INSTRUCTION MANUAL

Winter Air Powered Radial Infeed

Thread Rolling, Knurling and Burnishing Attachments

Model # 170 / 172SA Series

CJWINTER

A Brinkman International Group, Inc. Company

ISO 9001: 2008 CERTIFIED

Table of Contents

Section 1
General Preparation

1.1 Introduction

The Winter Attachments incorporate various features which make them different from other forms of tooling you may have used. First, they provide both sizing and feed rate control functions that are normally performed by a machine. Secondly, the pressure required to perform thread rolling is generated by the attachment, not by the forward movement of the cross slide. Because of these differences, set-up procedure and operating conditions that are typical for other forms of tooling may not be applicable to the Winter attachment. The following sections provide information necessary to prepare you for Winter thread rolling attachment.

1.2 Air Pressure and Volume Requirements

THE WINTER ATTACHMENT MUST BE PROVIDED WITH A STEADY SOURCE OF CLEAN DRY AIR AT A MINIMUM PRESSURE OF 80 P.S.I THROUGH A SUPPLY LINE OF AT LEAST 3/8" I.D. (FOR MODEL 125-SA) OR ½ I.D. (FOR ALL OTHER MODELS)

To perform thread rolling, it is necessary to force the thread rolling dies into the work piece with sufficient pressure to exceed the yield strength of the material being rolled. While most forms of tooling rely on the forward movement of the cross slide to force the tool into the work, the Winter attachment performs this function by the means of the air cylinder mounted at the rear of the attachment. Because of this, OPERATING THIS ATTACHMENT WITH LESS THAN THE RECOMMENDED AIR PRESSURE AND/OR VOLUME WILL RESULT IN INCONSISTANT THREAD DIMENSIONS AND POSSIBLE DAMAGE TO THE THREAD ROLLS AND/OR THREAD ROLLING ATTACHMENT.

1.3 Cross-Slide Movement Requirement

The Winter attachment is equipped with a flow control valve, which regulates the penetration (feed) rate of the thread rolls into the work. Because the feed rate control function is performed by the attachment, the cross-slide on which the attachment is mounted is used only to position the attachment on center and dwell long enough for the thread rolling operation to take place. Under most circumstances, the part can be rolled in approximately 15 part revs. maximum. In the case of a cam operated cross-slide, this means that the cam will be no-lead (i.e. zero feed rate) dwell cam with approximately 20 part revs. of dwell. A dwell portion in excess of 20 part revs. will not effect the thread rolling function in any way. However, excess dwell should be avoided because while in the full forward position the attachment is exposed to chips which may enter and damage the compensating mechanisms.

The machine cross slide must also provide sufficient backward travel to clear the attachment during index (in the case of multiple spindle machines) or other adjacent tooling. Refer to the Machine Application Chart in Section 5. This chart will tell you whether or not increased cross-slide travel is necessary on your machine and if so, how much. If your machine is not listed in the Machine Application Chart, jog the machine through a complete cycle and carefully check all the possible interference point for sufficient clearance.

1.4 Blank Sizing Requirements

The importance of proper blank design and preparation to the success of the thread rolling operation cannot be over emphasized. The diameter to which the blank is formed, the tolerance to which this diameter is held and several other considerations, such as thread relief and blank chamfer are important factors which will have significant impact on both the quality of the finished parts and the life of thread roll dies. FOR OPTIMUM PERFROMANCE FROM YOUR WINTER THREAD ROLLING ATTACHMENT, IT IS IMPORTANT THAT THE MACHINE HAVE THE CAPABILITY TO PRODUCE BLANKS HELD TO A TOTAL TOLERANCE OF .001 (i.e. ±.0005). For this reason, we recommend that the blank be finished-formed using a skiving or shave type tool taking a light cut. Recommended blank diameters for most thread sizes can be obtained from the Reference Data Charts in Section 5.

Section 2
Attachment Preparation

2.1 Obtaining Set-Up Information

The information necessary to prepare the attachment for a specific application is contained in the Reference Data Charts in Section 5. Locate the specific thread size for which you are setting up the attachment and write down the wedge, wedge roller, spring, gage setting and blank diameter. (If your application is not contained in these charts please call C.J. Winter Technologies, Inc. at 1-800-288-ROLL).

"Stock Clearance" refers to the largest diameter that the attachment will clear when rolling that thread size. Note that this dimension varies with each application. Therefore, it is important that the stock clearance dimension be checked each time the attachment is set up for specific application. Be sure to calculate the dimension across the points of hex stock (Hex size x 1.1547) rather than using the hex stock size itself.

"Blank Diameter" refers to the recommended initial diameter to which the blank should be shaved prior to the thread rolling. NOTE: THIS RECEMOMENDED BLANK DIAMETER IS A STARTING POINT ONLY. FOR OPTIMUM RESULTS, THE IDEAL BLANK DIAMETER MAY HAVE TO BE ARRIVED AT THROUGH TRIAL AND ERROR BY MAKING MINOR ADJUSTMENTS TO THIS INITIAL RECOMMENDED DIAMETER. ONCE ARRIVED AT, THE IDEAL BLANK DIAMETER SHOULD BE HELD TO A TOTAL TOLERANCE OF .001 (i.e. ±.0005).

"Gage Setting" refers to the micrometer setting gage dimension necessary to adjust the cross-slide so that in the full dwell position that attachment is properly positioned over the thread blank. A full description of this procedure is provided in Section 3.4.

The C.J. Winter Attachment is supplied with various wedges, wedge rollers and roll arm return springs which are used in combination to provide different diameter adjustment ranges necessary to roll all of the thread sizes within the capacity of the attachment. Therefore make sure all wedges, rollers and springs are kept in a central location.

2.2 Installation of Wedge Rollers and Roll Arm Return Spring

A) All models except 145-OB and 165-OB

Loosen the fulcrum pin set screws and remove the fulcrum pins from the attachment. Remove the roll arm assemblies from the attachment, being careful not to over extend the roll arm return spring. Loosen the wedge roller pin set screw, remove the wedge roller pin, wedge roller and roll arm return spring. Install the correct wedge roller and roll arm return spring. Insert the pin and tighten the set screw making sure to align the retention flat on the pin under the set screw. MAKE

SURE THAT EACH END OF THE WEDGE ROLLER PIN IS FLUSH OR BELOW THE SIDES OF THE ROLL ARM. Do not re-install the roll arms at this time.

B) Model 145-OB and 165-OB

Remove the six flat head screws from each side of the roll arm yoke. Remove the taper setting plate and the two fulcrum thrust plates. Remove the fulcrum pin lock screw located in the center of each roll arm assembly and remove the fulcrum pin. Remove the roll arm assembly, loosen the wedge roller pin set screw, remove the wedge roller and position the roll arm return spring with the coil facing the front of the roll arm assembly. Reinsert the wedge roller pin, align the retention flat under the set screw and tighten the set screw. MAKE SURE THAT EACH END OF THE WEDGE ROLLER PIN IS FLUSH OR BELOW THE SIDES OF THE ROLL ARM. Do not reinstall the arms at this time.

2.3 Installation of Wedge

NOTE: When installing the wedge and during initial sizing procedures, the piston in the attachment air cylinder can be positioned in the full forward or full backward position by directing short bursts of air from a hand operated blowgun into the quick disconnect sockets located at the front and rear of the cylinder. In addition, all 160-SA, 162-SA, 163-SA, 170-SA, 172-SA, 173-SA, and 165-OB thread rolling attachments are equipped with removable air cylinder which can be separated from the roll arm bracket assembly by means of quick disconnect ring located between the roll arm bracket assembly and the cylinder.

If you are changing the wedge on an attachment without a removable cylinder, rotate the pitch diameter adjustment knob fully in the (-) direction. Use the above procedure to position the piston in the full forward position. If you are changing the wedge on any other Winter attachment, remove the cylinder from the roll arm bracket assembly. Then use the above procedure to position the piston in the full forward position. Loosen the wedge adapter pin set screw and remove the pin and the wedge. Reposition the correct wedge, reinsert the wedge adapter pin and tighten the set screw making sure to align the retention flat on the pin under the set screw. Reposition the piston in full backward position (and reassemble the air cylinder to the roll arm bracket assembly if applicable)
Install the roll arm assemblies back on to the roll arm bracket assembly, reversing the procedure used to remove them (refer to 2.2A or B as applicable). Again, be sure to align all pin retention flats under the set screw. Note: A slight realignment of the idler gears inside the roll arm assembly may be necessary to fully insert the fulcrum pins.

NOTE: IF THE IDLER GEARS HAVE BEEN REMOVED FROM THE ROLL ARM ASSEMBLIES FOR ANY REASON, INSURE THAT THE IDLER GEAR HUBS FACE IN OPPOSITE DIRECTIONS WHEN REINSTALLING.

2.4 Installation of Thread Rolls

A) Model 125-SA, 141-SA, 160-SA and 170-SA Series

Note: Observe that the carbide roll pin is held in position between two set screws, one of which is located on the inside portion of the roll arm assembly and the other located on the outside portion of the roll arm assembly. THE INSIDE SET SCREW IS USED FOR TAPER ADJUSTMENT ONLY. ITS POSITION SHOULD NOT BE CHANGED WHEN REMOVING OR INSTALLING THREAD ROLLS. USE ONLY THE OUTSIDE SET SCREW WHEN REMOVING OR INSTALLING THREAD ROLLS. IF THE POSITION OF THE INSIDE SET SCREW HAS BEEN CHANGED, REFER TO SECTION 5 FOR CORRECTIVE TAPER ADJUSTMENTS. THESE ROLL PINS ARE SUPPLIED WITH A PARTIAL RETENTION

FLAT ("U" SHAPED) AND A FULL RETENTION FLAT ("L" SHAPED). THE ROLL PIN MUST ALWAYS BE INSTALLED WITH THE FULL RETENTION FLAT ALIGNED WITH THE TAPER ADJUSTING (INSIDE) SET SCREW. WHEN REMOVING OR INSTALLING THREAD ROLLS, THE OUTSIDE SET SCREW MUST BE LOOSENED SUFFICIENTLY TO CLEAR THE PARTIAL RETENTION FLAT.

Also, in the outside position, your thread rolling attachment may be equipped with two set screws, one behind the other. (If you have loosened the outside set screw and the roll pin is still not free, this is probably the case.) If this is the case, remove the first set screw completely so that access can be gained to the second set screw.

Remove the roll gear guard and observe the positions of the roll gear, roll gear washer, thread roll and thrust washer (Model 160-SA and 170-SA Series only). Loosen the outside roll pin set screw and remove the roll pin. Install the correct thread roll, making sure to engage the tangs of the roll gear in the thread roll drive slot. Also insure that the roll gear washer is properly positioned between the roll gear and the thread roll and that the thrust washer (if applicable) is properly positioned on the locating pin. After all components are properly assembled and aligned, reinsert the roll pin. ALIGN THE FULL RETENTION FLAT WITH THE TAPER ADJUSTING (INSIDE) SET SCREW and tighten the outside screw securely.

B) Model 151-SA
Note: Observe that the carbide roll pin is held in position between two set screws. One which is located on the inside portion of the roll arm assembly and the other located on the outside portion of the roll arm assembly. THE INSIDE SET SCREW IS USED FOR TAPER ADJUSTMENT ONLY. ITS POSITION SHOULD NOT BE CHANGED WHEN REMOVING OR INSTALLING THREAD ROLLS. IF THE POSITION OF THE INSIDE SET SCREW HAS BEEN CHANGED, REFER TO SECTION 5 FOR CORRECTIVE TAPER ADJUSTMENTS. THESE ROLL PINS ARE SUPPLIED WITH A PARTIAL RETENTION FLAT ("U" SHAPED) AND A FULL RETENTION FLAT ("L" SHAPRED). THE ROLL PIN MUST ALWAYS BE INSTALLED WITH THE FULL RETENTION FLAT ALIGNED WITH TAPER ADJUSTING (INSIDE) SET SCREW. WHEN REMOVING OR INSTALLING THREAD ROLLS, THE OUTSIDE SET SCREW MUST BE LOOSENED SUFFICIENTLY TO CLEARD THE PARTIAL RETENTION FLAT.

Also, the outside position, your thread rolling attachment may be equipped with two set screw, one behind the other. (If you loosened the outside set screw and the roll pin is still not free, this is probably the case.) If this is the case, remove the first set screw completely so that access can be gained to the second set screw.

Remove the two thrust bushing cap screw and remove the thrust bushing, roll gear and roll gear washer. Loosen the outside roll pin set screw and remove the roll pin and thread roll. Install that correct thread roll and reinsert the pin, ALIGNING THE FULL RETENTION FLAT WITH THE TAPER ADJUSTING (INSIDE) SET SCREW. Reinsert the roll gear washer and roll gear, making sure the roll gear washer is properly positioned between the roll gear and thread roll, and the tangs of the roll gear are inserted in the thread roll drive slots. Tighten the outside roll pin set screw securely.

C) Model 162-SA. 163-SA, 172-SA, 173-SA Series

Note: Observe that the carbide roll pin is held in position between slotted taper adjusting screw and a hex socket screw. THE SLOTTED TAPER ADJUSTING SCREW IS USED FOR TAPER ADJUSTMENT ONLY. ITS POSITION SHOULD NOT BE CHANGED WHEN REMOVING OR INSTALLING THREAD ROLLS. IF THE POSITION OF THE TAPER ADJUSTMENT

SCREW HAS BEEN CHANGED, REFER TO SECTION 5 FOR CORRECTIVE TAPER ADJUSTMENT.
Remove the roll gear guard and observe the positions of the thrust bearings, roll gear, roll gear washer, and thread roll. Loosed the hex set screw and remove the roll pin. Install the correct thread roll, making sure to engage the tangs of the roll gear in the thread roll drive slot. Insure that the thrust bearings are installed with the chamfered sides in the counter-bore of the roll arm assembly. After all components are properly assembled and aligned, reinsert the roll pin, align the visible retention flat with the slotted head taper adjusting screw and tighten the hex head set screw securely.

D) Model 145-OB and 165-OB

Push in release button, slide roll onto pin and spin roll until release pin returns to its normal position.

2.5 Initial Adjustment

When the attachment is placed on workbench for initial adjustments, be sure that the weight of the attachment rests on the roll arm bracket mounting surface and not on the lower roll arm assembly. If the lower roll arm assembly contacts the workbench, initial adjustments will be inaccurate.

Direct a short burst of air (see procedure outlined in Section 2.2) into the quick disconnect socket located at the rear of the air cylinder so that the wedge moves to the full forward position. Check the distance between the thread roll using a gage pin, gage block or blank equal to the minor diameter of the thread to be rolled. If the distance between the rolls is greater than the minor diameter, turn the pitch diameter adjustment knob at the rear of the attachment in the (-) direction. Direct another burst of air to the rear quick disconnect and check the distance to the thread rolls again. Repeat this procedure until the thread rolls are the proper distance apart.

If the dimension between the thread rolls is less than the minor diameter of the part to be rolled, direct a short burst of air into the front quick disconnect of the cylinder so that the wedge travels to the full backward position. Turn the pitch diameter adjustment knob at the back of the attachment in the (+) direction. Then direct a short burst of air into the rear disconnect so that the wedge moves to the full forward position again. Repeat this procedure until the distance between the thread rolls when the wedge is in the full forward position is equal to the minor diameter of the thread to be rolled.

AFTER THE DISTANCE BETWEEN THE THREAD ROLLS HAS BEEN ADJUSTED SO THAT IT IS EQUAL TO THE MINOR DIAMETER OF THE THREAD TO BE ROLLED TURN THE PITCH DIAMETER ADJUSTMENT KNOB AT THE BACK OF THE ATTACHMENT TWO FULL TURNS IN THE (+) DIRECTION.

2.6 Synchronization of Thread Rolls

Direct short burst of air to the quick disconnect at the rear cylinder so that the wedge is in the full forward position. Loosen the adjusting collar cap screw on the attachment compensator mechanism and rotate one thread roll until the timing mark on that roll points directly at the other thread roll. While then holding this thread roll in position, rotate the other thread roll until the timing marks are pointing directly at each other. Tighten the cap screw in the adjusting collar securely.

NOTE: THE TIMING MARKS SCRIBED ON THE THREAD ROLLS ARE PROVIDED FOR YOUR CONVENIENCE AND REPRESENT A RECOMMENDED STARTING POINT ONLY. A FINAL ADJUSTMENT OF THREAD ROLL SYNCHRONIZATION IS MOST ACCURATELY OBTAINED THROUGH OBSERVATION OF A ROLLED PART. FINAL ADJUSTMENT WILL BE MADE DURING ROLL TRACKING TEST IN SECTION 4.1.

Section 3
Installing the Attachment

3.1 Installation of Control Valve Assembly

The control valve assembly can be mounted in any location on the machine frame from which the air hoses can easily reach the cross slide on which the attachment will be mounted. The mounting position should allow convenient access so that initial adjustment to the regulator and periodic maintenance can be easily performed. By using the mounting bracket supplied, the control valve assembly can be quickly removed from the machine for use in testing or adjusting the thread rolling attachment at a workbench.

TO OPERATE PROPERLY, YOUR THREAD ROLLING ATTACHMENT MUST BE CONNECTED TO A STEADY SOURCE OF CLEAN DRY AIR AT A MINIMUM PRESSURE OF 80 P.S.I.. DIFFICULT APPLICATIONS INVOLVING LONG THREAD LENGTHS, COURSE PITCHES, LARGE DIAMETER AND /OR LESS DUCTILE MATERIALS, MAY REQUIRE UP TO 110 P.S.I.. THE CONTROL VALVE ASSEMBLY SHOULD BE DIRECTLY CONNECTED TO THE MAIN SUPPLY LINE BY MEANS OF A MINIMUM I.D. FEED LINE OF 3/8” (FOR MODEL 125-SA) OR ½” (FOR LARGER MODELS). USE OF SMALLER I.D. FLEXIBLE PLASTIC OR RUBBER FEED LINE (SUCH AS THE TYPE COMMONLY CONNECTED TO A HAND –HELD BLOWGUN) WILL DIMINISH THE ROLLING PRESSURE CAPACITY OF THE THREAD ROLLING ATTACHMENT AND MAY RESULT IN DAMAGE TO THE THREAD ROLLS AND/OR THREAD ROLLING ATTACHMENT.

1

3.2 Installation of Trip Valve Bracket Assembly

Refer to the Trip Bracket Assembly drawing in Section 5. The purpose of the trip bracket assembly is to position the trip valve (also referred to as the 3way control valve) so that the adjusting screw mounted in the trip bracket can depress the valve button when the cross-slide reaches the full dwell.

NOTE: EVERY ATTEMPT HAS BEEN MADE TO FURNISH TRIP BRACKET ASSEMBLY COMPONENTS AND HARDWARE THAT CAN BE EASILY INSTALLED ON YOUR MACHINE WITHOUT ANY ADDITIONAL MODIFICATION. BECAUSE OF THE MANY VARIATIONS AND CHANGES IN MACHINE DESIGN, IT MAY BE NECESSARY TO MODIFY THE VALVE MOUNTING BRACKET AND/OR TRIP BRACKET TO ADAPT THEM TO YOUR MACHINE. IT MAY ALSO BE NECESSARY TO REPLACE THE HARDWARE ITEMS SUPPLIED WITH THOSE OF THE CORRECT THREAD SIZE FOR YOUR MACHINE.

After the valve mounting bracket and trip bracket have been installed on your machine, assemble the trip valve of the control valve assembly to the hardware supplied. Next, advance the slide to the full dwell position and assemble the adjusting screw and jam nut into the trip bracket. Do not position the adjusting screw to depress the trip button. Be sure that there is sufficient clearance between the adjusting screw and trip valve button so that the adjusting screw does not interfere with that adjustment of the full forward position of the cross-slide.

3.3 Installation of Adapter Plate Assembly

NOTE: Some thread rolling attachment models can be mounted directly to the cross-slide of certain machines. To determine whether an adapter plate is necessary for your application, refer to the Machine Application Chart in Section 5 and locate your specific machine and model. If no adapter plate is listed, then none is required. Disregard this step and proceed to Section 3.4.

Refer to the mounting drawing in Section 5. This drawing shows the adapter plate and other necessary hardware items assembled to the cross-slide in the proper configuration. Assemble the adapter plate to the cross-slide using the mounting hardware supplied being sure to orient the T-slot of the adapter plate towards the front or the rear of the machines as indicated in the drawing. Do not install the thread rolling attachment to the adapter plate at this time.

3.4 Slide Adjustment Using the Micrometer Setting Gage

The micrometer setting gage is used to adjust the full forward position of the cross-slide so that when in the full dwell position the thread rolling attachment will be aligned exactly over the centerline of the part. The gage setting must be taken against a blank which is shaved to the correct diameter for the thread size being rolled. Therefore, locate the thread size in the Thread Rolling Capacity and Reference Data Charts in Section 5 and arrange to have the appropriate diameter blank in the spindle.

NOTE: CERTAIN MODEL THREAD ROLLING ATTACHMENTS AND/OR ADAPTER PLATE ASSEMBLIES ARE PROVIDED WITH AN ADJUSTABLE KEY FOR USE ON MACHINES IN WHICH THE FULL FORWARD POSITION OF THE CROSS-SLIDE CANNOT BE ADJUSTED. IN THESE CASES, THE MICROMETER SETTING GAGE READINGS WILL BE USED TO ADJUST THE POSITION OF THIS KEY RATHER THAN THE FULL FORWARD POSITION OF THE CROSS SLIDE. REFER TO SECTION 5 FOR SPECIFIC INSTRUCTIONS.

Advance the cross-slide to the full dwell position. Position the micrometer setting gage so that the key is located in the T-slot of the cross-slide of the adapter plate as applicable. If the cross-slide is equipped with two T-slots, use the rear T-Slot for Models 141-SA, 145-OB, 151-SA and the front T-slot for all other model attachments. Hold the gage firmly in position and adjust the micrometer until it touches the sized blank and note the reading. Obtain the correct gage setting from the Reference Data Charts. Compare the reading just taken with the correct gage setting dimension and adjust the cross-slide as necessary to obtain the correct reading. It is recommended that the last .003 to .005 of adjustment be obtained using the cross slide positive stop to assure repeatability. Also, in the case of multiple spindle machines, it is recommended that the gage setting be taken against blanks in all spindle positions.

With the cross slide in the full dwell position and the positive stop set, advance the adjusting screw in the tip bracket until it depresses the actuating button of the trip valve. When the adjusting screw has been properly positioned, tighten the jam nut against the trip bracket.

3.5 Installation of the Attachment

Refer to the Attachment Mounting Drawing in Section 5. This drawing shows the thread rolling attachment, the adapter plate assembly (if applicable) and all necessary mounting hardware assembled in the proper configuration on the cross slide.

Position the machine cross slide in the fully retracted position. Note that the thread rolling attachment has two surfaces on which it can be mounted. To determine the correct mounting surface, position the thread rolling attachment so that it can be installed on the cross slide with the compensator assembly (the geared side of the roll arms) facing away from the spindle. Note the mounting surface to be used and install the attachment keys to this mounting surface using the hardware supplied. Assemble the remainder of the mounting hardware to the attachment and install it on the cross slide or the adapter plate. Tighten the mounting hardware enough to secure the attachment in position but loose enough that the attachment can be positioned from side to side. Advance the cross slide sufficiently to check the position of the thread rolls relative to the thread blank. Adjust the attachment position from side to side as necessary and tighten the hardware.

3.6 Connecting the Air Lines

NOTE: TO AVOID DAMAGE TO THE THREAD ROLLS, INSURE THAT THE CROSS SLIDE IS RETRACTED AND THE ROLLS ARE CLEAR OF THE WORK BEFORE CONNECTING THE AIR LINES.

There are two different control valve assemblies supplied with Winter thread rolling attachments. Part No. 125600 Control Valve Assembly is supplied with the Model 125-SA Attachment. All other attachments are supplied with Part No. 141600 Control Valve Assembly. The various air line connections for both of these control valve assemblies are outlined in the table below.

Part No. 125600, Model 125-SA

Line Color	Description	Connection Location
Blue	Chip Purge Line	Front of Attachment
Red	"In" Line	Rear of Cylinder*
White (Clear)	"Out" Line	Front of Cylinder*
Black	Pilot Line	Rear of Cylinder*

Part No. 141600, All other Models

Line Color	Description	Connection Location
White (Clear)	Chip Purge Line	Front of Attachment
Black/Silver	"In" Line	Rear of Cylinder*
Black/Gold	"Out" Line	Front of Cylinder*
Black	Pilot Line	Rear of Cylinder*

* Supplied with different quick release connectors. Cannot be connected incorrectly

Make all necessary connection and then perform the following initial adjustments.

A) Adjust the air regulator to obtain a gage reading of 80-100 P.S.I

B) Operate the flow control valve connected to the chip purge line and note the increase or decrease in escaping air. The setting of this flow control valve has no effect on the thread rolling operation. The purpose of the chip purge line is to pressurize the compensator mechanism area to help eliminate chip accumulation in the compensator gears. Open the valve approximately 2-3 turns.

C) Depress the trip valve button several times by hand while operating the flow control valve in the red (out) line. Note that the attachment will cycle faster or slower depending upon where the valve is set.

SET THES FLOW CONTROL VALVE FOR THE FASTEST POSSIBLE ATTACHMENT CYCLE.

3.7 Checking Clearances

NOTE: BEFORE JOGGING THE MACHINE THOUGH A COMPLETE CYCLE, DISCONNECT THE ATTACHMENT AIR LINES TO PREVENT THE THREAD ROLLS FROM CLOSING DOWN ON A STATIONARY OR OVERSIZED BLANK.

Carefully operate the machine through one complete cycle in order to check for sufficient clearances for the attachment and/or thread rolls. In the case of single spindle machines, check for sufficient clearance between the attachment and any tooling mounted on an upper (cutoff) slide. Also, check that the cross slide has sufficient backward travel clearance between the attachment and advance turret tooling. In the case of multiple spindle machines, check for sufficient clearance between the attachment and tooling mounted on adjacent cross slides. Also, please check that there is sufficient clearance between the attachment in the full forward position and any end-working tooling operating simultaneously. Finally, check that there is sufficient clearance for the thread rolls during machine index. Reconnect the air lines to the attachment, making sure that the thread rolls are clear of stationary or oversized blank. Note the routing of the air lines and insure that they will not be damaged by moving parts when automatic operation begins.

Section 4
Final Adjustments

4.1 Final Adjustment of Roll Synchronization

TOO PROPERLY CONDUCT THE ROLL TRACKING TEST, THE THREAD ROLLS MUST BE SYNCHRONIZED (SECTION 2.6), INITIAL PITCH DIAMETER ADJUSTMENT MUST BE MADE (SECTION 2.5) AND THE THREAD ROLL PENETRATION RATE MUST BE SET AS FAST AS POSSIBLE (SECTION 3.6)

Start the machine and adjust the pitch diameter adjusting knob at the rear of the attachment so that the thread rolls produce a very light scribe line (approximately .010-.015 deep) around the circumference of the blank. Observe the scribe line and insure that there is only one line. (See Fig. 1). If there are two closely spaced scribe lines, stop the machine, loosen the compensator adjusting collar and adjust the positions of the thread rolls. Tighten the adjusting collar, run another part, and again observe the scribe line around its circumference. (See Fig. 1).

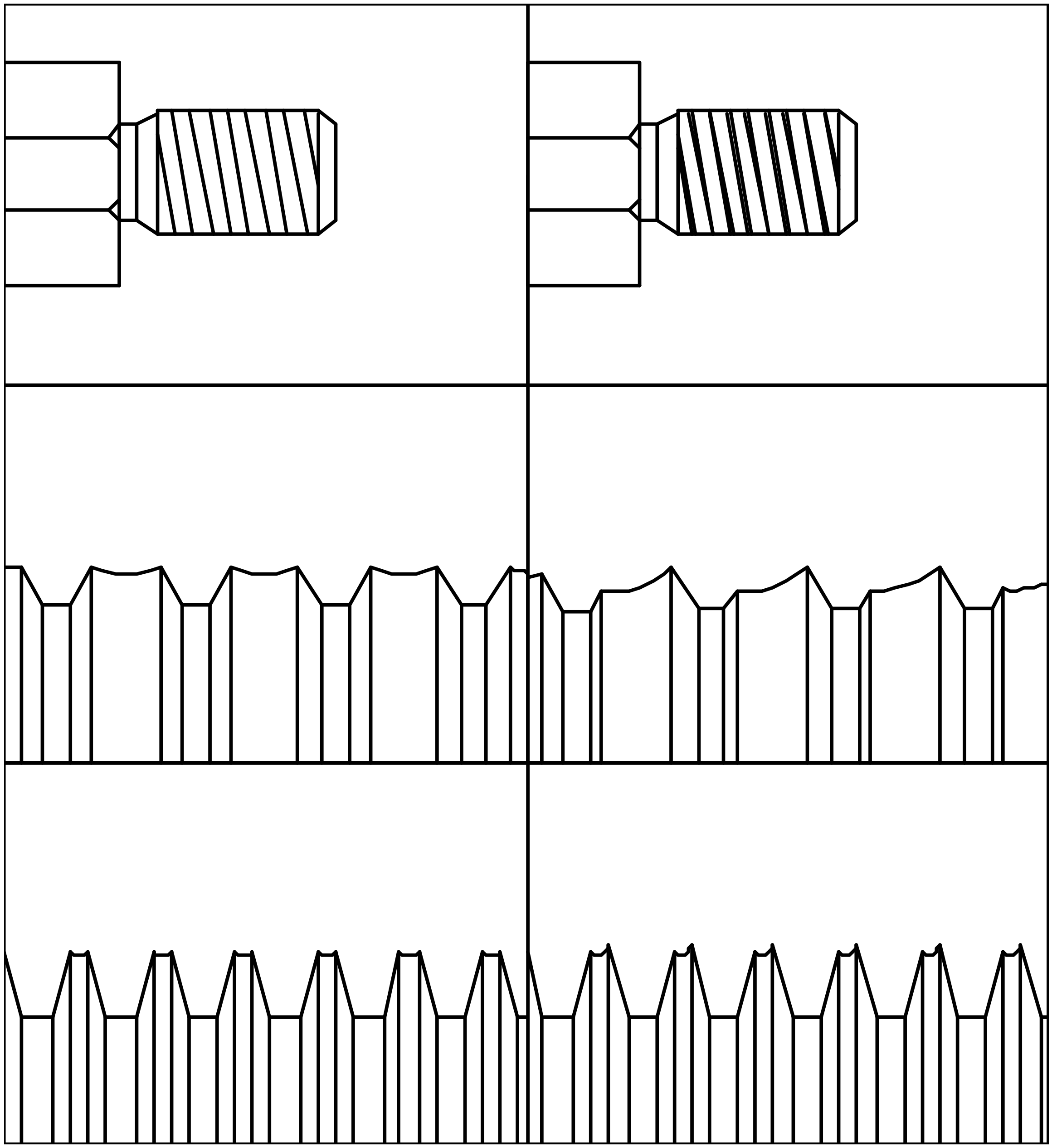
Start the machine and turn the pitch diameter adjustment knob in the (-) direction until the parts produced have approximately half the required tooth height. Observe the rolled part under a magnifying glass and note that the crest appears slightly concave. The thread form should appear symmetrical with the peaks at either side of the crest approximately equal in height. (See Fig. 1) If this is not the case, continue making very slight adjustments to the thread roll synchronization until the tooth form is balanced and symmetrical.

4.2 Final Adjustment for Pitch Diameter

NOTE: DURING THE FINAL ADJUSTMENT FOR CORRECT PITCH DIAMETER, IT IS ADVISABLE TO REDUCE THE BLANK DIAMETER APPROXIMATELY .002 TO PREVENT OVER ROLLING.

In general it is the depth of penetration of the thread rolls into the work, as controlled by the pitch diameter adjusting knob setting, which determines the pitch diameter of the finished part. The major diameter of the finished part is controlled by the blank diameter.

Synchronized Non-Synchronized



In the top view, the diagonal lines on the thread rolling blank are light (approx. .010 deep) scribe lines (tooling marks) made by the thread rolls. If the rolls are properly synchronized, they will roll a single line around the circumference of the blank. In the lower views, not that properly synchronized rolls produce a thread form that is symmetrical with “peaks” of equal height on each side of the thread crest. Start the machine and begin reducing the pitch diameter adjusting knob in the (-) direction. Check the rolled parts using the Go and NoGo gages. For the moment, do not check the major diameter of the rolled part, since the reduced blank diameter will result in an undersized condition. Continue making pitch diameter adjustment in smaller increments until the Go gage consistently threads the entire length of the part and the NoGo gage consistently does not. When the correct Go and NoGo gauging conditions have been met, the pitch diameter adjustment of the attachment is properly set for the thread size being produced.

4.3 Final Adjustment for Major Diameter

In Section 4.2, the blank diameter was reduced slightly so that the attachment could be adjusted to produce the proper pitch diameter without the possible interference of over-rolling. The result should be a finished part which meets the pitch diameter requirement, but is undersized as far as major diameter requirements. To achieve the correct major diameter it will not be necessary to make gradual increases in the blank diameter. It should be stressed at the point that these increases should be in as small an increment as possible since any increase in blank diameter will, in most cases, result in approximately 3 times the increase in the major diameter. In other words, if the blank diameter is increased .001 major diameter on the finished part can be expected to increase approximately .003 (assuming there is room in the root of the thread for this amount of increase). It should also be noted that since over-rolling is the most common cause of premature die failure, careful adjustment of the blank diameter can significantly extend or reduce roll life.

Being to increase the blank diameter until the correct major diameter is achieved. Because the blank diameter has been increased, the amount of resistance to the thread roll penetration has been increased. Since it is the depth of thread roll penetration which controls the pitch diameter, it may now be necessary to make a very slight adjustment of the pitch diameter adjustment knob in order to maintain the correct gauging requirements. Continue making blank diameter adjustments and attachment adjustments as required to obtain the correct major diameter while maintaining proper gauging requirements.

After all dimensional requirements have been met; observe the crest of the rolled thread under a magnifying glass. If the tooth height is fully formed and the thread crest is sharp with no visible seam and is high burnished, then an over-rolling condition exists and a reduction in potential roll life can be expected. If the tooth id formed approximately 70% formed and there is a slight roughness of a visible seam on the crest of the thread, then the over rolling condition has been eliminated and the maximum potential roll life can be achieved. Although the appearance of the correctly rolled part is not favorable as that of the over-rolled one, it should be noted that the very slight increase in tooth height on the over rolled part has little or no effect on the strength of the part or quality of the thread, yet the stress on the thread rolls to produce this increase is drastically higher.

4.5 Final Adjustment for Penetration (Feed) Rate

The chart on page 15 shows the recommended number of part revolutions for a wide variety of thread rolling applications.

The thread roll penetration is adjusted by means of the flow control valve connected to the “out” line of the control valve assembly. (Do not confuse this flow control valve with the flow control valve on the chip purge line)

Although the penetration rate can be expressed in terms of inches per revolution or rolling time, these figures are of value for estimating purposes only, since there is no accurate method of setting the flow control valve so that penetration rate is at the calculated value. (The thread rolling time formula will be provided later in the section.)

The following method of determining and setting the correct penetration rate has been proven to be the easiest and most accurate:

A) Using the chart, determine the recommended part revs.
B) Obtain the number of starts on the thread roll from the Reference Data Charts.
C) Divide the recommended part revs by the number of starts on the thread roll to determine the recommended compensator revs.
D) Start the machine and observe the adjusting collar on the attachment compensator mechanism. (Redirect or shut off the machines coolant flow temporarily if necessary.)
E) Adjust the penetration rate flow control valve until the compensator makes the recommended number of compensator revs.

Note: It is easier to count the compensator revs if the compensator is marked with a white line or a small piece of paper in the adjusting collar.

Thread Rolling	Brass Aluminum	Steel Up to Rc 15 400 Series Stainless Steel	Steel Rc 15-32 300 Series Stainless Steel
8-12 TPI Acme	9 - 12	10 - 13	Consult Factory
8-13 TPI UN or 3.0-2.0 MM	8 - 11	9 - 12	10 - 14
14-20 TPI UN or 1.75-1.5 MM	7 - 10	8 - 11	9 - 12
20-28 TPI UN or 1.25-1.0 MM	6 - 9	7 - 10	8 - 11
29-Finer TPI UN or 0.8 MM-Finer	6 - 7	6 - 8	6 - 9
Knurling			
12-17 TPI	8 - 11	9 - 12	10 - 14
18-25 TPI or 64 DP	7 - 10	8 - 11	9 - 12
26-35 TPI or 96 DP	6 - 9	7 - 10	8 - 11
36-50 TPI or 128 DP	5 - 8	6 - 9	7 - 10
51-Finer TPI or 160 DP	5 - 7	5 - 8	6 - 8

Example 1

Thread Size: ¾-16 Material: Brass Attachment: 160-SA

a) Recommended part revs: 8
b) Number of starts on thread roll: 3
c) 8/3 =2.7
d) Set the penetration rate flow control valve so that the adjusting collar on the compensator mechanism makes approximately 2 ½ - 3 revs.

Example 2

Thread Size: ¼ - 28 Material: 303 Stainless Steel Attachment: 141-SA

a) Recommended part revs: 10
b) Number of starts on thread roll: 7
c) 10/7 = 1.4
d) Set the penetration rate flow control valve so that the adjusting collar on the compensator mechanism makes approximately 1 ½ revolutions

Example 3

Thread Size: 4 – 40 Material: 2011-T3 Aluminum Attachment: 125-SA

a) Recommended part revs.: 6
b) Number of starts on thread roll: 12
c) 6/12 = .5
d) Set the penetration rate flow control valve so that the adjusting collar on the compensator mechanism makes approximately ½ a revolutions

Calculating the penetration rate in terms of rolling time is useful for determining maximum recommended machine spindle speeds or for calculating attachment cycle times for estimating purposes.

The following formula is used to determine the rolling time.

$$\frac{\text{Machine spindle speed (in R.P.M)}}{60} = \text{Rolling time (in seconds)}$$

$$\frac{\text{Recommended part revs.}}{\text{Machine spindle speed (in revs per second)}} = \text{Rolling time (in seconds)}$$

Example 4

Thread Size: 1” 11 ½ NPTF Material: Brass Attachment: 172-SA
Machine Spindle Speed: 680 R.P.M.

$$\frac{\text{680 R.P.M.}}{60} = \text{11.2 revs per second}$$

$$\frac{\text{10 part revs.}}{\text{11.3 revs per second}} = \text{.88 second of rolling time}$$

Example 5

Thread Size: 2 – 56 Material: 2011-T3 Aluminum Attachment: 125-SA
Machine spindle speed: 2950 R.P.M.

$$\frac{2950 \text{ R.P.M}}{60} = 49.2 \text{ revs per second}$$

$$\frac{6 \text{ part revs}}{49.2 \text{ revs per second}} = .12 \text{ seconds rolling time}$$

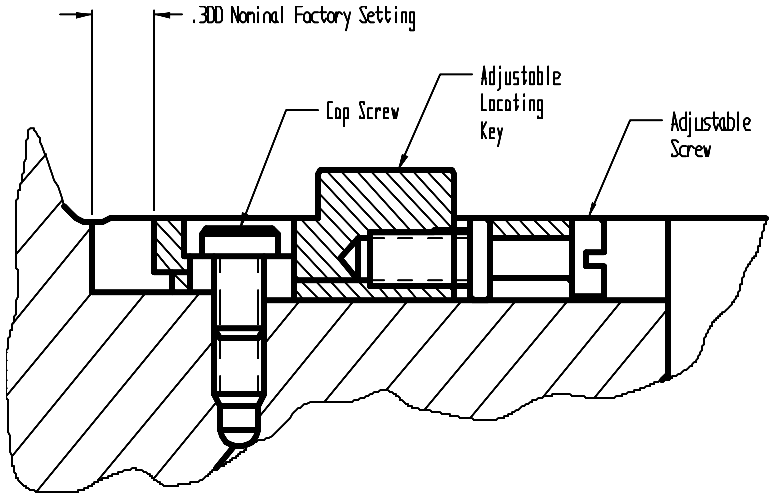
After any change in the setting of the penetration rate flow control valve has been made, it may be necessary to make minor readjustments to the pitch diameter knob and/or blank diameter to re-establish the correct dimensions of the finished part.

Section 5
Reference
Information

5.4 Adjustment Instructions
Adjustable Key Type Attachments and Adapters

Certain model attachments or adapter plates are supplied with adjustable locating keys for use on machines in which the full forward position of the cross-slide cannot be adjusted. Since the center position (the position at which the attachment is exactly centered over the thread rolling blank) varies with each thread size, no single cross slide location dimension will be applicable to all thread sizes within the capacity of the attachment. Using the Micrometer Setting Gage it is possible to adjust the position of the locating key to compensate for cross slide position error and properly center the attachment for each application.

1) ADJUSTMENT FOR ADJUSTABLE KEY TYPE ATTACHMENTS



160-904 ROLL ARM BRACKET ASSEMBLY

Note in the diagram above that the location of the key is checked by measuring the dimension between the front of the key assembly (not the actual mounting face of the key) and the front of the recess in the adapter or bracket in which the key is assembled.

A. If the attachment requires an adapter plate assembly, refer to the mounting drawing in Section 5.2 and install it on the cross slide. If no adapter plate assembly is required, proceed to Step B.
B. Advance the cross slide to the full forward position
C. Position the Micrometer Setting Gage in the front T-slot of the cross slide of the key-way of the adapter plate (not the T-slot) as applicable.
D. Adjust the Micrometer Setting Gage so that the gage spindle touches the sized thread rolling blank and note the reading
E. Obtain the correct gage setting for the thread size being rolled in the Reference Data Sheets. Compare that setting with the reading just taken and subtract the smaller dimension from the larger and not the results. This is the Offset Amount.
F. Note: The .300 Nominal Factory Setting in the diagram. If the required gage setting was greater than the reading taken from the cross-slide, subtract the offset amount from .300. If the required gage setting was less that the reading taken from the slide, add the offset amount to .300. The result of either calculation is the Adjustment Dimension.

Example 1

Attachment: 160SA-2	Thread Size: ¾-16
Setting Gage Reading from Cross Slide	.806
Required Gage Setting	.824
Offset Amount	-.018
Adjustment Dimension (.300 - .018)	.282

Refer to Step G and adjust the key towards the front of the attachment to obtain the .282 dimension.

Example 2

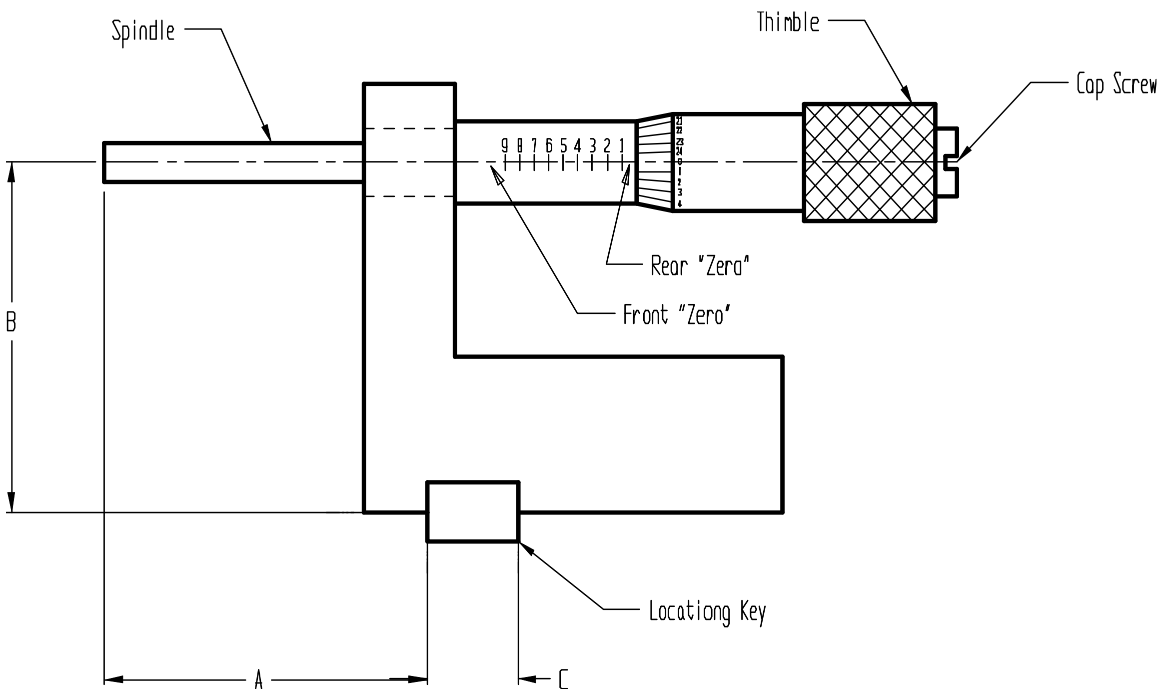
Attachment: 172 SA-2	Thread Size: 1 5/16 – 12
Setting Gage Reading from Cross Slide	.642
Required Gage Setting	.614
Offset Amount	.028
Adjustment Amount (.300 - .028)	.328

Refer to Step G and adjust the key towards the rear of the attachment to obtain the .328 dimension.

2. ADJUSTMENT INSTRUCTIONS FOR ADJUSTABLE KEY TYPE ADAPTER PLATE ASSEMBLIES

A. Loosen the cap screw which secures the adjustable key in positions
B. Refer to the mounting drawing in Section 5.2 and install the adapter plate assembly to the cross slide. Secure the plate in position but do not tighten the mounting hardware at this time.
C. Obtain the required gage setting from the Reference Data Chart and set the Micrometer Setting Gage to this reading.
D. Position the Micrometer Setting Gage in the key-way of the adapter plate and advance or retract the adjustable key using the adjusting screw until the gage spindle touches the sized thread rolling blank.
E. Tighten the cap screw to secure the adjustable key in position (remove the adapter plate from the cross slide if necessary) and tighten the hardware securely.

5.5 MICROMETER SETTING GAGE CALIBRATION



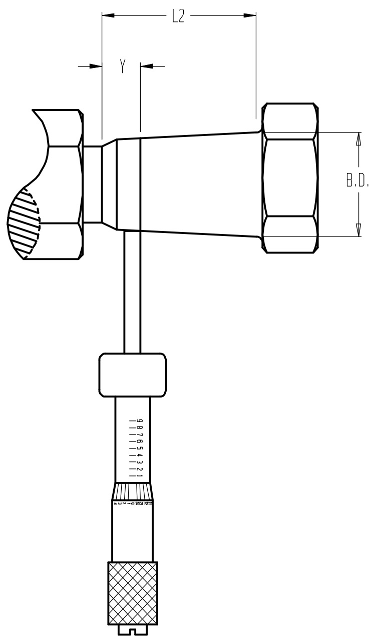
Gage Number	Dimensions		
	A	B	C
125-100	1.562	1.000	.375
125-104	2.033	1.181	.393
141-297	4.907	1.313	.500
145-100	5.250	1.313	.500
151-010	5.049	1.313	.500
160-057	2.212	2.250	.625
160-061	2.150	2.250	.750
160-074	2.556	2.000	.562
160-079	2.181	2.125	.687
160-150	2.416	1.969 (50 mm)	.629 (16 mm)
160-155	2.372	1.969 (50 mm)	.708 (17 mm)
160-349	2.455	1.969 (50 mm)	.551 (14 mm)
165-057	4.579	2.250	.625
165-061	5.705	2.250	.750
165-074	5.861	2.000	.562
165-079	5.986	2.125	.687
170-001	2.625	2.250	.750
170-006	2.687	2.250	.625
170-007	2.625	2.500	.750
170-010	3.031	2.000	.562
170-012	2.656	2.125	.687

1) Turn the thimble counter clockwise to obtain a reading of “zero” at the rear zero position.
2) Loosen the cap screw at the rear of the thimble.

3) Holding the thimble securely to maintain the rear "zero" reading turn the spindle as required to obtain the "A" dimension shown on the chart.
4) When the "A" dimension has been obtained with the thimble at the rear zero position, the gage is properly calibrated. Tighten the cap screw at the rear of the thimble.

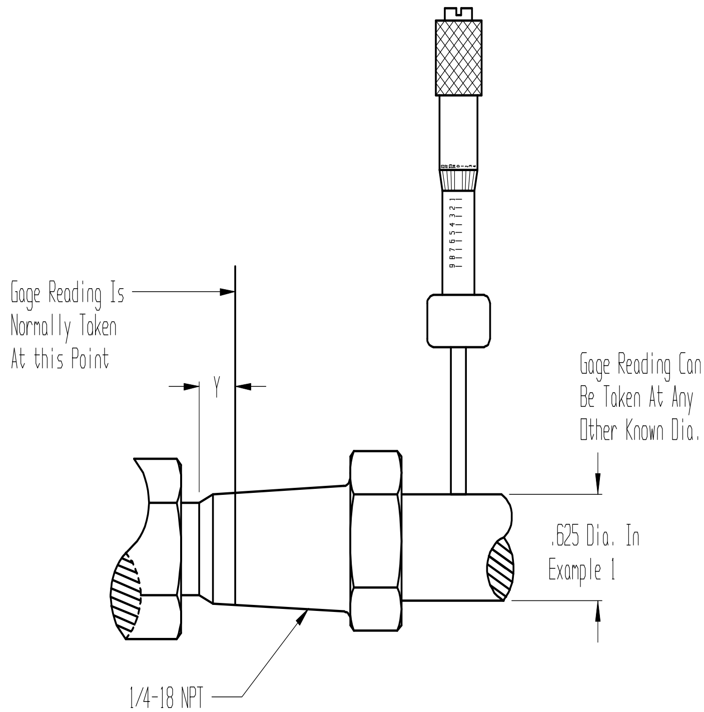
5.6 GAGE SETTING INSTRUCTIONS FOR TAPERED PIPE APPLICATIONS

A) All blank diameter and gage setting specification given in the Reference Data Charts are to be taken at "Y". To determine the location of "Y", obtain the L2 dimension (effective length of thread) for the thread size being rolled. Divide the L2 dimension by 2. The resulting dimension as measure from the small end of the thread, is the location of "Y". The blank diameter should be measured and the gage setting taken from this reference point.



BLANK SPECIFICATIONS			
Pipe Size	Y	L2	Blank Diameter @Y
1/16-27	.130	.261	.278
1/8-27	.132	.264	.370
¼-18	.201	.402	.489
3/8-18	.204	.408	.624
½-14	.267	.534	.774
¾-14	.273	.546	.984
1-11 ½	.341	.683	1.234
1 ¼-11 ½	.353	.707	1.579
1 ½-11 ½	.362	.724	1.818

B) Optional Gage Setting Instructions for Tapered Applications



For reasons of convenience or accuracy, it may be desirable to take Micrometer Setting Gage reading from a diameter other than the recommended blank diameter at "Y". This is easily accomplished by computing a corrected gage setting dimension, using the formula:

$$\frac{\text{Difference Between Blank Dia @ Y – The other Diameter}}{2} = \text{Offset Amount}$$

Add offset amount to recommended gage setting if blank dia @ Y is larger than the other diameter.

Subtract offset amount to recommended gage setting if blank diameter @ Y is smaller than the other diameter.

The result is the Corrected Gage Setting

Example 1

Attachment: 141SA	Thread Size: ¼-18 NPT
Blank dia. @ Y	.489
Another dia. From which gage reading will be taken	
Difference	.625
.136	
Offset Amount = $\frac{\text{Difference}}{2}$ =	.068

Since the blank dia. @ Y is the smaller diameter, subtract .068 from the recommended gage setting of .327 to yield a corrected gage setting of .259

The cross slide can now be adjusted using either the .327 gage setting against the .489 blank diameter @ Y, or the .259 gage setting against the .625 diameter.

Example 2

Attachment: 162 SA — Thread Size: 1-11 ½ NPT

In this example, the gage setting will be taken against the flat of the 1 ½ hex stock.

Blank dia @ Y	1.234
Dimension across flats of hex stock	1.500
Difference	.266

Offset Amount = $\frac{\text{Difference}}{2}$ = .133

Recommended gage setting	.554
Offset Amount	.133
Corrected Gage Setting	.421

The cross slide can now be adjusted using either the .554 gage setting against the 1.234 blank diameter @ Y, or the .421 gage setting against the flat of the hex stock. Note: Be sure that the hex stock is positioned so that the flat is perpendicular to the gage spindle and that the gage spindle sits squarely against the flat.

5.7 Taper Adjustment

Winter thread rolling attachments are equipped with a taper adjustment feature to insure that the centerlines of the roll pins and thread rolls are parallel to the centerline of the part. This parallel alignment is necessary if the finished part is to have consistent major diameter and crest truncation specifications. It is also possible using the taper adjustment to more closely align tapered pop thread rolls with the blank, or compensate for a slight taper in a straight blank.

Note that using calipers to measure across the roll pin is not an adequate method of setting taper adjustment. Although this method guarantees that the roll pins will be parallel to each other, they may not be parallel to the attachment mounting surface and therefore will not be parallel to the spindle centerline once the attachment is installed on the machine.

Prior to making the taper adjustment, determine the attachment mounting surface that will be used. Set the attachment on a surface plate with this mounting surface supported on parallels. Using a dial indicator or height gage, indicate each side of the roll pin and adjust for parallelism using one for the following methods:

1) Model 125-SA, 141-SA, 151-SA, 160-SA and 170-SA Series Attachments

   The roll pin is held in position between two hex socket head set screw, one of which is located on the inside portion of the roll arm, and the other located on the outside portion of the roll arm. Adjustment is made by loosening one of these set screws and tightening the other, until equal indicator readings are obtained from each end of the pin. AFTER THE FINAL ADJUSTMENT HAS BEEN MADE, USE ONLY THE OUTSIDE SET SCREWS WHEN REMOVING OR INSTALLING THREAD ROLLS.

2) Model 162-SA, 163-SA, 172-SA, and 173-SA Series Attachment

   The roll pin is held in position against the taper adjusting screw (a slotted head set screw) and locked in position by means of hex head socket screw. Adjustment is made as follows:

A) Indicate each end of the pin and note the difference in the indicator readings. Also, note in which direction the adjustable end of the pin must be moved in order to obtain equal indicator readings.
B) Loosen the hex socket head set screw and slide the roll pin towards the geared side of the roll arm clear of the taper adjusting screw.
C) Advance the taper adjusting screw ONE FULL TURN in the appropriate direction, depending on which direction the pin must be offset in order to obtain equal indicator readings on each end. Each full turn of the taper adjusting screw will displace the pin approximately .0005 from its previous dimension.
D) INSURE THAT THE FALT ON THE TAPER ADJUSTING SCREW IS ALIGNED WITH THE RENTENTION FLAT ON THE ROLL PIN. Replace the roll pin and tighten the hex socket head set screw.

3) 145-OB and 165-OB Attachments

   TAPER ADJUSTMENT ON THESE ATTACHMENTS CAN ONLY BE MADE BY OBSERVATION AND MEASUREMENT OF ROLLED PARTS.

After inspection of a rolled part one of the following conditions will exist.

A) Major diameter is smaller on side of part. Pitch diameter is larger on spindle side of part. Crest flat width is wider on spindle side of part.
B) Major diameter is larger on spindle side of part. Pitch diameter is smaller on spindle side of part. Crest flat width is wider opposite spindle side of part.

If condition A exists, change the taper adjusting plate to the next higher number. (i.e. if taper adjusting plate No. 001 is installed on the attachment, install plate No. 002)

If condition B exists, change the taper adjusting plate to the next lower number. (i.e. If taper adjusting plate No. 003 is installed on the attachment, install plate No. 002)

PROCEDURE FOR TAPER ADJUSTING PLATE INSTALLATION

1) Remove the six flat head screws which secure the taper adjusting plate and remove the plate. Note: It may be necessary to make minor adjustments to the taper adjusting bolt to easily remove these screws.
2) Place the correct taper adjusting plate in position but DO NOT FORCE THE PLATE INTO POSITION IF THE PILOTS ON THE PLATE DO NOT ALIGN WITH THE FULCRUM PIN CENTERBORES.
3) Turn the taper adjusting bolt as necessary to bring the pilots on the taper adjusting plate into alignment with the fulcrum pin counter-bores. When the plate can be easily assembled into position, replace the six flat head screw.

Problem	Cause	Solution
Slivers or flakes on threads	1. Rolls not in match 2. Center line of rolls not parallel with center line of work. 3. Loose or worn cross slide or adapter 4. Overfilling rolls 5. Material not adaptable to cold-working 6. Rough finish on blank 7. Seamy stock 8. Feed rate too slow, causing rolls to slip on work 9. Incorrect roll diameter	1. Resynchronize rolls 2. Check slide for alignment 3. Check slide gib and springs. Tighten adapter if used. 4. Reduce blank diameter 5. Change material. Check with material supplier 6. Regrind tooling. 7. Not suitable for roll threading 8. Increase rate of penetration. 9.Use correct rolls for job
Drunken Threads	1.Rolls not in match 2. Center line of rolls not parallel with center line of work. 3. Inaccurate rolls 4. Work bending during rolling	1. Resynchronize rolls 2. Check slide for alignment 3. Replace rolls 4. Support part during rolling operation or slow down penetration rate if possible
Off-size threads 1.Pitch diameter and major diameter, both oversize 2.Pitch diameter oversize, major diameter correct size 3. Pitch diameter oversize, major diameter undersize 4. Pitch diameter correct size, major diameter oversize 5. Pitch diameter correct size, major diameter undersize 6. Pitch diameter undersize, major diameter oversize 7. Pitch diameter undersize, major diameter correct size 8. Pitch diameter and major diameter both undersize	1. Oversize blanks 2. Oversize blanks. If finished thread is full, thread on roll is too shallow 3. Insufficient penetration on rolls. If finished thread is lull thread on roll is too shallow 4. Blank too large. Thread on roll deeper than necessary 5. Blank too small. If finished thread is full, thread on roll is too shallow. 6. Excessive penetration. Thread on roll deeper than necessary 7. Blank too small. Thread on roll deeper than necessary. 8. Blank to small	1. Reduce blank diameter 2. Use correct rolls for job 3. Increase roll penetration 4. Reduce blank diameter 5. Increase blank diameter. Use correct rolls for job 6. Reduce roll penetration. Use correct rolls for job. 7. Increase blank diameter. Use correct rolls for job. 8. Increase blank diameter.
Out-of-round thread	1. Out of round blank 2. Center line of rolls not parallel with center line of work. 3. Feed rate too high 4. Insufficient work revolutions 5. Material not ductile enough for cold-working 6. Attachment not on centerline of work.	1. Shave tool not reaching center or not cleaning up rough form diameter. 2. Check slide for alignment 3. Reduce rate of penetration 4. Reduce rate of penetration 5. Change material. Check with supplier. 6. Reset cross slide with gauge
Tapered Threads 1. Pitch diameter straight. Major diameter tapered and not filled out on small end 2. Pitch diameter and major diameter both tapered same way 3. Pitch diameter and major diameter tapered in opposite directions and thread not filled out on end with small major diameter.	1. Tapered Blank 2. Tapered blank 3. Rolls not penetrating deep enough on edge with large pitch diameter and small major diameter, or work bending during rolling.	1. Straighten blank 2. Straighten blank 3. Support part during rolling. Part deflecting out of contact with center rolls
Thread with expansion lead	1. Expand lead in rolls 2. Material extruding on short length of blank	1. Use correct rolls 2. Use longer blank and remove excess in another position
Thread with contracted lead	Contracted lead in rolls	Use correct rolls for job