



## (MS) Mid-Size Clamshell Operating Manual

Rev. C

### Table of Contents

<b>Safety Instructions</b>	-----	<b>2</b>
<b>Introduction</b>	-----	<b>4</b>
<b>Components</b>	-----	<b>5</b>
<b>Machine Setup</b>	-----	<b>7</b>
<b>Locator Extensions Table</b>	-----	<b>9</b>
<b>Installation on In-line Pipe</b>	-----	<b>10</b>
<b>Squaring and Centering</b>	-----	<b>10</b>
<b>Setting Tool Bits</b>	-----	<b>11</b>
<b>Motor Installation</b>	-----	<b>13</b>
<b>Machine Operation</b>	-----	<b>14</b>
<b>Severing and Beveling</b>	-----	<b>14</b>
<b>Counter Bore Attachment</b>	-----	<b>15</b>
<b>Swivel Head Attachment</b>	-----	<b>16</b>
<b>Single Point Attachment</b>	-----	<b>17</b>
<b>Machine Maintenance</b>	-----	<b>18</b>
<b>Bearing Adjustment</b>	-----	<b>19</b>
<b>Assembly Drawings</b>		
<b>MS Clamshell (Dwg.1)</b>	-----	<b>20</b>
<b>Locator Assembly (Dwg.2)</b>	-----	<b>22</b>
<b>Tripper Assembly (Dwg.3)</b>	-----	<b>23</b>
<b>Counter bore Assembly (Dwg.4)</b>	-----	<b>24</b>
<b>Swivel Head Assembly (Dwg.5)</b>	-----	<b>25</b>
<b>Single Point Assembly (Dwg.6)</b>	-----	<b>26</b>

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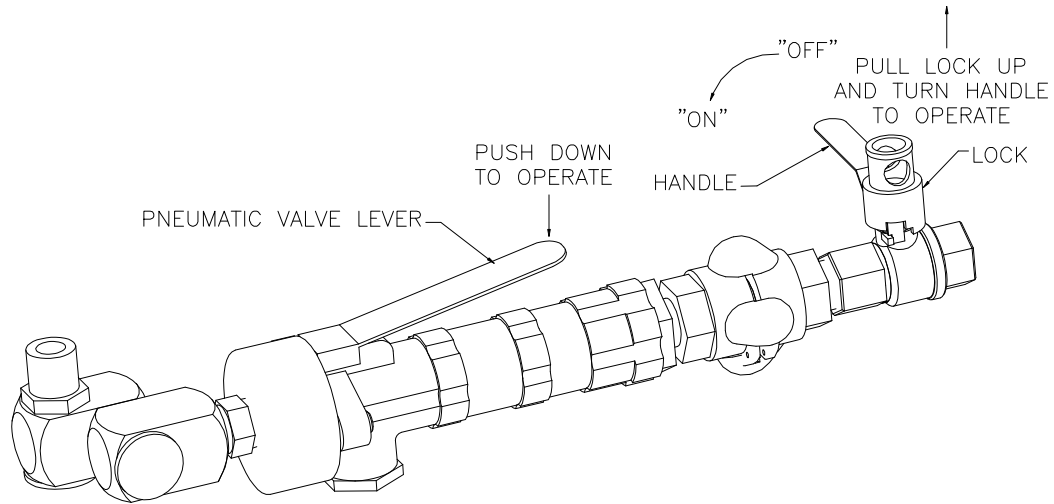
## *General Safety Instructions*

1. **DO NOT RUSH THE JOB!** Read and understand the instructions before operating the machine.
2. If there is a question on safety, or if technical expertise is required, call 1-651-388-8661 or 1-800-283-1937 for technical support.
3. Wear appropriate protective safety equipment including: Safety Glasses, Gloves, Hard Hat, Protective Shoes, Hearing Protection, Hair Restraints, and Coveralls.
4. Keep loose clothing, long hair, or any other unsecured part away from operating machines.
5. Keep the work site clean. Use a brush to remove chips from the work piece. **DO NOT** use your hands or an air hose to remove chips and swarf.
6. Ensure adequate workspace around work area before mounting the Clamshell.
7. Support work material for total machine weight.
8. Before connecting the power source to the Clamshell, make sure the following items are tightly secured:

Clamshell Split Line	Feed Pin Bracket
Tool Blocks	Tool Bits
Locator Pads	Motor & Motor Mounts
9. **KEEP HANDS AWAY FROM CLAMSHELL WHEN OPERATING!** Adjustments should only be made when the rotation has stopped and the power is disconnected.
10. **NEVER** move or work on the Clamshell without first isolating the power source.
11. **ALWAYS CLOSE CONTROL VALVES IF A POWER FAILURE OCCURS!**
12. **NEVER MOVE THE MACHINE WHILE CONNECTED TO THE POWER SOURCE!!!** Disconnect air hose or hydraulic power before moving or removing the machine from the work piece.

# Pneumatic Drive Safety Instructions

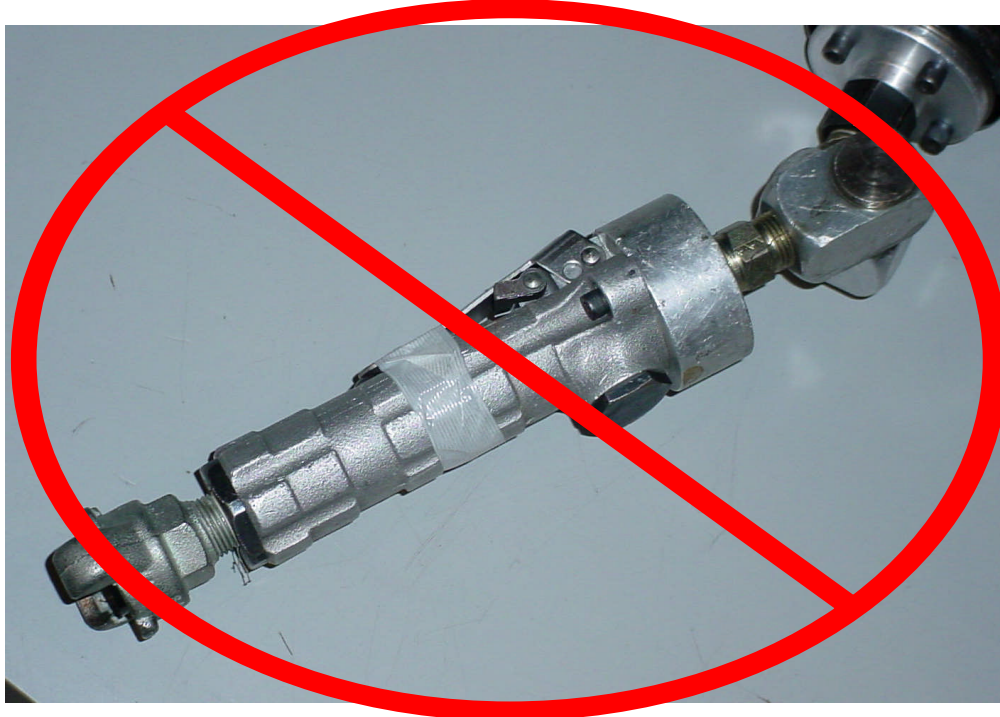
When using a pneumatic motor, *make sure the pneumatic valve handle is locked in the “off” position* (see Figure 1



below) when not in use. Make sure the pneumatic valve lever operates properly before running the machine. If the pneumatic valve is operating properly, the motor will not run unless the pneumatic valve lever is pushed down and the handle is turned to the “on” position.

**Figure 1**

**NEVER PERMANENTLY LOCK THE PNEUMATIC VALVE LEVER DOWN. DOING SO COULD RESULT IN SERIOUS INJURY!**



**Figure 2**

# Introduction

## General Description:

The D.L.Ricci MS Series Clamshells are portable pipe lathes designed to simultaneously sever and bevel in-line pipe, plus form machine any angle bevel as they cut. MS series clamshells are portable machines that are strong enough to cut and bevel heavy wall pipe and rigid enough to reface worn flanges. The frame is split for easy installation and the tool bits automatically feed into the work piece with each rotation of the lathe to assure precision machining.

## Machining Function & Capacities:

- \* Sever In-Line Pipe
- \* Sever and Bevel In-Line Pipe
- \* Sever and J-Bevel In-Line Pipe
- \* Sever and Double Bevel In-Line Pipe
- \* Socket Weld Removal
- \* Reface Flange Faces (requires an additional attachment)
- \* ID Bevel or Counter Bore (requires an additional attachment)

## Drive Assembly:

There are many different drives available for the MS clamshells. Figure 3 below shows all of the different drive arrangements.

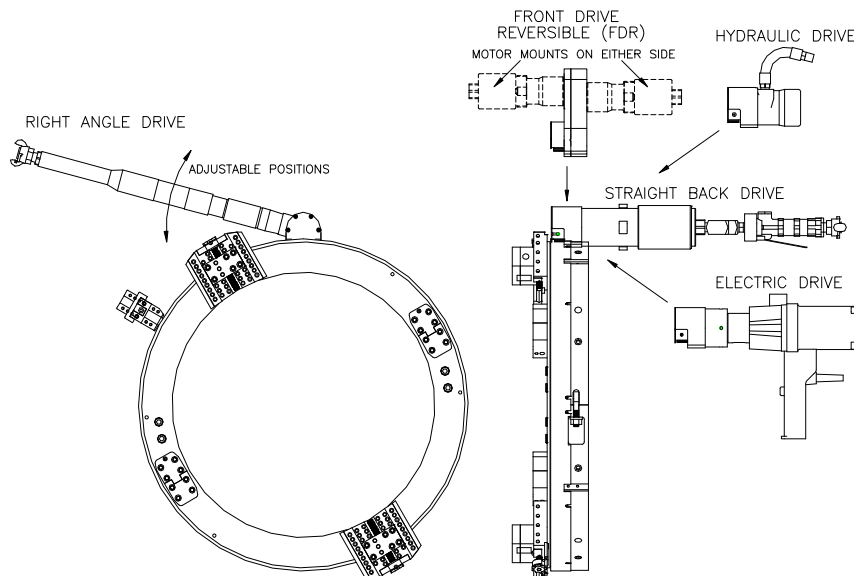


Figure 3

## Tooling:

1/2 x 1 straight sever bits and 1 x 1 bevel/sever high speed steel bits are standard. Any angle of bevel or counter bore bit can be designed; D.L.Ricci Corp. stocks all standard prep configurations for right and left hand severing and beveling. Specialty bits can be designed as required. Indexable tooling is also available on request.

# Components

(Refer to Figure 4 on the next page.)

## **Housing:**

An aluminum split ring housing, connected with swing bolts, that is capable of being disassembled for installation on in-line piping. The housing has bearing mountings for the rotating cutting head, a mount for the drive motor assembly, and locator pockets.

## **Cutting Head Assembly:**

Made from 4140-alloy steel, this split ring assembly, connected by the gear clamps, will align with the split lines of the housing when the clamshell is split into halves. The cutting head assembly has gear teeth on the outside diameter of the cutting head and mounting locations for the slide assemblies. An internal bearing race allows the cutting head to rotate about the housing.

## **Drive Assembly:**

Mounted to the housing and arranged with a pinion gear on a shaft. The motor mounting bracket is designed to accept the reaction torque generated by the drive motor. Alignment keys are used to guarantee perpendicularity between the motor and the cutting head.

## **Bearings:**

The cutting head assembly runs on precision bearings that provide for axial and radial force reaction. The bearings are adjustable to compensate for normal wear.

## **Slide Assembly:**

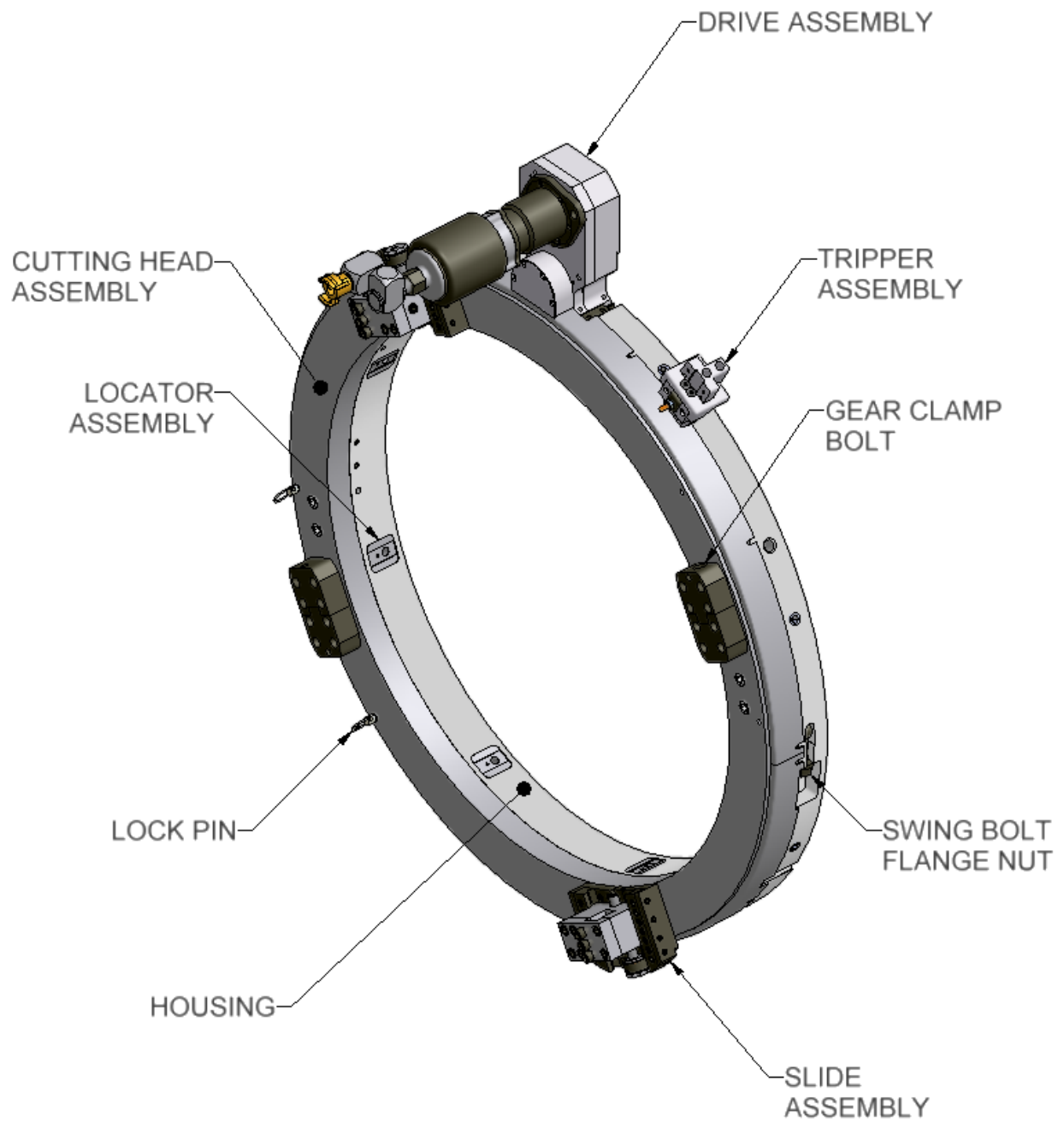
The slide assembly is designed to hold the cutting tool (tool bit). The slide assembly has adjustable gibs and also contains a feed screw assembly, which is used to feed the tool bit into the work piece. The slide assemblies are bolted to the face of the clamshell assembly and can be moved in 1/2" increments.

## **Tripper Assembly:**

The tripper assembly is designed to hold the tripper pin. The tripper pin is used to turn the star wheel on the feed screw assembly, which feeds the tool bit into the work piece. The tripper assembly is bolted to the OD of the housing. There are four different mounting locations that allow for more flexibility in machine mounting.

## **Locator Assembly:**

The MS clamshell uses adjustable locator assemblies with 1/2" of travel. Turning set screws located on the outside of the housing actuates the adjustable locators. Locator extensions are required to mount on smaller diameter pipe.



**Figure 4**

# Machine Set Up

## Pre-Installation Procedure:

### Separating Clamshell Halves:

1. Rotate gear by hand until both the gear and housing split lines are aligned. If the lock pin holes in the gear will not line-up with the holes in the housing, rotate gear 180 degrees for proper alignment.
2. Place the locking pins into the holes through the gear and housing to prevent gear rotation when the clamshell is split. Press the top button to allow pin to slip into the hole. **Make sure there is a locking pin in each half of the clamshell.**

**Caution: FAILURE TO INSERT LOCKING PINS DURING CLAMSHELL SEPARATION CAN RESULT IN INJURY**

3. Loosen the two swing bolt flange nuts in the housing and swing the bolts out of the pockets. Unscrew the two clamp bolts on the gear halves and separate the clamshell halves by pulling straight apart.

**Caution: DO NOT FORCE OPEN USING TOOLS**

4. Determine pipe OD and select proper locator extensions from the MS Size Chart / Table1. If required, bolt the locator extensions to the locator pads (see Figure 5), trapping the dowel between the locator and extension. The locator pads are adjusted by turning the set screws that are accessed from the outside of the housing with an Allen wrench. Back-up the locator pads as needed for proper clearance of pipe diameter.

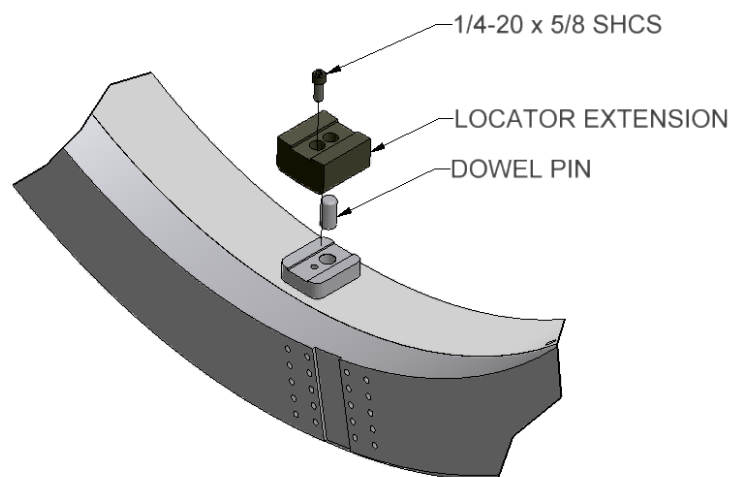
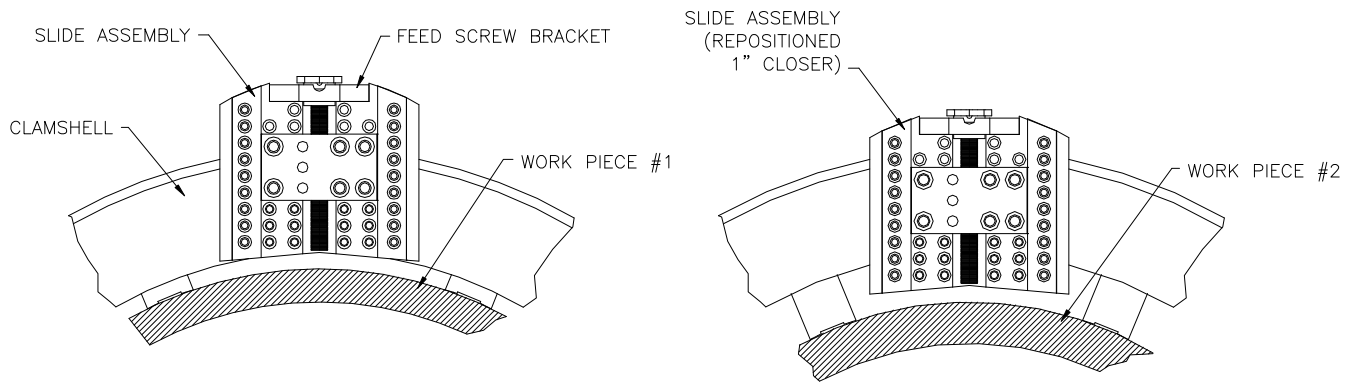


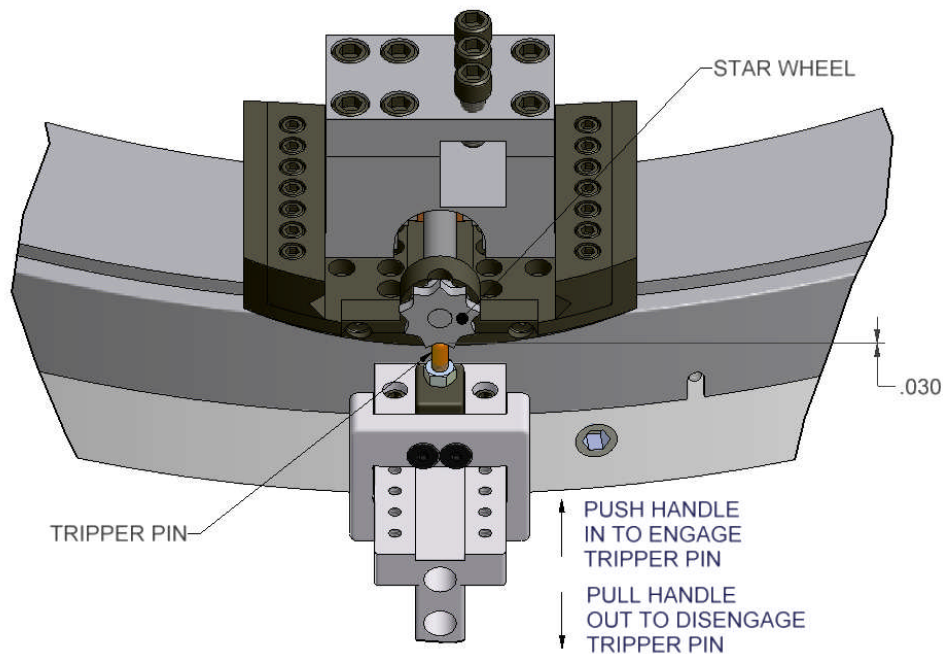
Figure 5

5. Make sure the Slide Assemblies are positioned so they clear the work piece but are as close to the OD as possible (see Figure 6 below). The slides can be moved by removing the feed screw bracket and tool block and then removing the 1/4-20 socket head cap screws that secure the slide to the clamshell.



**Figure 6**

6. Remove the lock pins. Push the handle of the tripper pin assembly in so the tripper pin is in the “engaged” position. If the tripper pin does not line up with the star wheel, reposition it. After the tripper pin height is set, check the tripper pin length (see Figure 7 below). The end of the tripper pin should be spaced .030” away from the cavity between 2 of the points of the star wheel. Pull the handle to disengage the tripper pin and reinsert the lock pin.



**Figure 7 Note the star wheel position**

**Recommended MS Locator Extension Ranges with Std. Locator**

		<b>MS SIZE</b>													
		<u>12</u>		<u>16</u>		<u>18</u>		<u>20</u>		<u>24</u>		<u>28</u>		<u>30</u>	
<b>EXTENSION</b>	<b>NONE</b>	13 1/8	12 1/4	16 1/4	15 3/8	18 1/4	17 3/8	20 1/4	19 3/8	24 1/4	23 3/8	28 1/4	27 3/8	30 1/4	29 3/8
	<b>1/4</b>	12 5/8	11 3/4	15 5/8	14 3/4	17 5/8	16 3/4	19 5/8	18 3/4	23 5/8	22 3/4	27 5/8	26 3/4	29 5/8	28 3/4
	<b>3/8</b>	12 3/8	11 1/2	15 1/2	14 5/8	17 1/2	16 5/8	19 1/2	18 5/8	23 1/2	22 5/8	27 1/2	26 5/8	29 1/2	28 5/8
	<b>1/2</b>	12 1/8	11 1/4	15 1/4	14 3/8	17 1/4	16 3/8	19 1/4	18 3/8	23 1/4	22 3/8	27 1/4	26 3/8	29 1/4	28 3/8
	<b>3/4</b>	11 5/8	10 3/4	14 3/4	13 7/8	16 3/4	15 7/8	18 3/4	17 7/8	22 3/4	21 7/8	26 3/4	25 7/8	28 3/4	27 7/8
	<b>1</b>	11 1/8	10 1/4	14 1/4	13 3/8	16 1/4	15 3/8	18 1/4	17 3/8	22 1/4	21 3/8	26 1/4	25 3/8	28 1/4	27 3/8
	<b>1 1/4</b>	10 5/8	9 3/4	13 3/4	12 7/8	15 3/4	14 7/8	17 3/4	16 7/8	21 3/4	20 7/8	25 3/4	24 7/8	27 3/4	26 7/8
	<b>1 1/2</b>	10 1/8	9 1/4	13 1/4	12 3/8	15 1/4	14 3/8	17 1/4	16 3/8	21 1/4	20 3/8	25 1/4	24 3/8	27 1/4	26 3/8
	<b>1 3/4</b>	9 5/8	8 3/4	12 3/4	11 7/8	14 3/4	13 7/8	16 3/4	15 7/8	20 3/4	19 7/8	24 3/4	23 7/8	26 3/4	25 7/8
	<b>2</b>	9 1/8	8 1/4	12 1/4	11 3/8	14 1/4	13 3/8	16 1/4	15 3/8	20 1/4	19 3/8	24 1/4	23 3/8	26 1/4	25 3/8
	<b>2 1/4</b>	8 5/8	7 3/4	11 3/4	10 7/8	13 3/4	12 7/8	15 3/4	14 7/8	19 3/4	18 7/8	23 3/4	22 7/8	25 3/4	24 7/8
	<b>2 1/2</b>	8 1/8	7 1/4	11 1/4	10 3/8	13 1/4	12 3/8	15 1/4	14 3/8	19 1/4	18 3/8	23 1/4	22 3/8	25 1/4	24 3/8
	<b>2 3/4</b>	7 5/8	6 3/4	10 3/4	9 7/8	12 3/4	11 7/8	14 3/4	13 7/8	18 3/4	17 7/8	22 3/4	21 7/8	24 3/4	23 7/8
	<b>3</b>	7 1/8	6 1/4	10 1/4	9 3/8	12 1/4	11 3/8	14 1/4	13 3/8	18 1/4	17 3/8	22 1/4	21 3/8	24 1/4	23 3/8
	<b>3 1/4</b>	6 5/8	5 3/4	9 3/4	8 7/8	11 3/4	10 7/8	13 3/4	12 7/8	17 3/4	16 7/8	21 3/4	20 7/8	23 3/4	22 7/8
	<b>3 1/2</b>	6 1/8	5 1/4	9 1/4	8 3/8	11 1/4	10 3/8	13 1/4	12 3/8	17 1/4	16 3/8	21 1/4	20 3/8	23 1/4	22 3/8
<b>4</b>	5 1/8	4 1/4	8 3/8	7 1/2	10 3/8	9 1/2	12 3/8	11 1/2	16 3/8	15 1/2	20 3/8	19 1/2	22 3/8	21 1/2	

		<b>MS SIZE</b>													
		<u>32</u>		<u>36</u>		<u>36.5</u>		<u>42</u>		<u>48</u>		<u>50</u>			
<b>EXTENSION</b>	<b>NONE</b>	32 1/4	31 3/8	36 1/4	35 3/8	36 3/4	35 7/8	42 1/4	41 3/8	48 1/4	47 3/8	50 1/4	49 3/8		
	<b>1/4</b>	31 5/8	30 3/4	35 5/8	34 3/4	36 1/8	35 1/4	41 5/8	40 3/4	47 5/8	46 3/4	49 5/8	48 3/4		
	<b>3/8</b>	31 1/2	30 5/8	35 1/2	34 5/8	36	35 1/8	41 1/2	40 5/8	47 1/2	46 5/8	49 1/2	48 5/8		
	<b>1/2</b>	31 1/4	30 3/8	35 1/4	34 3/8	35 3/4	34 7/8	41 1/4	40 3/8	47 1/4	46 3/8	49 1/4	48 3/8		
	<b>3/4</b>	30 3/4	29 7/8	34 3/4	33 7/8	35 1/4	34 3/8	40 3/4	39 7/8	46 3/4	45 7/8	48 3/4	47 7/8		
	<b>1</b>	30 1/4	29 3/8	34 1/4	33 3/8	34 3/4	33 7/8	40 1/4	39 3/8	46 1/4	45 3/8	48 1/4	47 3/8		
	<b>1 1/4</b>	29 3/4	28 7/8	33 3/4	32 7/8	34 1/4	33 3/8	39 3/4	38 7/8	45 3/4	44 7/8	47 3/4	46 7/8		
	<b>1 1/2</b>	29 1/4	28 3/8	33 1/4	32 3/8	33 3/4	32 7/8	39 1/4	38 3/8	45 1/4	44 3/8	47 1/4	46 3/8		
	<b>1 3/4</b>	28 3/4	27 7/8	32 3/4	31 7/8	33 1/4	32 3/8	38 3/4	37 7/8	44 3/4	43 7/8	46 3/4	45 7/8		
	<b>2</b>	28 1/4	27 3/8	32 1/4	31 3/8	32 3/4	31 7/8	38 1/4	37 3/8	44 1/4	43 3/8	46 1/4	45 3/8		
	<b>2 1/4</b>	27 3/4	26 7/8	31 3/4	30 7/8	32 1/4	31 3/8	37 3/4	36 7/8	43 3/4	42 7/8	45 3/4	44 7/8		
	<b>2 1/2</b>	27 1/4	26 3/8	31 1/4	30 3/8	31 3/4	30 7/8	37 1/4	36 3/8	43 1/4	42 3/8	45 1/4	44 3/8		
	<b>2 3/4</b>	26 3/4	25 7/8	30 3/4	29 7/8	31 1/4	30 3/8	36 3/4	35 7/8	42 3/4	41 7/8	44 3/4	43 7/8		
	<b>3</b>	26 1/4	25 3/8	30 1/4	29 3/8	30 3/4	29 7/8	36 1/4	35 3/8	42 1/4	41 3/8	44 1/4	43 3/8		
	<b>3 1/4</b>	25 3/4	24 7/8	29 3/4	28 7/8	30 1/4	29 3/8	35 3/4	34 7/8	41 3/4	40 7/8	43 3/4	42 7/8		
	<b>3 1/2</b>	25 1/4	24 3/8	29 1/4	28 3/8	29 3/4	28 7/8	35 1/4	34 3/8	41 1/4	40 3/8	43 1/4	42 3/8		
<b>4</b>	24 3/8	23 1/2	28 3/8	27 1/2	28 7/8	28	34 3/8	33 1/2	40 3/8	39 1/2	42 3/8	41 1/2			

**TABLE 1**

# Installation on In-Line Pipe:

## Joining Clamshell Halves:

1. Install the 2 halves of the clamshell around the pipe and tighten the housing swing bolts and the gear clamp bolts on the cutting head (see Figure 4 above).

**Note:** *If Clamshell will not close, check locator pads for proper size and clearance. Adjust the locators if necessary.*

2. Lightly tighten two adjustable locator pads directly across from each other (locators 1 and 2 in the Figure 8), just enough to secure the clamshell while trying to keep it centered on the work piece. Lightly tighten two more locator pads that are directly across from each other and 90 degrees away from the first set of locators (locators 3 and 4 in the Figure 8). **DO NOT TIGHTEN** the locators down completely until the clamshell has been squared to the pipe.

## Squaring & Centering:

1. Squaring: Place a Square on the back of the clamshell, directly in line with a locator, hold the square against the housing and the work piece and square the machine to the work piece at all four locations around the pipe (see Figure 8 below).

2. Centering: Using a 6" scale, measure the distance from the work piece to the clamshell ID at the four lightly tightened locator positions. Tighten the four locators so the 6-inch scale reads the same at all 4 positions. Pull out the locking pins so the clamshell gear can rotate.

3. Mount a dial indicator on the gear face with the tip resting on the work piece OD. Turn the gear so the indicator is positioned over one of the tighten locators (locator 1) and set the dial to zero. Slowly rotate the gear 180 degrees to another locator (locator 2) and take an indicator reading. If the reading is not zero, adjust the locators until the indicator reads one-half of the original reading. Reset the indicator dial to zero and repeat. If the clamshell cannot be centered, different locators are required.

4. Rotate the gear 90 degrees so the indicator is positioned over another locator (locator 3) and set the dial to zero. Slowly rotate the gear 180 degrees to another locator (locator 4) and take an indicator reading. If the reading is not zero, adjust the locators until the indicator reads one-half of the original reading. Reset the indicator dial to zero and repeat. The first two locators may need to be slightly loosened in order to zero the clamshell to the work piece.

5. Repeat steps 3 and 4 for all of the other locators. The number of locators varies from four to twelve, depending on the model of clamshell lathe. Most pipe is out of round; therefore a zero reading all the way around may not be possible.

6. Tighten all remaining locators.

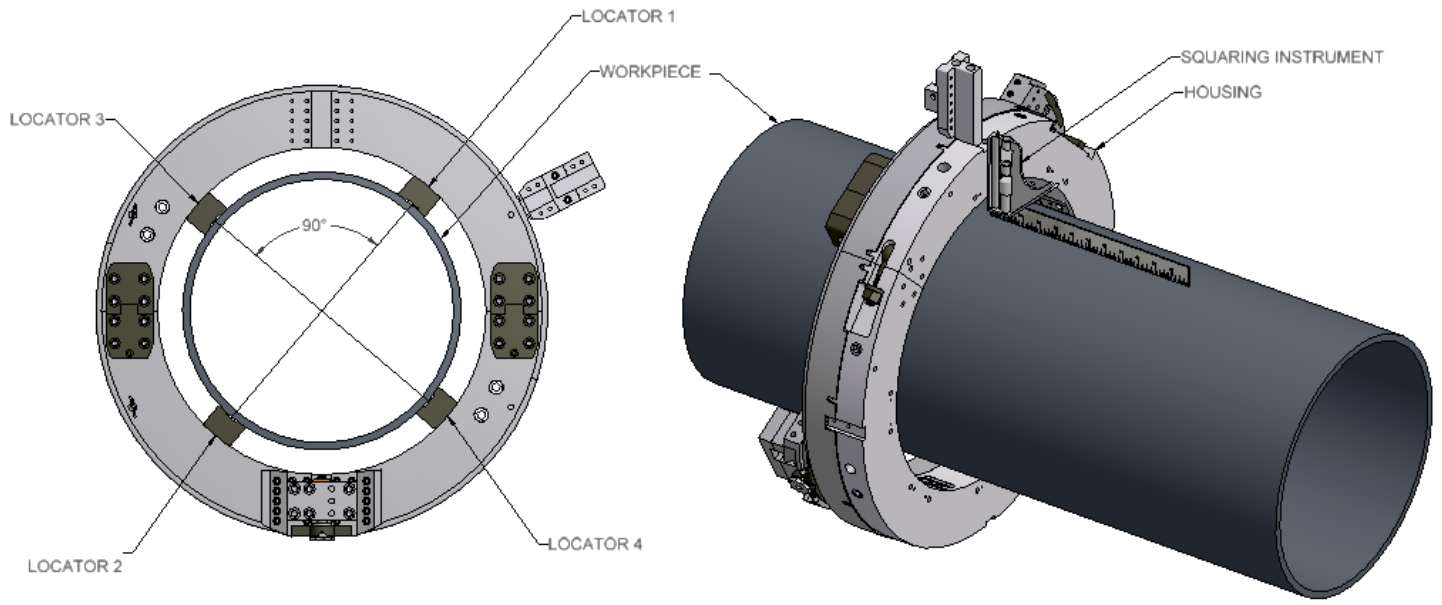


Figure 8

## Setting Tool Bits:

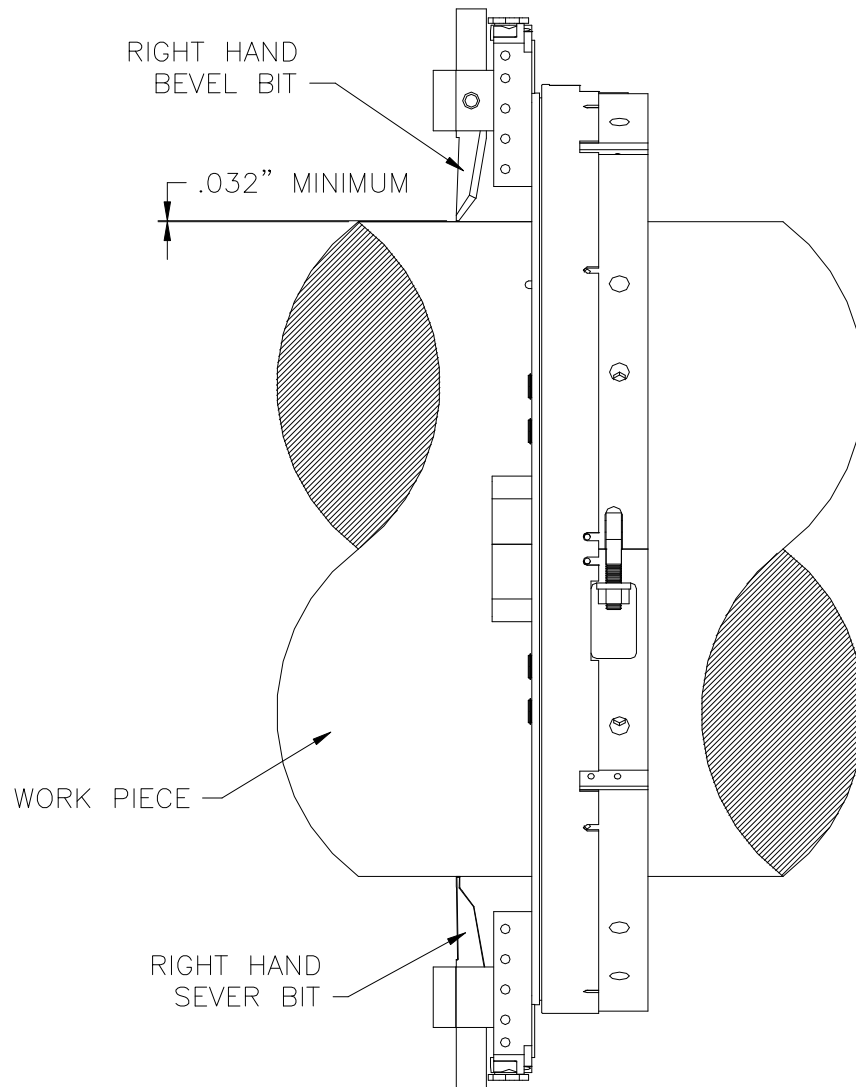
1. Prior to installation of tool bits, determine which tool bits must be used for your specific machining operation.

***NOTE: The Clamshell cuts in a clockwise direction, when viewed at its face. There are right hand and left hand bevel and sever bits, right hand bits bevel on the side which the clamshell is mounted, left hand bits bevel on the side opposite.***

2. Using the star wheel wrench, back the tool blocks away from the pipe, to allow enough room for the tool bits to pass completely through the work piece without running the tool blocks into the work piece. Disengage the feed pin, by pulling the tripper handle away from the clamshell.

3. Insert the proper beveling and severing bits so that the tip touches the pipe OD and the cutting edge or tip is on center. Hold the bit with one cap screw, snug but not tight.

4. Manually rotate the cutting head counter clockwise one revolution. This reverse action will push the tool bits away from any high spots in the pipe that could cause tool damage. After one complete revolution has been made tighten the cap screws on both tool blocks. Back the bevel bit 1/32" away from the work piece with the star wheel wrench (see Figure 9).



**Figure 9**

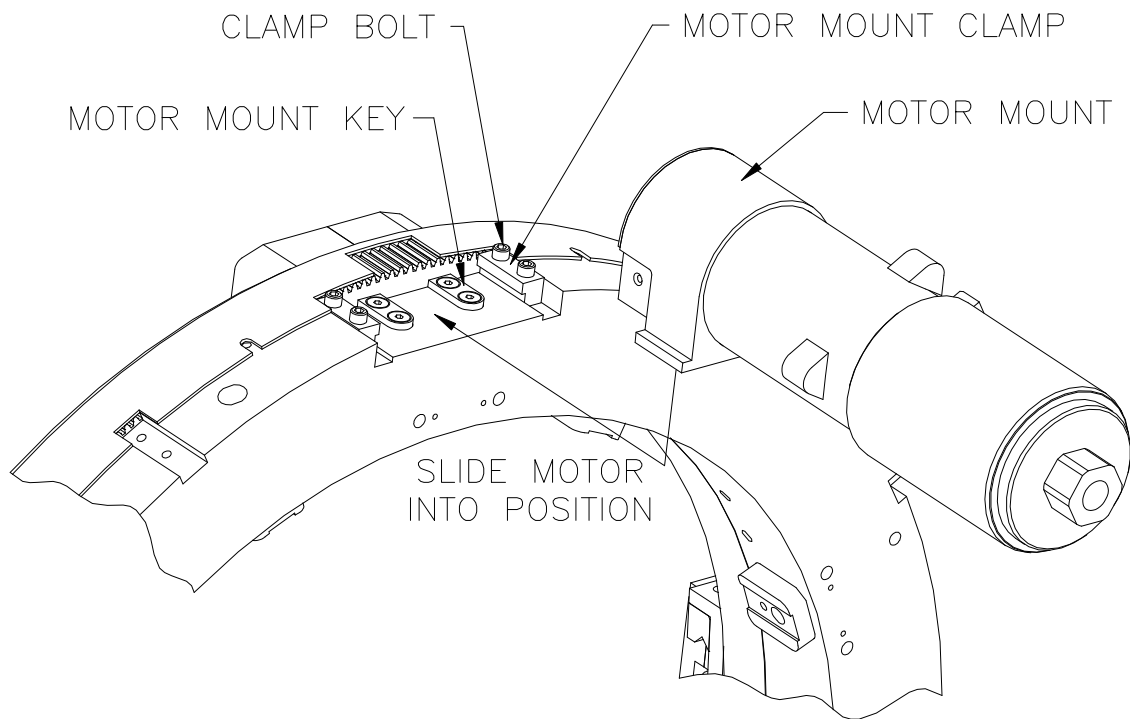
**NOTE: Always cut with the sever bit leading the bevel bit by 1/32" in depth of cut.**

## Motor Installation:

**CAUTION:** *Both locking pins must be removed from the gear face before installing the motor, and all power must be turned off.*

1. Loosen the four motor mount clamp screws. Position the motor mount toward the rear of the clamshell (see Figure 10).
2. Slide the motor mount under the motor mount clamps and slide the motor forward until the back of the motor mount is flush with the back of the clamshell housing. If the motor mount does not slide in all the way, rotate the cutter head to align the gear teeth. Tighten the motor mount cap screws.

**NOTE:** *If the motor does not engage, check to make sure the two gears are properly aligned. Rotate the cutting head by hand if necessary to align gear teeth.*



**Figure 10**

# Machine Operation

**CAUTION:** *To prevent damage to the tool bit, the work piece to be cut must be rigged properly to keep the tool bits from binding when the pipe is severed. Improperly rigged piping may result in personal injury or equipment damage.*

## **Severing In-Line Pipe:**

1. Follow set-up procedures, using a wide and narrow straight sever bit in opposite tool blocks. Back up both bits (out approx. 1/32"); then back up the wider bit another 2-5 turns of the tripper star wheel, so that it will trail the narrow bit throughout the cut. Attach the drive motor to the clamshell, disengage the tripper pin, and open the control valve slowly to check function and speed.

**NOTE:** *If the tool blocks do not move smoothly in the slides during the test rotation the adjustable gibs may need adjustment.*

**CAUTION:** *The cutting operation is continuous until terminated by the operator. To stop the cutting feed during rotation, LIFT THE TRIPPER HANDLE and let the machine rotate a few times to clear the tool bit. Turn off the power to stop clamshell rotation. Letting the tool bit clear will prevent tool damage and gouging.*

2. Engage the tripper pin by pushing down on the tripper handle, after the machine has been started. Each rotation will advance the tool bits approximately .003" with the tripper pin engaged. Use the tripper pin to advance the feed of the tool bits until both of the tool bits are cutting. If chatter or vibration occurs, reduce cutting RPM. If the tool bits chip or become dull, replace them immediately with sharp bits. **NEVER TRY TO RE SHARPEN the TOOL BITS, they must be sent back to the factory for regrinding to maintain proper relief angles (DAMAGE TO THE MACHINE COULD OCCUR).** Use coolant during the cutting operation to reduce friction on the cutting edge.

3. Stop the machine when the severing is complete. Back out the tool blocks with the star wheel wrench to the full position.

## **Severing and Beveling In-Line Pipe:**

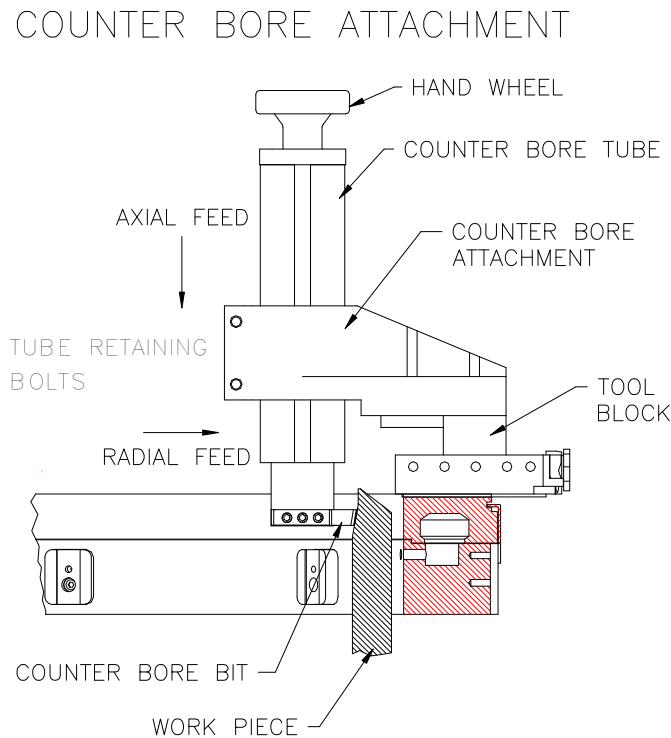
1. Follow tool bit setup procedures replacing both sever bits with either left hand or right hand **SEVER, BEVEL** combinations. Back the **BEVEL** bit up 1/32" above the sever bit and follow the procedure above, until the pipe is severed and beveled.

# I.D. Boring:

## Counter Bore Attachment:

The counter bore attachment (See Figure 11) comes with either a 6" or 10" long counter bore tube. The counter bore attachment can also be used for flange facing and flange face grooving.

1. Square and center the clamshell on the work piece. Remove the tripper bracket. Remove the cap from the tool block on one slide assembly. Bolt the counter bore attachment to the tool block.
2. Insert the counter bore bit into the counter bore bar. The cutting side of the bit should face the setscrews in the bar (see Figure 11). Adjust the counter bore tube height and lock into place. Use the star wheel wrench and the hand wheel to position the tool bit at the edge of the inner wall of the work piece.



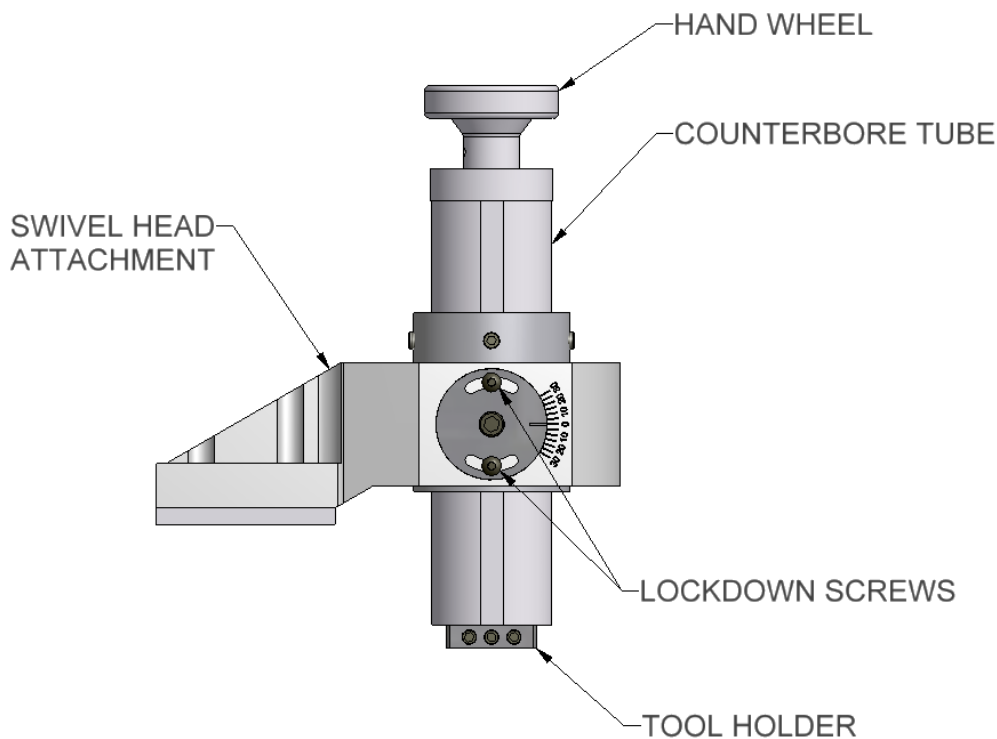
**Figure 11**

3. Install the motor and start the machine. Feed the tool bit axially by turning the hand wheel counter-clockwise approximately  $\frac{1}{4}$  turn for every revolution of the clamshell. Continue to feed until the correct counter bore depth is reached. Turn the hand wheel clockwise to back the tool bit up to make another cut. Stop the machine.
4. Use the star wheel wrench to radially position the counter bore attachment. Start the machine and feed the tool bit axially by turning the hand wheel. Continue to feed until the cut blends into the previous cut. Stop the machine.
5. Repeat step 4 until the desired counter bore diameter is reached.

## Swivel Head Attachment:

The swivel head attachment (See Figure 12) comes with either a 6" or 10" long counter bore tube. The swivel head attachment can be used for flange facing, OD beveling and flange face grooving.

1. Square and center the clamshell on the work piece. Disengage the tripper pin. Remove the cap from the tool block on one slide assembly. Bolt the swivel head attachment to the tool block.
2. Insert the facing bit into the counter bore bar. The cutting side of the bit should face the setscrews in the bar (see Figure 12). Loosen the lock down screws and swivel the counter bore to match the desired counter bore profile. Tighten the lock down screws. Adjust the counter bore tube height and lock into place with the setscrews on the flat of the counter bore tube. Use the star wheel wrench and the hand wheel to position the counter bore attachment at the edge of the inner wall of the work piece.



**Figure 12**

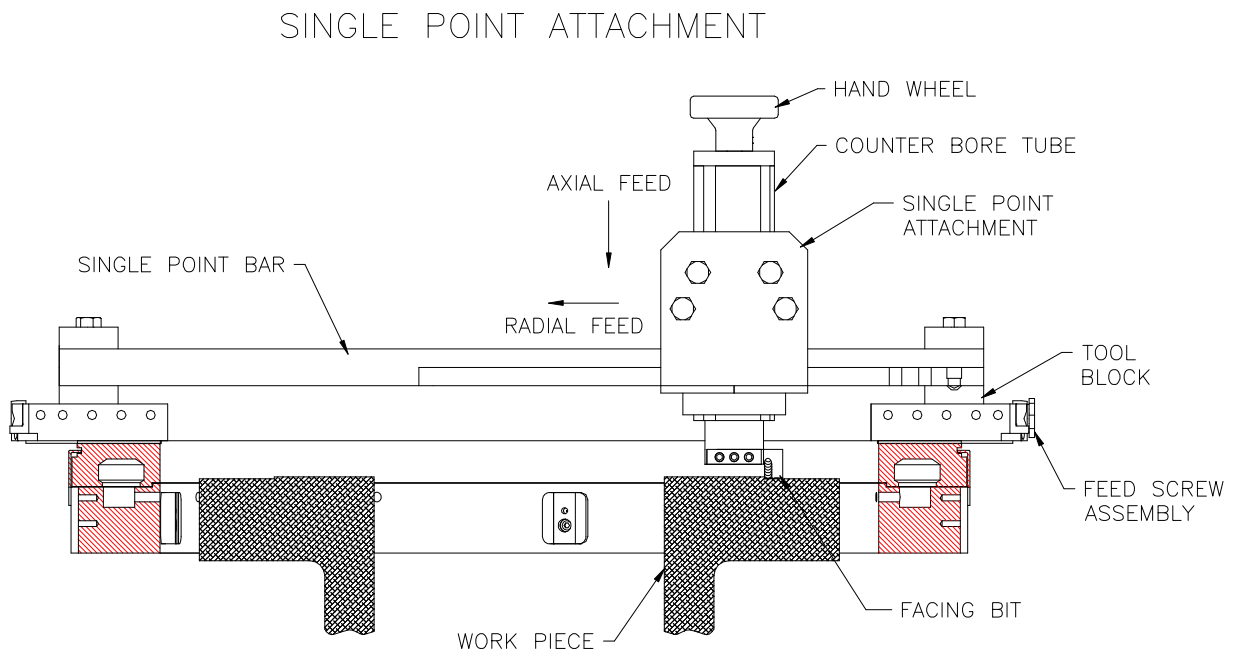
3. Install the motor and start the machine. Feed the tool bit axially by turning the hand wheel counter-clockwise approximately  $\frac{1}{4}$  turn for every revolution of the clamshell. Continue to feed until the correct counter bore depth is reached. Turn the hand wheel clockwise to back the tool bit up to make another cut. Stop the machine.
4. Use the star wheel wrench to radially position the counter bore attachment. Start the machine and feed the tool bit axially by turning the hand wheel. Continue to feed until the cut blends into the previous cut. Stop the machine.
5. Repeat step 4 until the desired counter bore diameter is reached.

# Flange Facing:

## Single Point Attachment:

The single point attachment (See Figure 13) comes with either a 6" or 10" long counter bore tube. The single point attachment can also be used for ID boring, OD beveling and flange face grooving.

1. Square and center the clamshell on the work piece. Disengage the tripper pin. Remove the cap from the tool blocks on both slide assemblies. Remove the feed screw assembly from one slide assembly. Bolt the swivel head attachment to the tool block with the slotted end of the bar pointing toward the slide assembly that has the feed screw assembly (see drawing below).
2. Insert the facing bit into the bore bar. The cutting side of the bit should face the setscrews in the bar (see Figure 13). Adjust the counter bore tube height and lock into place. Slide the single point attachment into position along the bar and tighten the 2 set screws to lock it in place. Tilt the counter bore tube to the desired angle and lock by tightening the 4 hex bolts on the single point attachment. Use the star wheel wrench and the hand wheel to position radially and axially the tool bit at the edge at the outer wall of the flange. Install the motor.



**Figure 13**

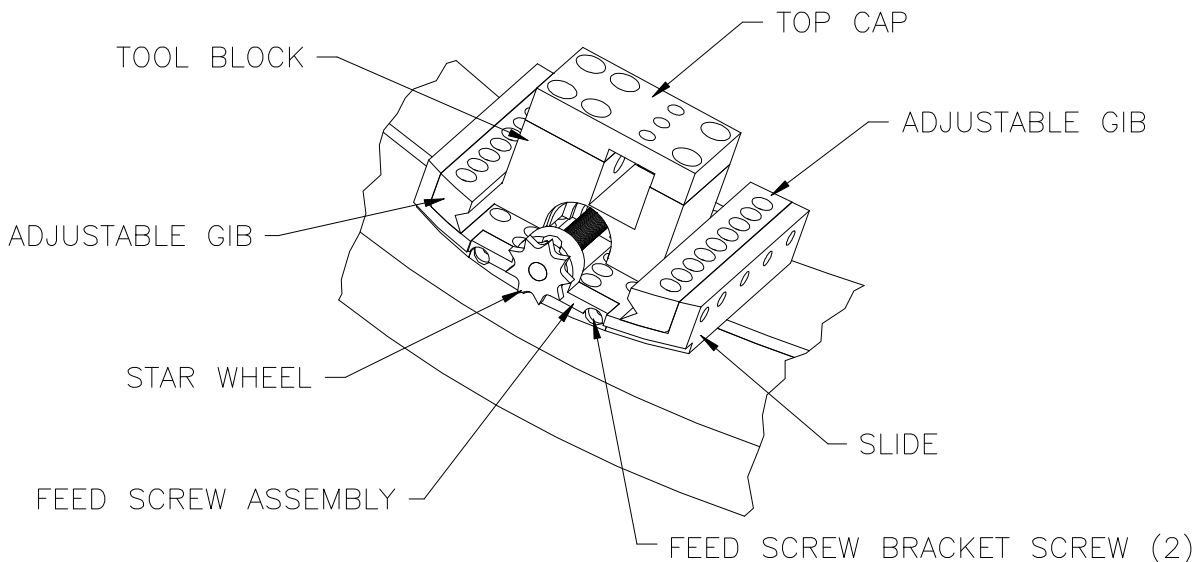
3. Start the machine. Engage the tripper pin to feed the tool bit radially. When the tool bit has traveled across the entire surface that needs to be faced, disengage the tripper pin and turn the hand wheel to lift the tool bit away from the surface. Stop the machine.
4. Use the star wheel wrench to radially position the tool bit at the flange OD. Turn the hand wheel to axially position the tool bit up to make another cut.
5. Repeat steps 3 and 4 until the flange face is flat.

# Machine Maintenance

## Adjusting Gibs on the Tool Block Slide:

**NOTE:** *Each tool block slide includes two gibs, which may be adjusted for wear after heavy use. It must always fit exactly parallel to the slide for proper feed screw action.*

1. To adjust the gibs first remove the two flat head screws holding the star wheel and feed screw assembly into place on the back of the slide.
2. Pull out the tool block and feed screw assembly. Remove the feed screw assembly from the feed nut pocket on the tool block (usually this is a tight fit). A dead blow may be needed to seat the gibs against the side set screws. Tap the tool block to either side and continue to adjust the side sets screws until the slop is removed.
3. Slide the tool block up and down by hand in the slide, adjust the side set screws until a snug fit is achieved with no sideways slop, yet not binding the feed nut pocket on the tool block (usually this is a tight fit). Replace the tool block into the slide. Put a tool bit into the tool block and tighten it down. Always adjust the gibs with a tool bit installed.
4. Remove the tool block; replace the feed screw assembly and tool block. Secure the feed screw assembly with two socket head screws. Use the **STAR WHEEL WRENCH** to move the tool block up and down the slide to checking for a proper fit: *moving easily yet snug.*

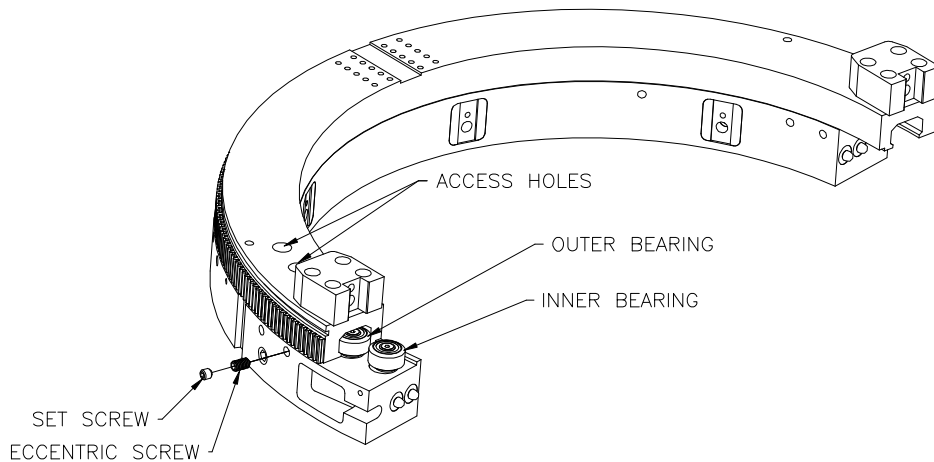


**Figure 14**

## Adjusting the Bearings:

**NOTE:** *MS clamshells feature adjustable bearings that require periodic adjustment and lubrication.*

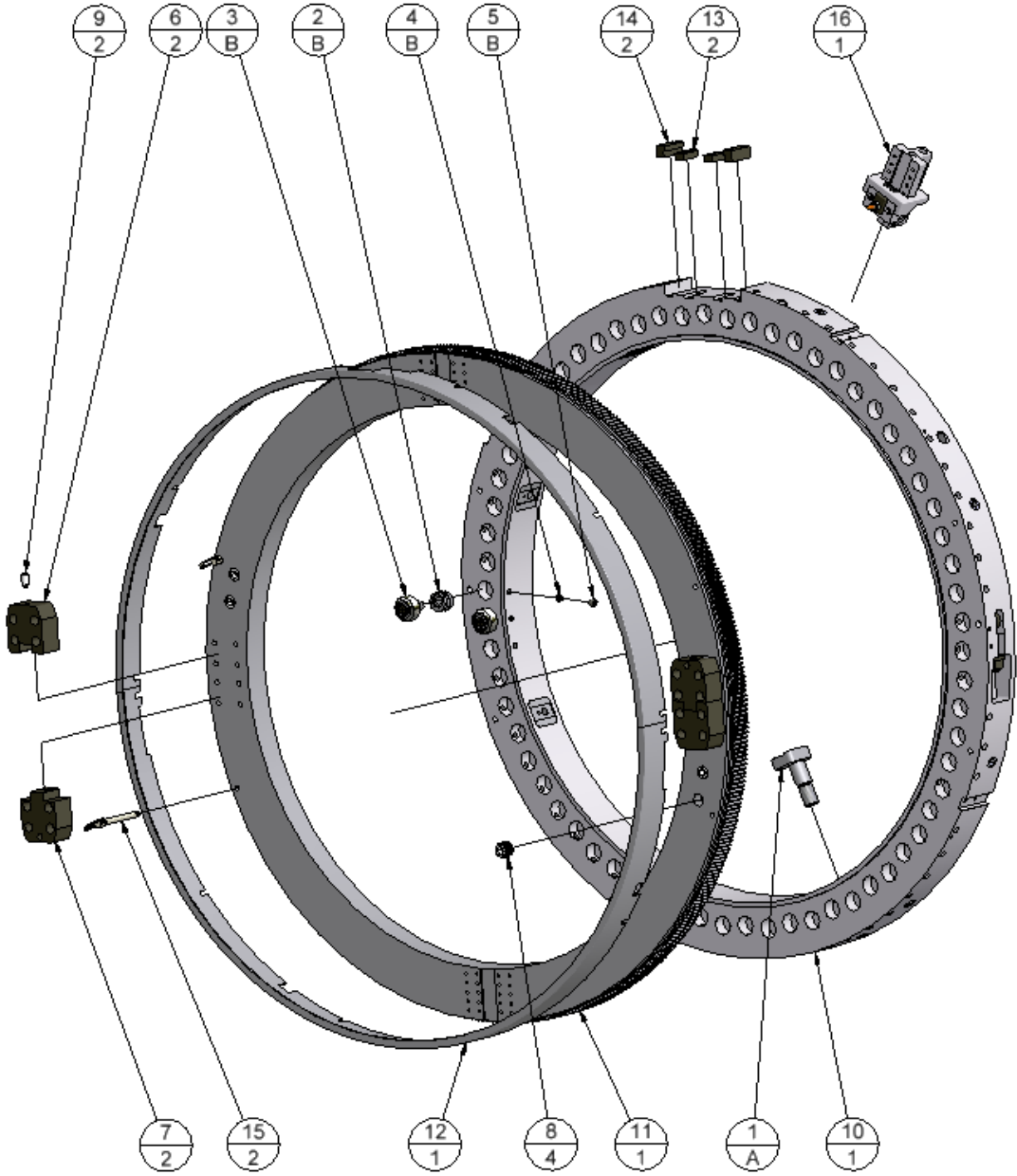
1. Place the fully assembled clamshell onto a flat surface, gear side up. Remove the locking pins so the gear can rotate on the housing. Remove the four pipe plugs from the access holes.
2. Remove the gear shield from the clamshell. Remove the outer locking setscrews and loosen the eccentric setscrews (see Figure 15, one half shown). Note that some of the eccentrics have locking and eccentric setscrews that are accessed from the ID instead of the OD.
3. Starting at the split line, rotate the gear until the access holes are directly over the top of the first two bearings. One of the bearings is an inner bearing and the other is an outer bearing. Insert an Allen wrench thru the access hole into the top of the inner bearing; turn it clockwise until it is tight against the inner gear wall. Tighten the eccentric screw to lock it in place. Insert the Allen wrench into the top of the outer bearing; turn it counter-clockwise until it is tight against the outer gear wall. Do not turn too hard or the screw on top of the bearing will unscrew and loosen up. Tighten the eccentric screw. Repeat this procedure for the bearings under the opposite side access holes.



**Figure 15**

4. Rotate the gear so the access holes are directly over the next two bearings. Repeat step 3.
5. Repeat step 4 until all the bearings are tight against the gear walls. All bearings will spin if this procedure is done correctly.
6. Slowly run the machine. Looking thru the access holes, verify that all the bearings are turning. Retighten all the bearings that are not turning. Tighten all of the setscrews to lock the eccentric screws. Install the pipe plugs into the access holes and reinstall the gear shield. Insert the locking pins.

**DRAWING 1 MS CLAMSHELL**  
(REFER TO TABLES 2 & 3 BELOW)



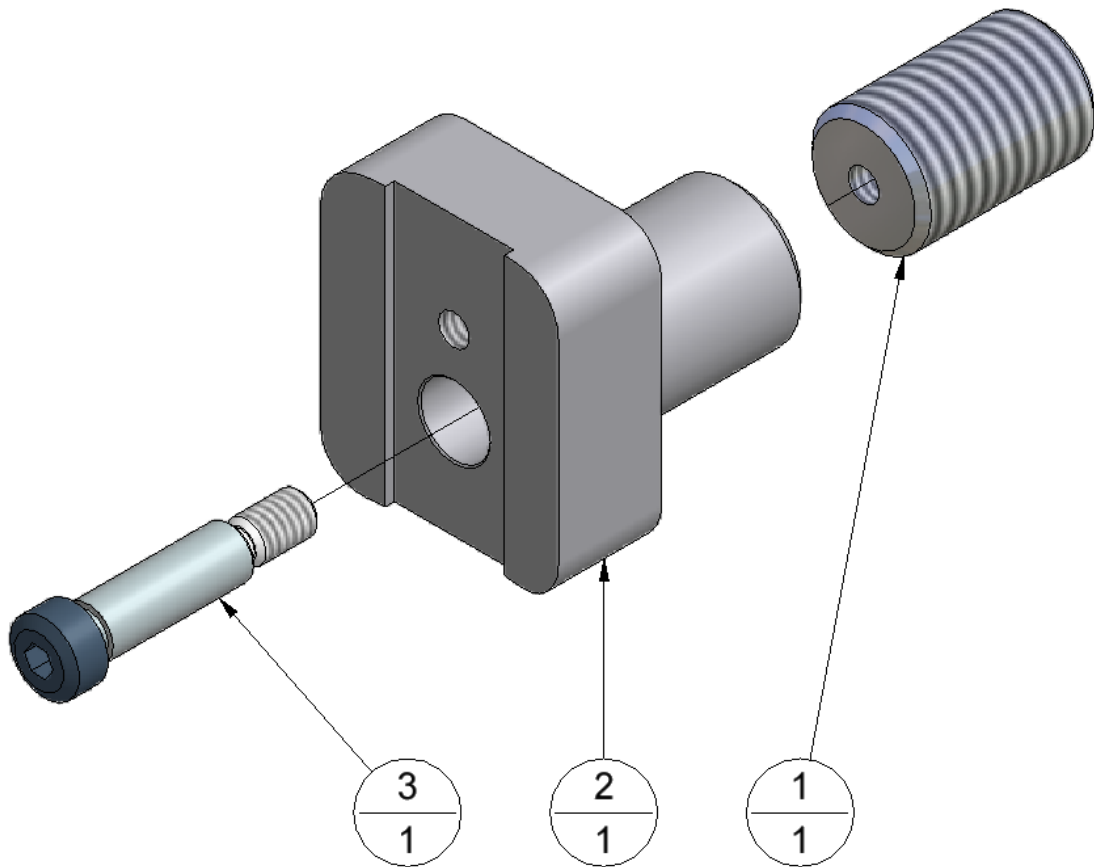
ITEM	QTY	PART NUMBER	DESCRIPTION
1	A	903-1414	LOCATOR ASSEMBLY - MS
2	B	500-1394	ECCENTRIC - MS
3	B	400-1071	BEARING - NB/MS BALL
4	B	501-1042	S.S.S. 3/8-16 X 1/2 CONE POINT
5	B	501-1016	S.S.S. 3/8-16 X 3/8
6	2	200-1082	GEAR CLAMP - FEMALE MS
7	2	200-1083	GEAR CLAMP - MALE MS
8	4	505-1182	PIPE PLUG 1/2-14
9	2	501-1070	S.S.S - 3/8-16 X 3/4 HALF DOG
10	1	<b>100-1XXX</b>	HOUSING ASSY - MSXX
11	1	<b>200-1XXX</b>	GEAR - MSXX
12	1	<b>210-1XXX</b>	GEAR SHIELD - MSXX
13	2	503-1007	KEY - MS MOTOR MOUNT
14	2	205-1024	BRACKET - NB MOTOR MOUNT LOCK
15	2	500-1032	LOCKING PIN MS/HD
16	1	903-1419	TRIPPER ASSEMBLY

**TABLE 2 – COMMON CLAMSHELL PARTS & QUANTITIES**

MS CLAMSHELL	A	B	100-1XXX	200-1XXX	210-1XXX
MS12	4	30	100-1093	200-1093	210-1101
MS16	8	38	100-1084	200-1097	210-1091
MS18	8	42	100-1104	200-1100	210-1105
MS20	8	46	100-1076	200-1076	210-1083
MS24	8	54	100-1077	200-1077	210-1084
MS28	8	62	100-1078	200-1078	210-1085
MS30	8	66	100-1125	200-1134	210-1132
MS32	12	70	100-1079	200-1079	210-1086
MS36	12	78	100-1080	200-1080	210-1087
MS36.5	12	78	100-1085	200-1088	210-1092
MS42	12	90	100-1081	200-1081	210-1088
MS48	12	90	100-1128	200-1136	210-1135
MS50	12	98	100-1129	200-1137	210-1136

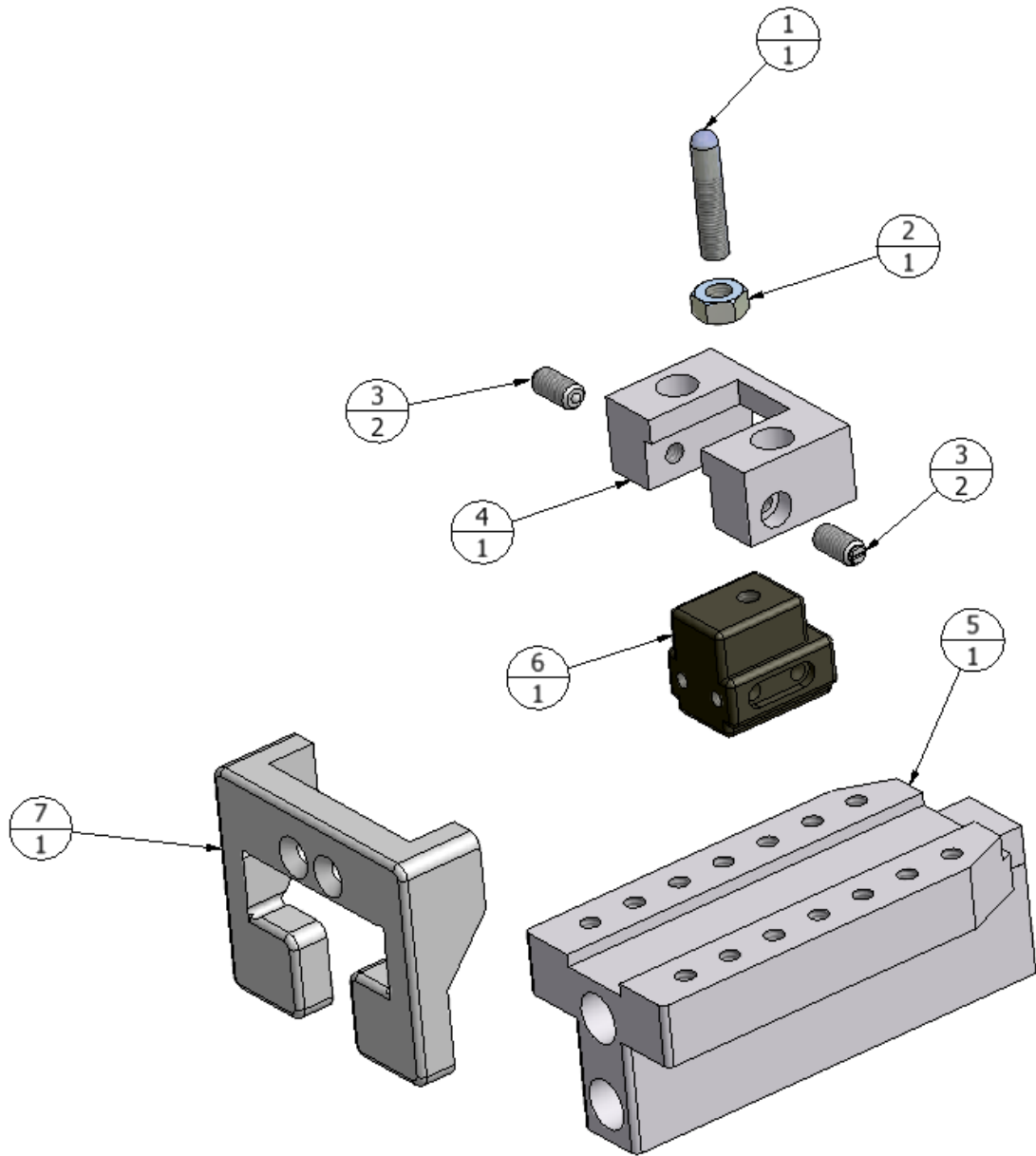
**TABLE 3 – SPECIFIC CLAMSHELL PARTS & QUANTITIES**

**DRAWING 2 MS LOCATOR ASSEMBLY 903-1414**



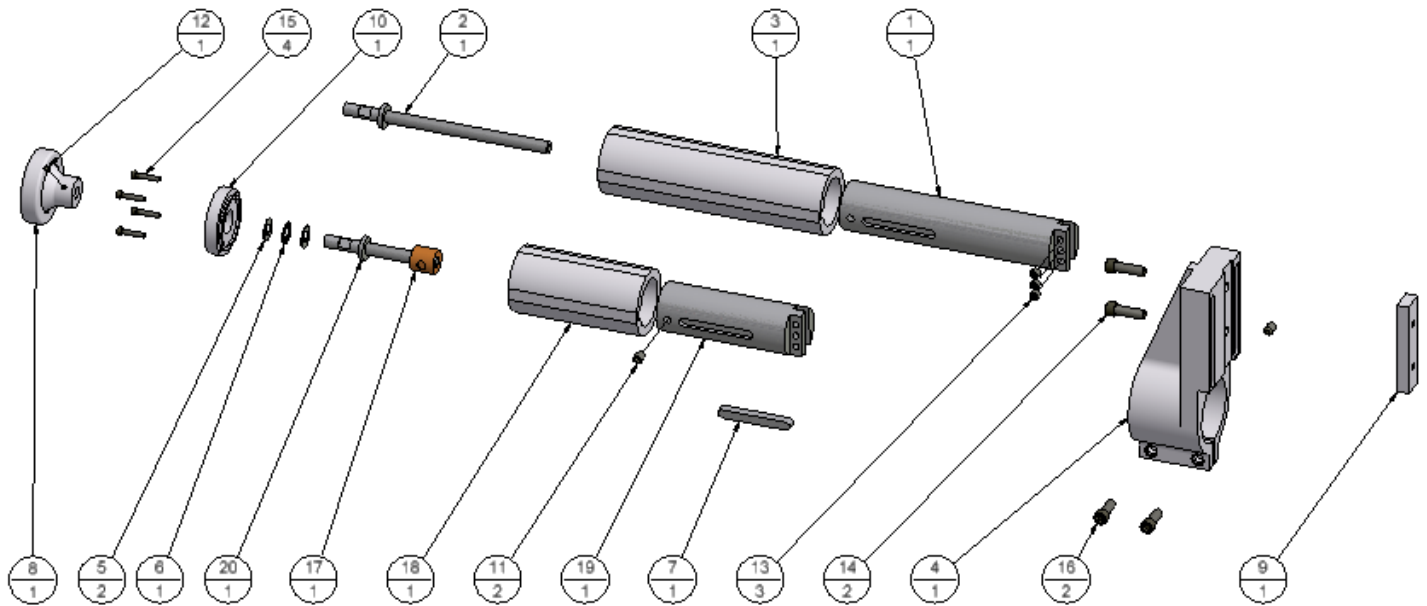
<b>ITEM</b>	<b>QTY</b>	<b>PART #</b>	<b>DESCRIPTION</b>
1	1	500-1012	LOCATOR SET SCREW - 3/4-10
2	1	101-1150	LOCATOR - MS 5/8 PAD
3	1	505-1056	SHOULDER BOLT - 5/16 X 1

**DRAWING 3 TRIPPER ASSEMBLY 903-1419**



<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	1	500-1177	PIN - TRIPPER
2	1	505-1012	NUT HEX 1/4-28
3	2	500-1124	PLUNGER - SPRING
4	1	205-1184	SLIDE HOLDER
5	1	205-1022	NB TRIPPER BRACKET
6	1	205-1493	SLIDE - MS TRIPPER PIN
7	1	205-1183	HANDLE - TRIPPER SLIDE

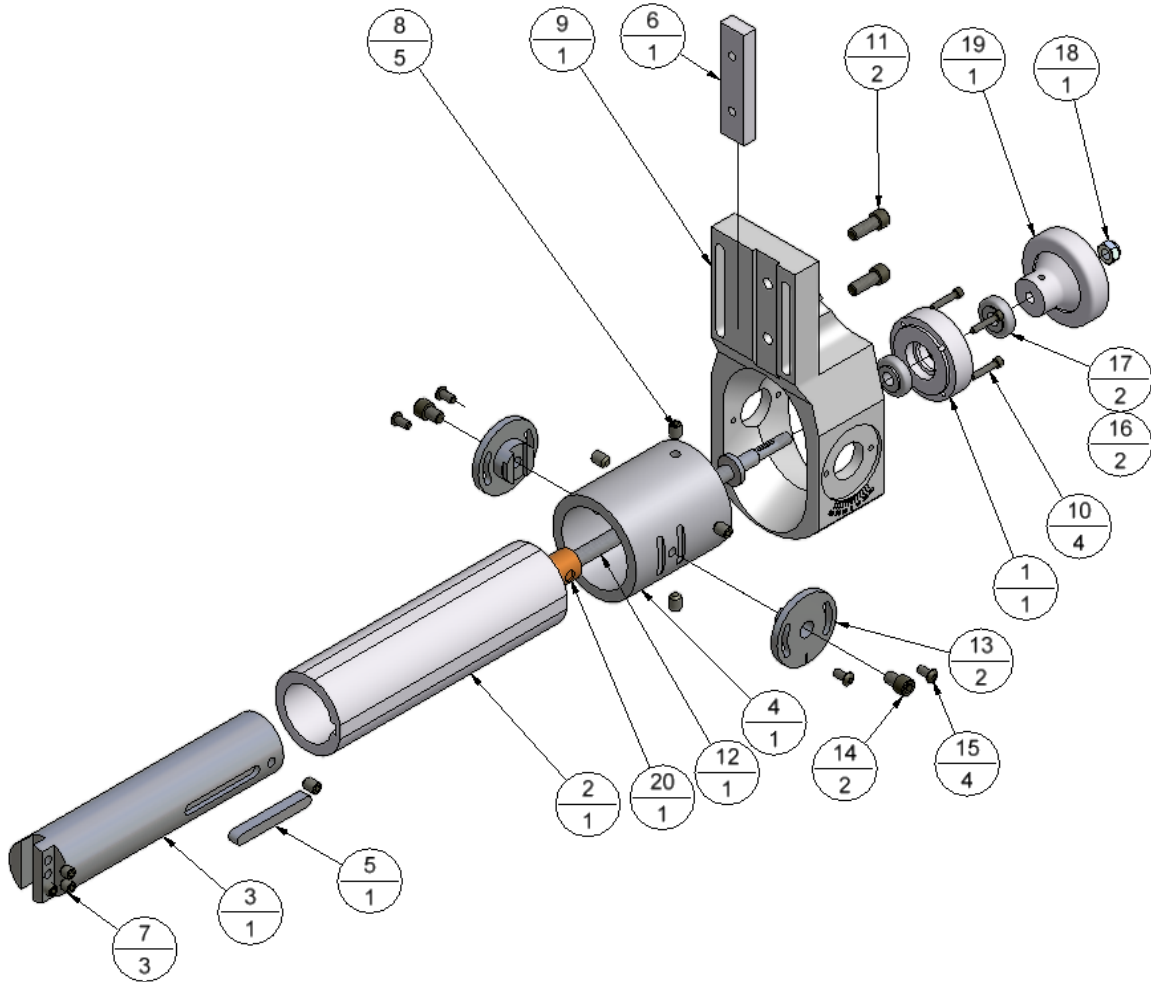
**DRAWING 4 COUNTER BORE ATTACHEMNT 903-1224**



NOTE: 1. 6" LH FEED USE P/N'S 201-1067, 201-1001, 500-1197 & 500-1199  
 2. 10" LH FEED USE P/N'S 201-1068, 201-1002, 500-1201 & 500-1199

ITEM	QTY	PART #	DESCRIPTION
1	1	201-1002	10" BORING BAR
2	1	500-1201	LH FEED SCREW - C'BORE 10"
3	1	201-1068	BORING BAR TUBE - 9.5
4	1	201-1005	BORING BAR HOUSING
5	2	400-1110	WASHER - THRUST
6	1	400-1099	BEARING - THRUST
7	1	201-1008	KEY - 3/8 X 3/8
8	1	201-1096	HAND WHEEL - BORE BAR
9	1	201-1007	LOCKING KEY
10	1	201-1095	BORING BAR TUBE CAP
11	2	501-1021	S.S.S. 3/8-16 X 1/2
12	1	501-1028	S.S.S - 1/4 - 20 X 1/4
13	3	501-1016	S.S.S. 3/8-16 X 3/8
14	2	505-1046	SHCS 3/8-16 X 1 1/4
15	4	505-2083	SHCS 10 - 32 X 1
16	2	505-1045	SHCS 3/8-16 X 1
17	1	500-1199	FEED NUT- C'BORE 1/2-20 LH
18	1	201-1067	BORING BAR TUBE - 5.5
19	1	201-1001	BORING BAR - 6" TUBE
20	1	500-1197	LH FEED SCREW - C'BORE 6"

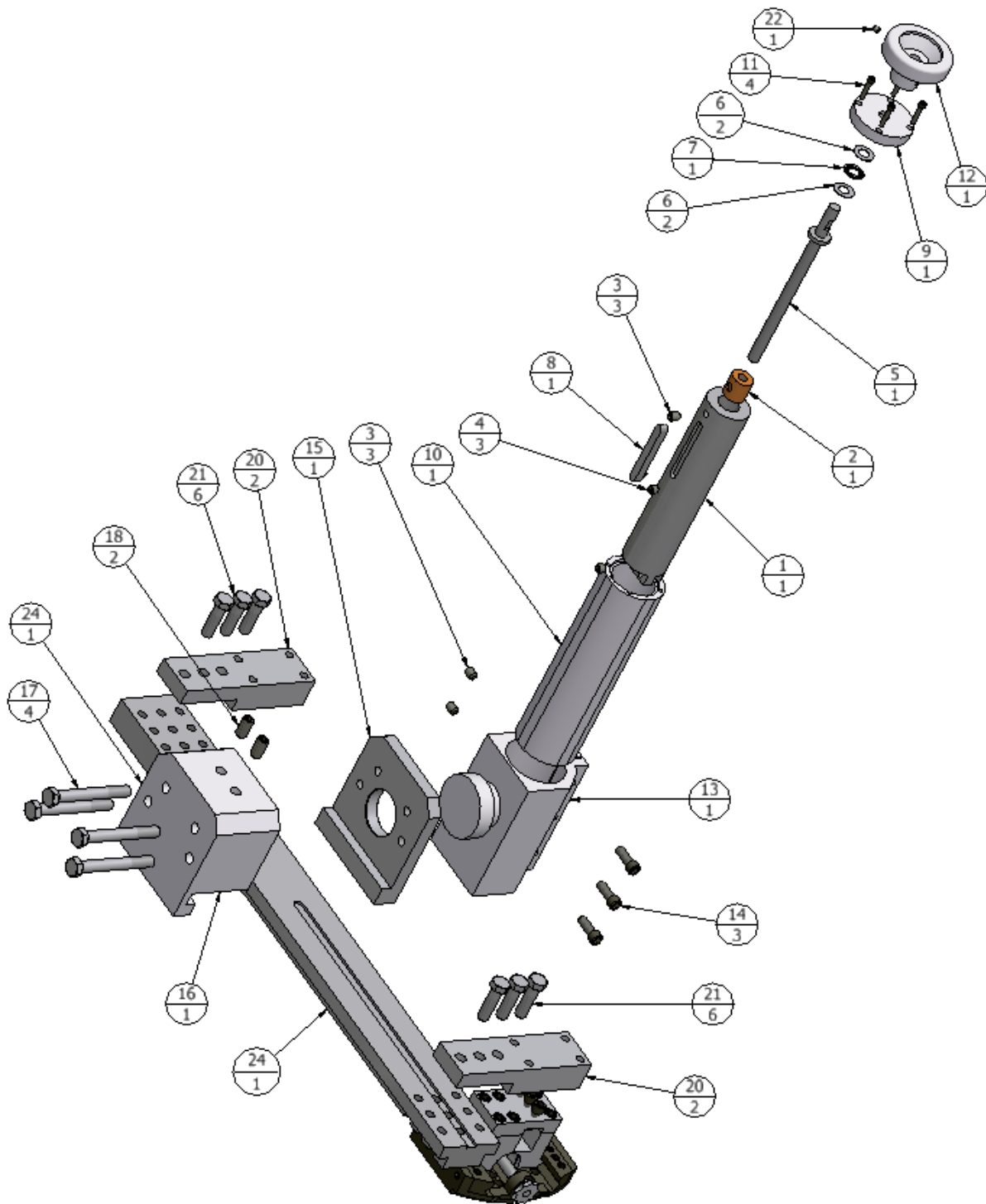
**DRAWING 5 SWIVEL HEAD ATTACHMENT 903-1616**



ITEM	QTY	PART #	DESCRIPTION
1	1	201-1225	TUBE CAP - COUNTERBORE SWIVEL HEAD
2	1	201-1068	BORING BAR TUBE - 9.5
3	1	201-1002	10" BORING BAR
4	1	201-1227	HOUSING - C'BORE SWIVEL HEAD
5	1	201-1008	KEY - 3/8 X 3/8
6	1	201-1007	LOCKING KEY
7	3	501-1016	S.S.S. 3/8-16 X 3/8
8	5	501-1021	S.S.S. 3/8-16 X 1/2
9	1	201-1229	MOUNTING BRACKET - C'BORE SWIVEL HEAD
10	4	505-2083	SHCS 10 - 32 X 1
11	2	505-1045	SHCS 3/8-16 X 1
12	1	500-1662	LH FEED SCREW - C'BORE 10"
13	2	201-1228	TRUNNION - C'BORE SWIVEL HEAD
14	2	505-1042	SHCS 3/8-16 X .5
15	4	505-1115	B.H.C.S. 1/4-20 X 1/2
16	2	400-1322	BEARING - TIMKEN CUP A2126
17	2	400-1321	BEARING - TIMKEN CONE A2047
18	1	505-2195	LOCK NUT - 3/8-16 THICK HEX JAM
19	1	201-1226	HAND WHEEL - COUNTER BORE SWIVEL
20	1	500-1198	FEED NUT - C'BORE 1/2 - 20

Note: Only the 10" Boring Bar is shown. A 6" model is also available.

**DRAWING 6 SINGLE POINT ATTACHMENT 903-1087**  
(REFER TO TABLES 4 & 5 BELOW)



<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	1	201-1002	10" BORING BAR
2	1	500-1199	FEED NUT- C'BORE 1/2-20 LH
3	3	501-1021	S.S.S. 3/8-16 X 1/2
4	3	501-1016	S.S.S. 3/8-16 X 3/8
5	1	500-1201	LH FEED SCREW - C'BORE 10"
6	2	400-1110	WASHER - THRUST
7	1	400-1099	BEARING - THRUST
8	1	201-1008	KEY - 3/8 X 3/8
9	1	201-1095	BORING BAR TUBE CAP
10	1	201-1068	BORING BAR TUBE - 9.5
11	4	505-2083	SHCS 10 - 32 X 1
12	1	201-1096	HAND WHEEL - BORE BAR
13	1	201-1028	BORING BAR HOLDER
14	3	505-1045	SHCS 3/8-16 X 1
15	1	201-1025	CLAMPING PLATE
16	1	201-1027	SLIDING BLOCK
17	4	505-2071	1/2 - 13X4 HEX BOLT
18	2	501-1014	S.S.S. 1/2-13 X 1
19	8	505-1040	SHCS 1/2-13 X 2
20	2	201-1026	MOUNTING BRACKET
21	6	505-1010	HEX BOLT - 1/2-13 X 1 3/4
22	1	501-1028	S.S.S - 1/4 - 20 X 1/4
23	1	NOT USED ON MS	FACING BAR STABILIZER - 53"
24	1	201-XXXX	FACING BAR - X"
25	1	903-1008	SLIDE ASSEMBLY #3 NB

**TABLE 4 COMMON 903-1087 PARTLIST**

Note: Only the 10" Boring Bar is shown. A 6" model is also available.

<b>201-XXXX</b>	<b>DESCRIPTION</b>	<b>MS CLAMSHELL USED ON</b>
201-1021	FACING BAR - 12"	MS12
201-1139	FACING BAR - 14"	MS14
201-1020	FACING BAR - 16"	MS16
201-1019	FACING BAR - 18"	MS18
201-1018	FACING BAR - 20"	MS20
201-1017	FACING BAR - 24"	MS24
201-1015	FACING BAR - 28"	MS28
201-1014	FACING BAR - 30"	MS30
201-1069	FACING BAR - 32"	MS32
201-1070	FACING BAR - 36"	MS36, MS36.5
201-1071	FACING BAR - 43"	MS42
201-1134	FACING BAR - 48"	MS48
201-1072	FACING BAR - 50"	MS50

**TABLE 5 SPECIFIC 903-1087 PARTLIST**

