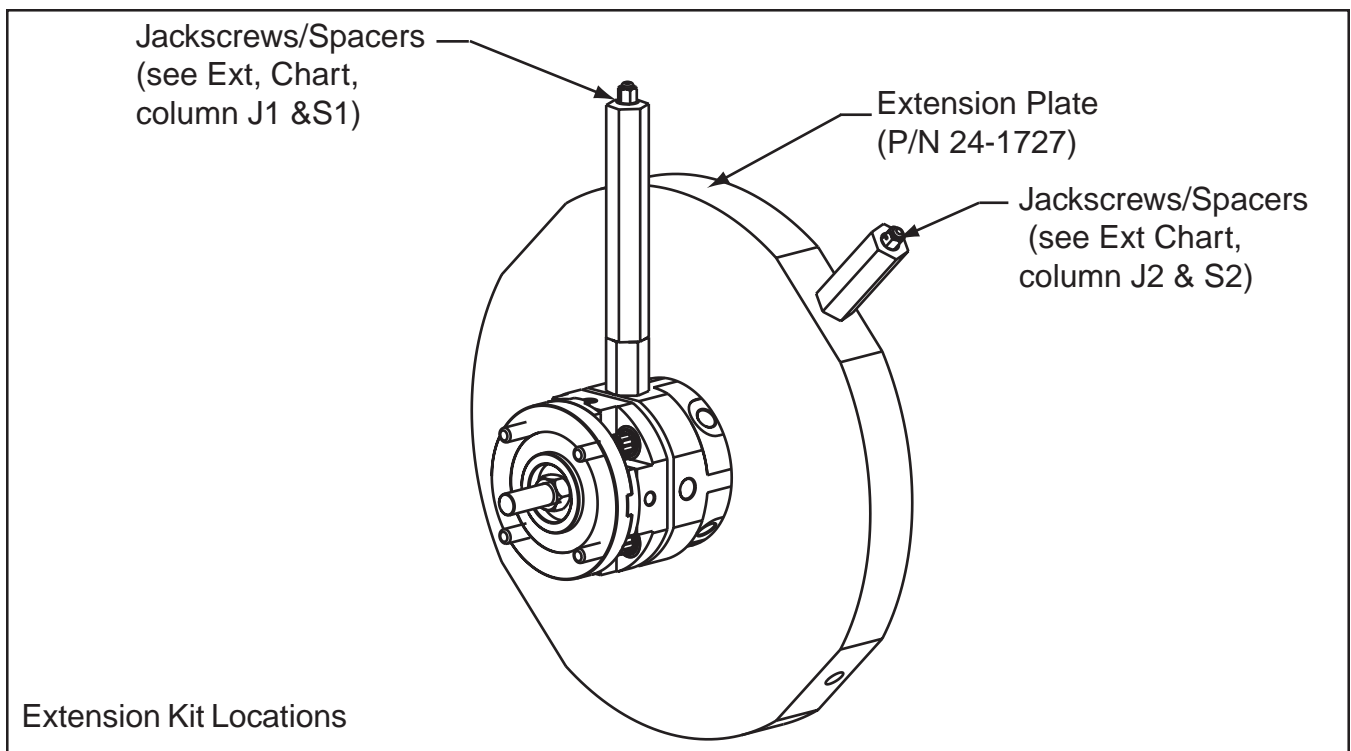
JACKSCREWS, SPACERS AND EXTENSION PLATE (24" THROUGH 42")

ID Range	Ext. Plate	S2 Ext. Spacer	J2 Jackscrew	S1 Head Spacer	J1 Jackscrews
19.75" to 21.00" 501.7mm to 533.4mm	24-1727	-	33-1417	44-0217 44-0221	33-1415
21.00" to 22.25" 533.4mm to 565.2mm	24-1727	-	33-1417	44-0217 44-0222	33-1415
22.25" to 23.50" 565.2mm to 596.9mm	24-1727	-	33-1417	44-0218 44-0222	33-1415
23.50" to 24.75" 596.9mm to 628.7mm	24-1727	44-0217	33-1415	44-0219 44-0222	33-1415
24.75" to 26.00" 628.7mm to 660.4mm	24-1727	44-0218	33-1415	44-0220 44-0222	33-1415
26.00" to 27.25" 660.4mm to 692.2mm	24-1727	44-0219	33-1415	44-0221 44-0222	33-1415
27.25" to 28.50" 692.2mm to 723.9mm	24-1727	44-0220	33-1415	44-0217 44-0527	33-1415
28.50" to 29.75" 723.9mm to 755.7mm	24-1727	44-0221	33-1415	44-0218 44-0527	33-1415
29.75" to 31.00" 755.7mm to 787.4mm	24-1727	44-0222	33-1415	44-0219 44-0527	33-1415
31.00" to 32.25" 787.4mm to 819.2mm	24-1727	44-0217 44-0220	33-1415	44-0220 44-0527	33-1415
32.25" to 33.50" 819.2mm to 851.0mm	24-1727	44-0217 44-0221	33-1415	44-0221 44-0527	33-1415
33.50" to 34.75" 851.0mm to 882.7mm	24-1727	44-0217 44-0222	33-1415	44-0222 44-0527	33-1415
34.75" to 36.00" 882.7mm to 914.4mm	24-1727	44-0218 44-0222	33-1415	44-0217 44-0220	33-1415
Extension Kit					

Model 224B Miter Mandrel Head

ID Range	Ext. Plate	S2 Ext. Spacer	J2 Jackscrew	S1 Head Spacer	J1 Jackscrews
34.75" to 36.00" 882.7mm to 914.4mm	24-1727	44-0218 44-0222	33-1415	44-0217 44-0220 44-0527	33-1415
36.00" to 37.25" 914.4mm to 946.2mm	24-1727	44-0219 44-0222	33-1415	44-0217 44-0221 44-0527	33-1415
37.25" to 38.50" 946.2mm to 978.0mm	24-1727	44-0220 44-0222	33-1415	44-0217 44-0222 44-0527	33-1415
38.50" to 39.75" 978.0mm to 1,00.7mm	24-1727	44-0221 44-0222	33-1415	44-0218 44-0222 44-0527	33-1415
39.75" to 41.00" 1,009.7mm to 1,041.4mm	24-1727	44-0217 44-0219 44-0222	33-1415	44-0219 44-0222 44-0527	33-1415
41.00" to 42.25" 1,041.4mm to 1,073.2mm	24-1727	44-0217 44-0220 44-0222	33-1415	44-0220 44-0222 44-0527	33-1415

Extension Kit



Extension Kit Locations

OPERATION

CAUTION: Never attempt to manually lift the Mandrel with the BEVELMASTER™ installed.

The (8) eight Jackscrews are removable.

They are made of heat treated steel and have a slight spherical radius on the surface that contacts the workpiece.

On most surfaces this provides for excellent holding power with virtually no marring of the workpiece.

(3) Three lengths of jackscrews and (6) six lengths of spacers are provided. Combinations of Spacers will extend the ID Range.

An Extension Plate, which is also available, will extend the ID range.

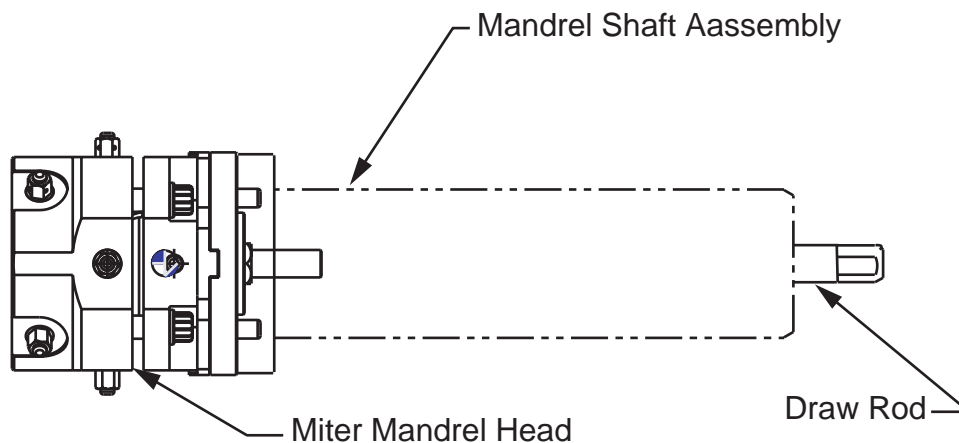
Turn the Jackscrews to a diameter slightly smaller than the bore of the workpiece.

Before the Miter Mandrel Head is mounted to the workpiece, both the Angular Offset and the Parallel Offset Adjustments should be approximately centered.

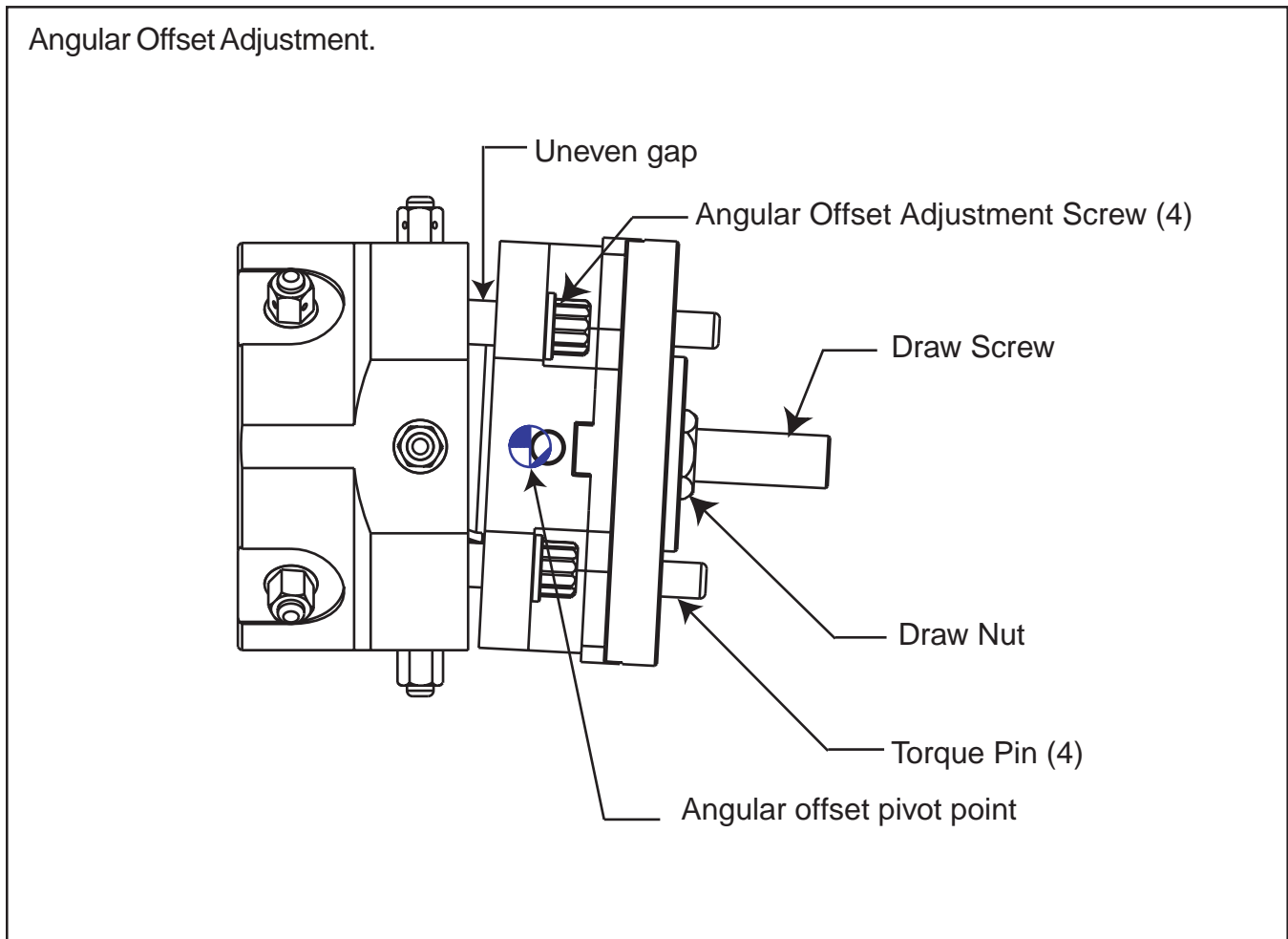
This will permit a maximum range of adjustment for final settings after the mandrel has been mounted.

NOTE: To make the Parallel Offset Adjustment, all (4) four screws must be slightly loose.

Mandrel Shaft Assembly and Draw Rod locations.



Check the gap between the Gimbal Plate and the Mandrel Head to see that it is approximately even all around.



If it is not, then loosen the angular offset adjustment screw(s) where the gap is small and tighten the Angular Offset Adjustment Screw(s) where the gap is wide.

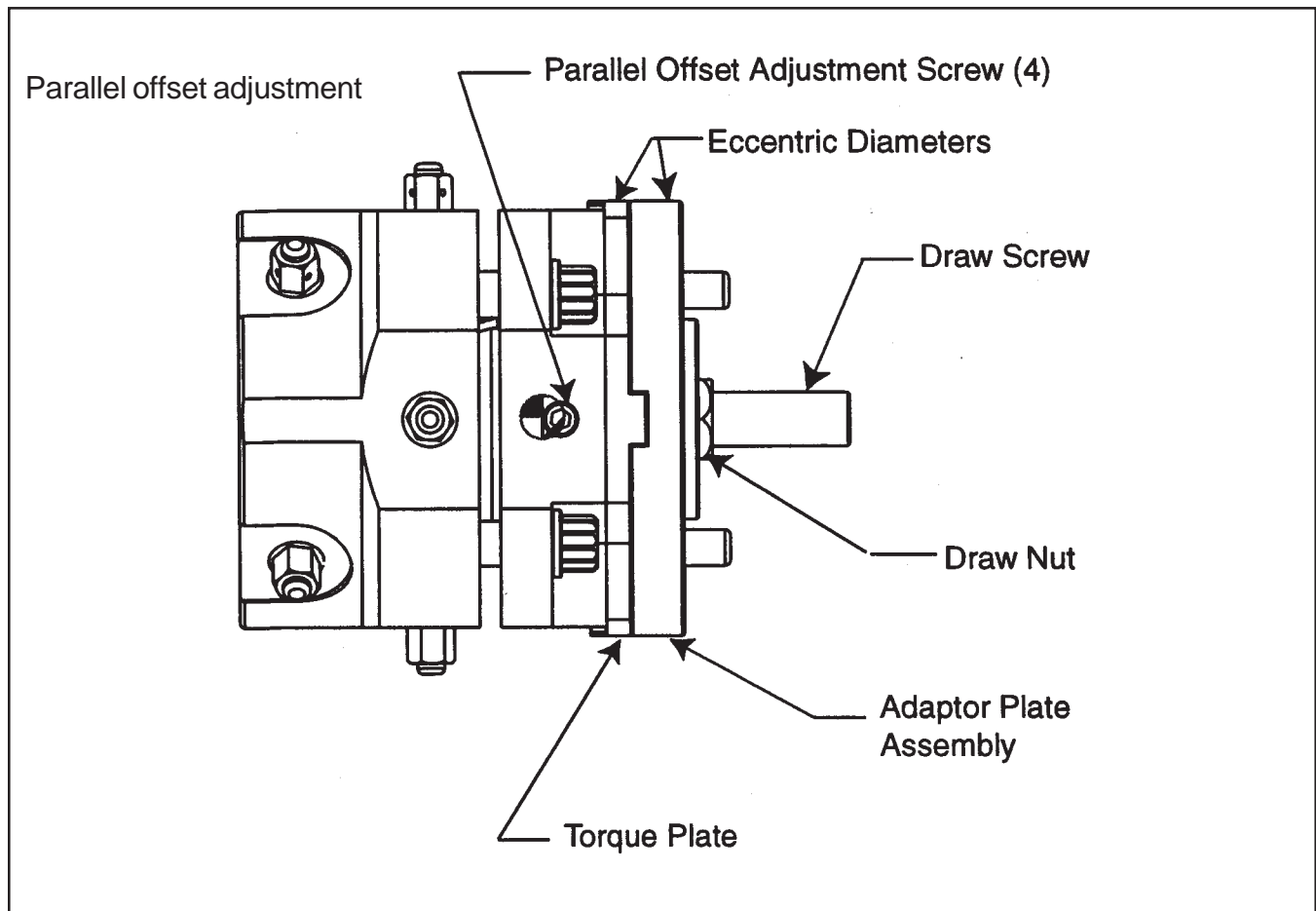
Lightly tighten the Draw Nut.

NOTE:

All four of the Angular Offset Adjustment Screws must be used in conjunction with each other.

All screws must be at least slightly loose to allow movement.

If the Mandrel Shaft is to be drawn directly toward one screw, the opposite screw must be loosened far enough to allow for the take up before the near screw is tightened.



Leave the Draw Nut slightly loose during and after the Angular Offset adjustment.

Check to see that the Adaptor Plate Assembly is centered to the gimbal plate.

If not, locate the four parallel offset adjustment screws and back off one or two screws where the Adaptor Plate Assembly is "in".

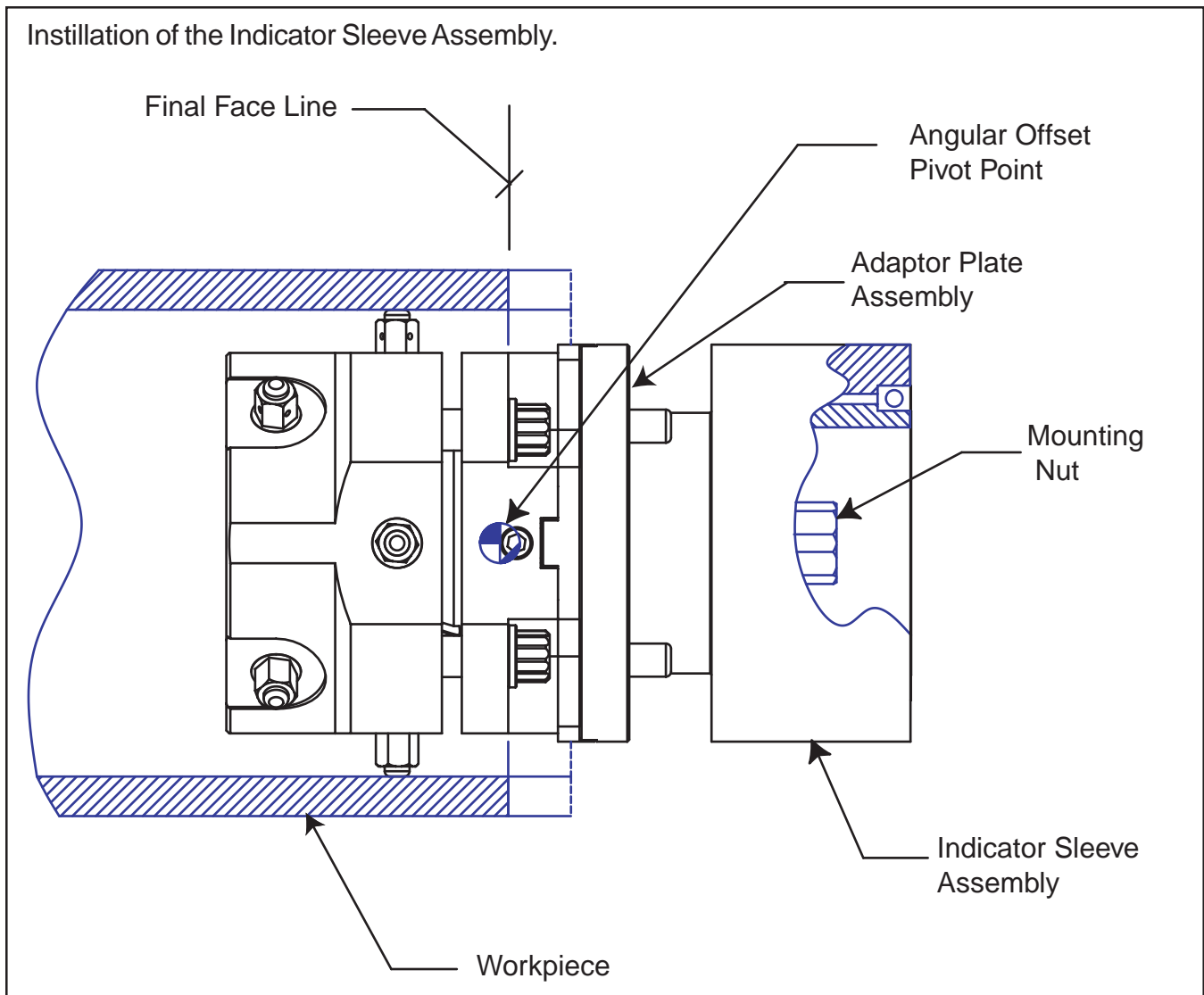
Tightening to opposite one or two screws will bring the Adaptor Plate Assembly toward the center.

NOTE:

To make the Parallel Offset adjustment, all (4) four screws must be slightly loose.

Once the Adaptor Plate Assembly has been roughly aligned and centered, temporarily snug all of the Adjustment Screws and the Draw Nut.

Insert the Miter Head into the workpiece.



NOTE:

It is highly desirable to mount the Miter Head so that the Angular Offset Pivot point is on the same plane with the proposed finished wall preparation.

This will diminish the amount of parallel offset required after the angular adjustment has been made.

Using a tape measure or steel rule, keep the rear flange of the Gimbal Plate roughly centered while turning the Jackscrews to tighten them against the ID of the workpiece.

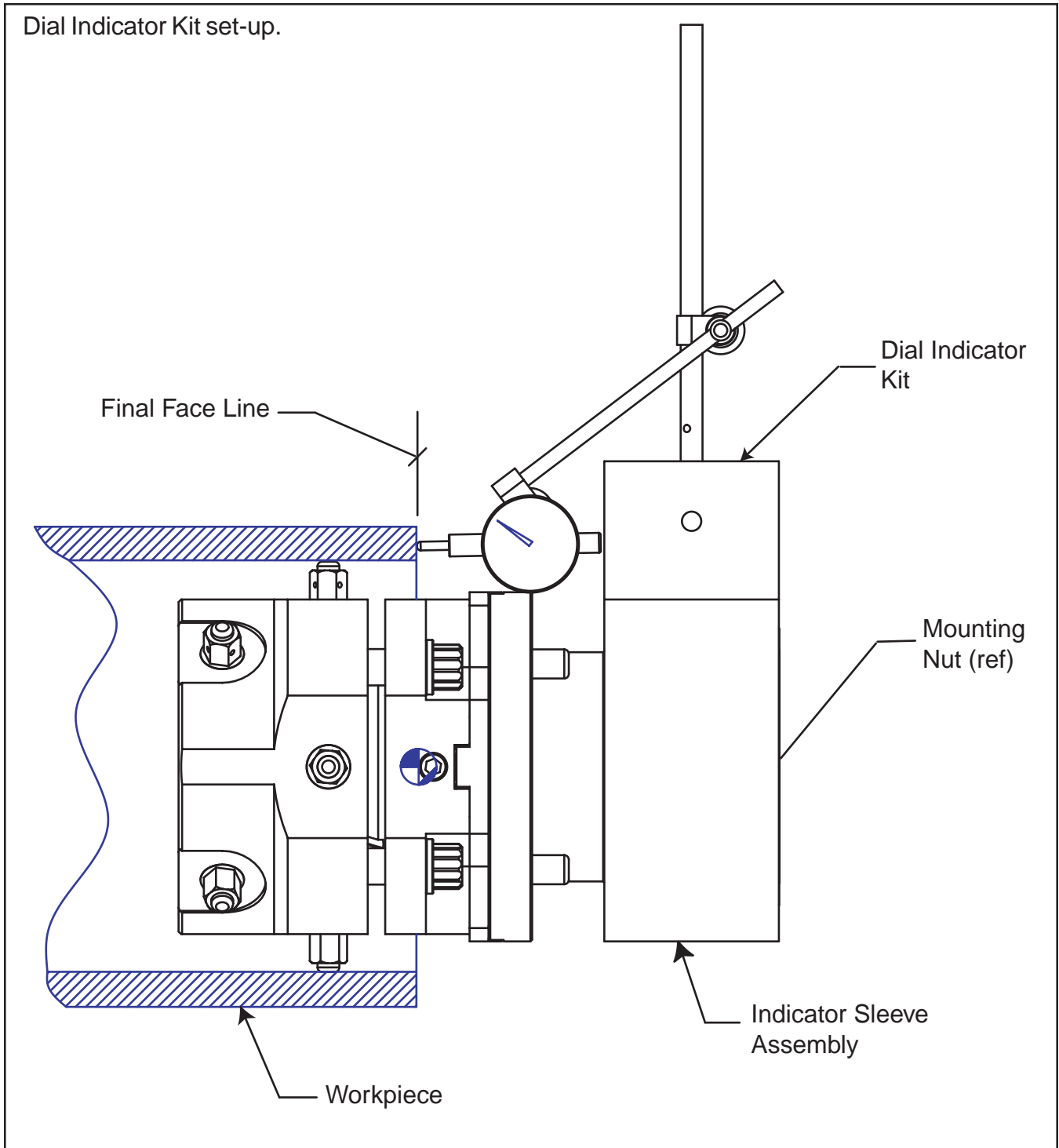
Use the wrenches provided to tighten all (8) eight Jackscrews securely.

Mount the Indicator Sleeve to the Adaptor Plate Assembly and tighten the Mounting Nut.

Place the Magnetic Based Indicator Holder onto the Sleeve and energize the magnet.

If the existing surfaces of the workpiece are to be used for alignment and centering references, use the Dial Indicator and hardware provided.

If punch marks, scribe lines or other references are to be used, simply select the



required hardware from the Indicator Kit to be used as a pointer.

The first adjustment to be made after mounting is always the angular offset.

NOTE:

Changing the Angular Offset will always change the Parallel Offset, but changing the Parallel Offset will not change the Angular Offset.

To move the Adaptor Plate Assembly in a given direction, one or two Angular Offset Adjustment Screw(s) opposite the direction of the movement must be loosened enough to allow the amount of movement anticipated.

Then the screw(s) directly across must be retightened to draw the adaptor Plate Assembly in the desired direction.

NOTE:

Never exceed 40 ft-lbs (54.4 N·m) of torque on the Angular Offset Adjustment Screws.

Repeat the indicating procedure and Angular Offset procedure as many times as necessary to achieve the accuracy desired.

Evenly tighten (4) four Angular Offset Adjustment Screws.

Now the Parallel Offset adjustment may be made.

As before, use the Indicator Kit to determine how much the Adaptor Plate Assembly must move, and in what direction.

To move the Adaptor Plate Assembly in a given direction, first loosen one or two Parallel Offset Adjustment Screw(s) on the side of the Adaptor Plate Assembly which you wish to move toward.

Now tighten the screw(s) on the side of the Adaptor Plate Assembly which you wish to move away from in order to push the Adaptor Plate Assembly in a given direction.

Never exceed 30 ft-lbs (41 N·m) of torque on the Parallel Offset Adjustment Screws.

Repeat the indicating procedure and the Parallel Offset adjusting procedure as many times as necessary to achieve the accuracy desired.

Once the accuracy requirements have been satisfied, evenly tighten all four Parallel Offset Adjustment Screws.

Recheck the adjustment with the indicator sleeve.

Remove the indicator items and the Indicator Sleeve from the Miter Head.

Tighten the Draw Nut securely.

Torque should be 50 to 75 ft-lbs (68 to 102 N·m).

Align the torque pin holes in the end of the Mandrel Shaft with the torque pins in the Adaptor Plate Assembly.

Install the Mandrel Shaft Assembly onto the Adaptor Plate Assembly and tighten the Draw Rod to 75 to 100 ft-lbs (102 to 136 N·m).

At this time, the Miter Mandrel should feel absolutely tight and rigid.

Before installing the 224B BEVELMASTER™, be sure to read the Operator's manual carefully, giving special attention to all safety cautions and warnings.

DISASSEMBLY AND ASSEMBLY

Back off the (4) four Parallel Offset Adjusting Screws about three full turns each

Unscrew the Draw Rod and slide the Mandrel Shaft Assembly rearward.

Remove the Draw Nut, the Adaptor Plate Assembly and the Torque Plate.

Remove the (4) four Angular Offset Adjustment Screws and the (4) four Spherical Washers.

Remove the Gimbal Plate.

Remove the Jackscrews and Spacers from the Head Assembly.

Assembly is done in reverse order of disassembly.

TROUBLE SHOOTING

Problem: There is a loss of air power.

The air supply pressure is too low.

The air filter is plugged.

The air line size is insufficient.

The air line is too long.

Problem: There is a loss of hydraulic power.

The hydraulic supply pressure is too low.

The hydraulic filter is plugged.

The hydraulic line size is insufficient.

The hydraulic line is too long.

Problem: The air motor will not start.

The air power supply is shut off.

The air motor is damaged and will not run free. The air motor needs lubrication.

Add lubrication and do not run the air motor for a few minutes, then try running the motor. Tap on the side of the air motor casing lightly with a piece of wood or with a soft rubber mallet just in case the vanes may be sticking.

Sand or other foreign material may be in the vanes of the air motor.

Problem: The hydraulic motor will not start.

The hydraulic power supply is shut off.

The hydraulic motor is damaged and will not run free.

ACCESSORIES

Jackscrew Extension Kits:

Extension Kit, ID mounting range 19.75" (501.7mm) to 42.25" (1,073.2mm)
P/N 05-0349

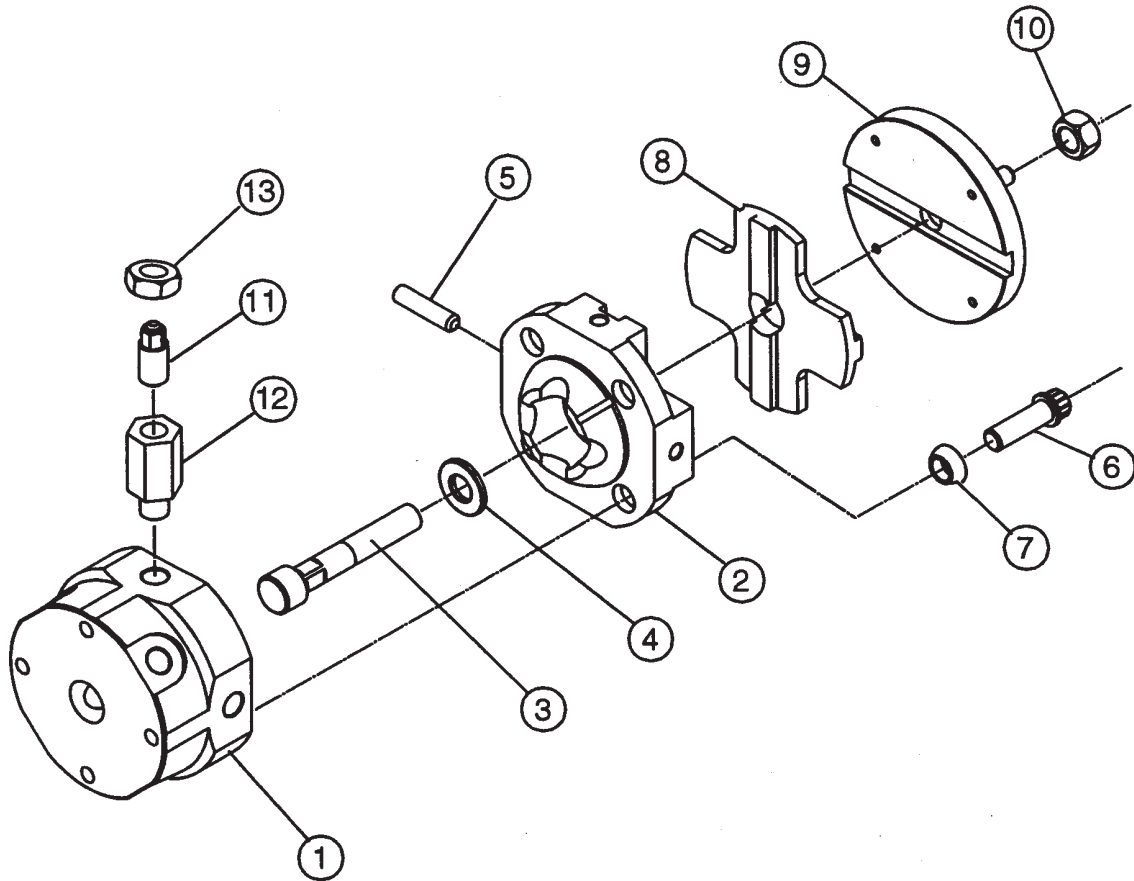
Jackscrew Assembly, Short, Stainless Steel, P/N 33-1425 (use in place of
(3) three P/N 33-1415).

Jackscrew Assembly, Medium, Stainless Steel, P/N 33-1426 (use in place
of (3) three P/N 33-1416).

Jackscrew Assembly Long, Stainless Steel, P/N 33-1427 (use in place of
(3) three P/N 33-1417).

ILLUSTRATED PARTS BREAKDOWN

Miter Mandrel Head Assembly



Parts List, Head Assembly, Miter Mandrel

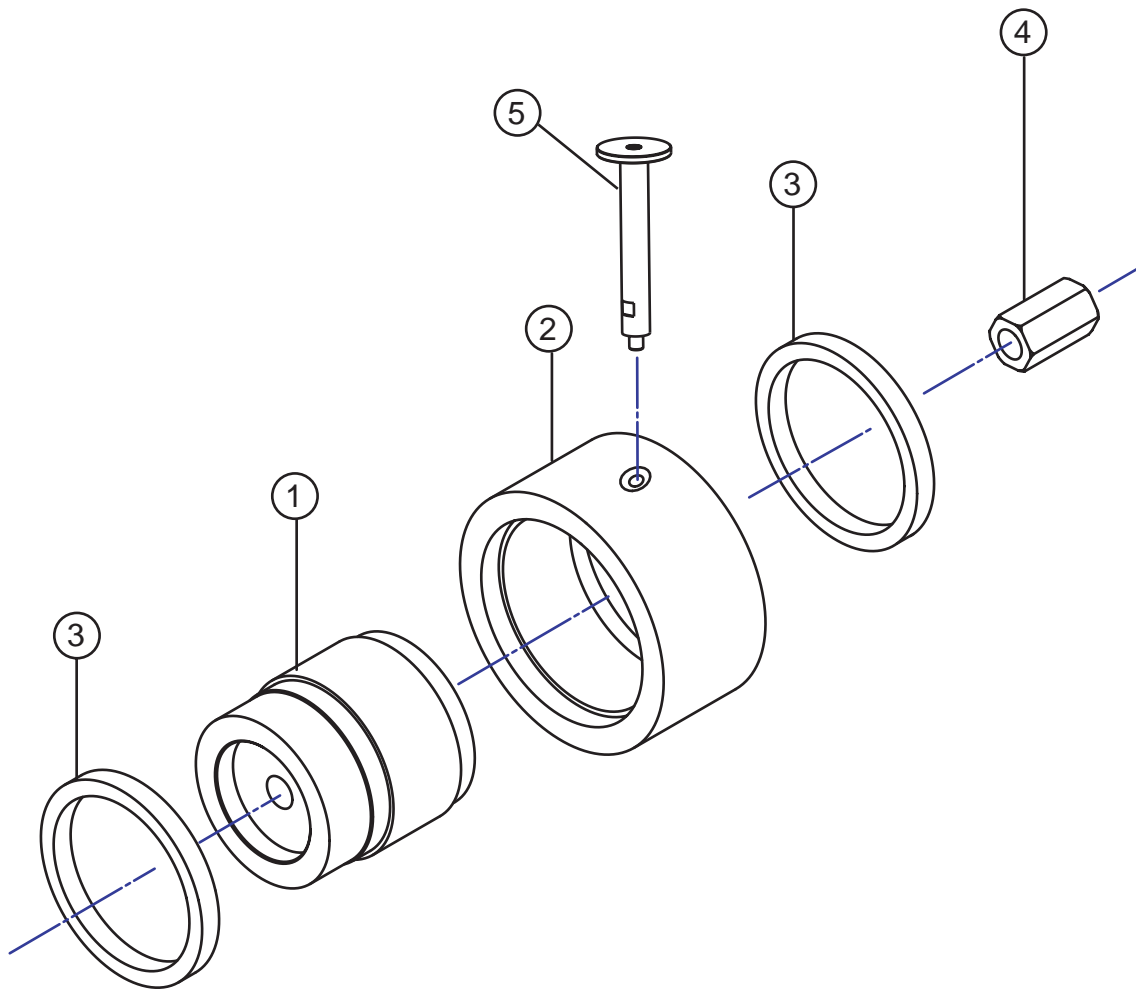
Item No.	Part No.	Description	Qty
1.	21-0526	HEAD, MITER MANDREL	1
2.	24-1630	PLATE, GIMBAL	1
3.	33-1409	SCREW, DRAW	1
4.	34-0142	WASHER, FLAT, H.T.	1
5.	33-0560	SCREW, SET, (1/2-13 X 2")	4
6.	33-2190	SCREW, HI-TORQUE, (5/8-11 X 2")	4
7.	29-0374	BEARING, SPHR, (5/8 X 1 1/8 X 3/8")	4
8.	24-1631	PLATE, TORQUE	1
9.	24-1728	PLATE, ASSY, ADAPTOR	1

Model 224B Miter Mandrel Head

Parts List, Head Assembly, Miter Mandrel

Item No.	Part No.	Description	Qty
10.	35-0076	NUT, HEX (3/4-16 X 41/64")	1
11.	33-1415	JACKSCREW ASSEMBLY (1.875" 47.6MM)	8
	33-1416	JACKSCREW ASSEMBLY (2.500" 63.5MM)	8
	33-1417	JACKSCREW ASSEMBLY (3.125" / 79.4MM)	8
12.	44-0217	SPACER, JACKSCREW (1.87" / 47.5MM)	8
	44-0218	SPACER, JACKSCREW (2.50" / 63.5MM)	8
	44-0219	SPACER, JACKSCREW (3.12" / 79.2MM)	8
	44-0220	SPACER, JACKSCREW (3.75" / 95.3MM)	8
	44-0221	SPACER, JACKSCREW (4.37" / 111.0MM)	8
	44-0222	SPACER, JACKSCREW (5.00" / 127.0MM)	8
13.	35-0177	NUT, JAM (3/4-16 X 27/64")	8
	NOT SHOWN:		
	36-0010	WRENCH, L, HEX (1/4")	1
	36-0059	WRENCH, COMBINATION (1 1/4")	1
	36-0060	WRENCH, COMBINATION (1 1/8")	1
	36-0076	WRENCH, COMBINATION (9/16")	1
	36-0244	WRENCH, 12PT COMBINATION, HEX (5/8")	1
	86-0228	CASE, 224B MITER MANDREL KIT	1

Indicator Sleeve Assembly

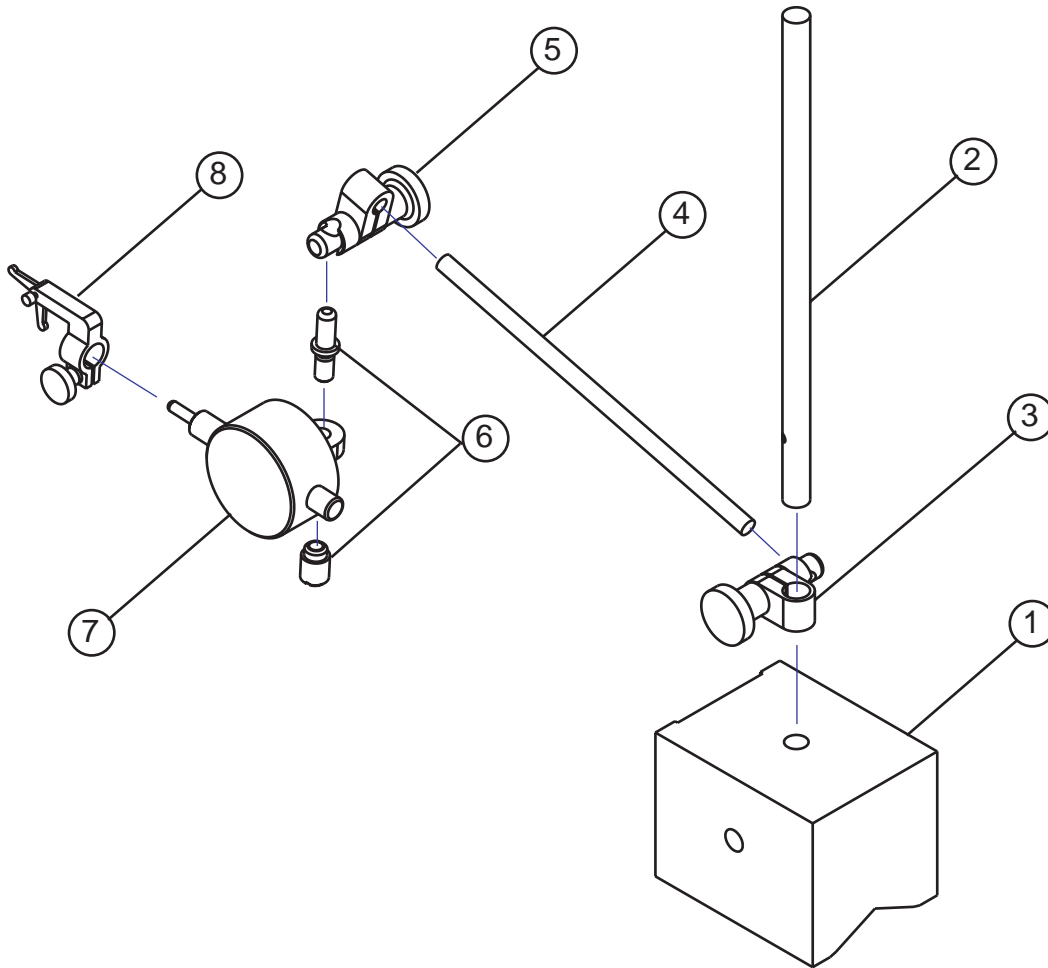


Parts List, Sleeve Assembly, Indicator

Item No.	Part No.	Description	Qty
1.	46-0509	SLEEVE, INNER	1
2.	46-0510	SLEEVE, OUTER	1
3.	29-0393	BEARING, BALL	2
4.	35-0222	NUT	1
5.	27-0676	ADAPTOR ASSEMBLY, EXT. INDICATOR	1

NOTE: ITEM #5 SUPPLIED WITH EXTENSION KIT FOR THE RANGE OF 24" - 42".

Dial Indicator Assembly (P/N 50-0015)



Parts List, Indicator Assembly, Dial (P/N 50-0015)

Item No.	Part No.	Description	Qty
1.	30-0334	BASE, MAGNETIC	1
2.	30-0335	POST, UPRIGHT BASE	1
3.	30-0336	SLEEVE	1
4.	30-0337	ROD	1
5.	30-0338	SLEEVE	1
6.	30-0339	ATTACHMENT, INDICATOR	1
7.	30-0340	INDICATOR, DIAL	1
8.	30-0341	ATTACHMENT UNIVERSAL	1