OMAX®

A-Jet® User's Guide

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OMAX Corporation is continually improving the OMAX JetMachining® Center to bring you the best in abrasivejet machining technology. For that reason, your OMAX JetMachining Center may differ slightly from what is described in this document. If you have any questions, please feel free to contact us at 1 800-838-0343 or at e-mail techsupport@omax.com.

You can also receive technical support on-line at: http://www.omax.com/support (user name and password required for access).

For Customer Service contact or warranty information, please refer to the OMAX web site at http://www.omax.com.

The OMAX Machine tool apparatus and linear motion track are covered by U.S. patent number 5,472,367. Other patents pending.
The OMAX motion control with precompilation is covered by U.S. patent number 5,508,596.

Original Instructions in English
January 2012

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Introduction to the OMAX A-Jet

The OMAX A-Jet®, short for "articulated jet" (Figure 1) cuts accurately beveled edges at angles determined by the machine operator or part program. Controlled entirely by OMAX proprietary Intelli-MAX® software, the A-Jet adds two motion axes that allow tilting the nozzle over a range of 0° to 59.5° from the vertical position and can be used to easily produce beveled edges. The A-Jet can also cut parts with complex geometries.

Figure 1

The A-Jet also allows production of beveled edges in preparation for welding operations. Using this accessory, many secondary machining and grinding operations can be eliminated.

The OMAX A-Jet is supplied with a MAXJET®5i Nozzle and a special breakaway Mixing Tube with a more chamfered tip. A significant feature of the A-Jet is its large diameter tubing which allows minimal pressure loss, supporting the use of large high-power nozzles. Utilizing a high-power nozzle provides a substantial increase in cutting speed which corresponds to economical part production.

Safety Issues

WARNING! ***Never place your hands near the cutting nozzle tip. The A-Jet cutting nozzle can quickly move without warning in unexpected directions while operating.***

WARNING! ***Be careful of being pinched. The servos driving the OMAX A-Jet are strong enough to crush bones and cause serious injuries. When the A-Jet is operating, do not touch it!***

WARNING! ***When piercing or cutting with the A-Jet, there could be additional splashing of water and garnet. Always wear safety glasses for eye protection. Consider using a splash shield available from OMAX.***

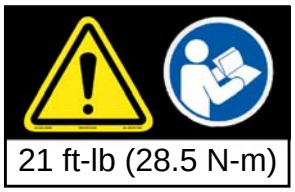
WARNING! ***To prevent accidentally cutting through the sides of the OMAX tank, always ensure that the A-Jet's nozzle is never angled at a position allowing it to strike a side of the tank when set to its maximum tilt angle of 59.5 degrees. Read this manual for the A-Jet cutting characteristics.***

WARNING! ***Do not attempt to bypass or disable any safety shutdown circuits as severe damage to the A-Jet and injury to personnel my occur.***

WARNING! ***Never do maintenance on the OMAX equipment with the main AC disconnect ON, unlocked, or while the pump is in operation. Always follow standard lockout/tag-out procedures.***

Refer to your OMAX JetMachining® Center Operator's Guide, P/N 400433, for additional safety requirements.

Caution: ***Do not attempt to operate the A-Jet without the shear bolts as severe damage to the hardware may occur.***



WARNING!
Ensure that system is locked-out prior to servicing the On/Off Valve. Do not attempt to turn ON the pump unless the On/Off valve is installed and torqued to the required settings. Read the OMAX User's Guide prior to servicing this device.

Software Settings

1. Open OMAX **Make**, click the **Change Path Setup** button. In the **Enter your material Setup here** area, check ***Enable A-Jet***.

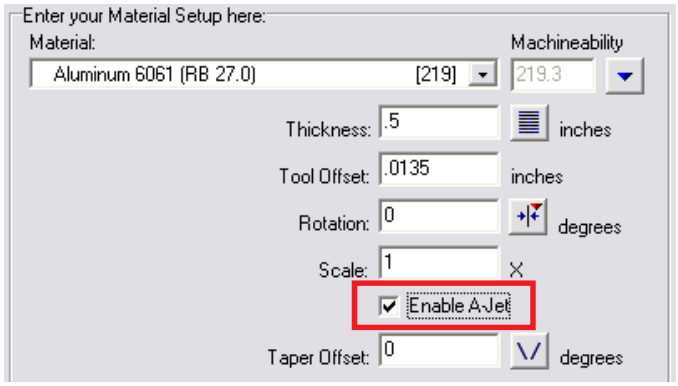


Figure 2

Note: *Whenever the A-Jet is enabled and tilt is applied to entities, the cutting model optimizations functions for lead length, corner passing etc. are not available.*

2. On the **Setup** menu, click **Motion Preferences** and on the **Motion** tab, set the stand-off distance to at least 0.080", if cutting angles:

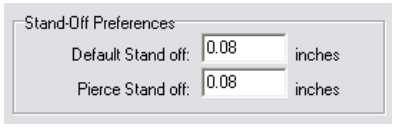


Figure 3

Note: *Increase the stand-off or use the A-Jet Terrain Follower on warped or wavy material.*

3. On the **Setup** menu, click **Event and Relay Timing**. On the **Event & Relay Timing** tab increase the dwell time to 3.0 seconds, provide ample time for clearing the abrasive out of the feed line.

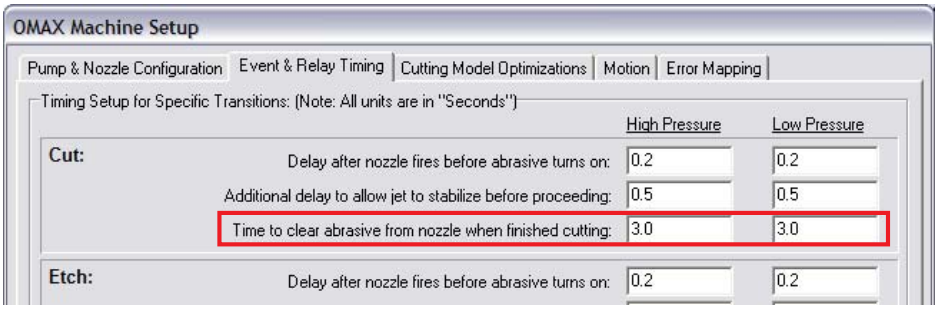


Figure 4

3D Path Editor Settings

The OMAX 3D Path Editor is used to specify cut angles for the A-Jet. An OMAX 3D Path Editor Training video, P/N 307922 **i**s available for downloading at omax.com training.

Note: *OMAX Make can also be used to specify the tilt angle **if** all part entities require the same cut angle.*

1. In the **OMAX 3D Path Editor** utility menu, for **Tilt View Settings**, configure **Set maximum allowed tilt** at **59.5** degrees:

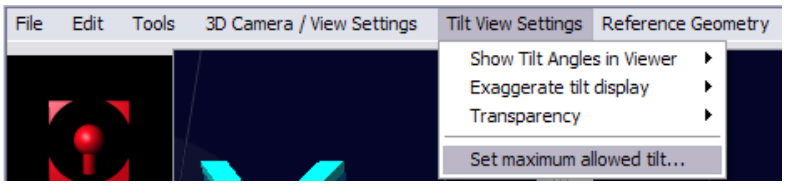


Figure 5

2. When configuring **Tilt View Settings**, set the **Exaggerate Tilt Display** to **1x**:

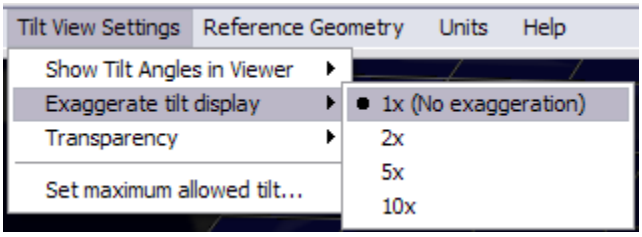


Figure 6

Calibrating the A-Jet

The A-Jet must always be calibrated for squareness upon initial use or following a collision. Refer to the **A-Jet Squareness Calibration Wizard**.

Using the A-Jet Controls

Caution: ***Before operating the A-Jet, ensure initial settings and squareness calibration procedures were correctly done.***

1. On the **View** menu, click **Show A-Jet Control**.

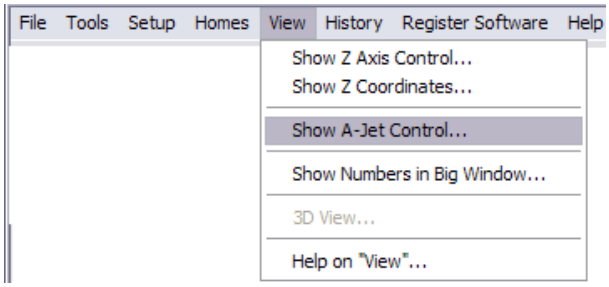
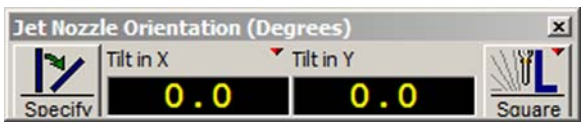
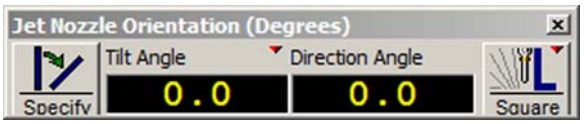


Figure 7

2. Verify that the **A-Jet Nozzle Orientation** display appears.



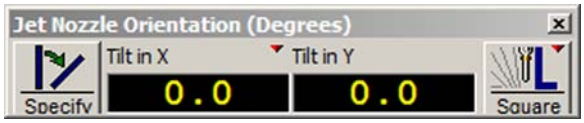
or



Two different **Jet Nozzle Orientation** displays are available: **Tilt in X / Tilt in Y** or **Tilt Angle / Direction Angle**. Usually the last one displayed appears first when **"Show A-Jet Control"** is clicked. Right-clicking on the numbers portion of the display presents a menu allowing you to select either of these two displays:

Orientation Buttons

Two buttons appear on the **Nozzle Orientation** display: **Specify** and **Square**.



Specify

Specify provides two possible displays which allow you to specify a nozzle's **Absolute Angles** either by **Direction and Angle** or by an **Angle to X and Angle to Y**:

Display as Tilt and Direction Angles

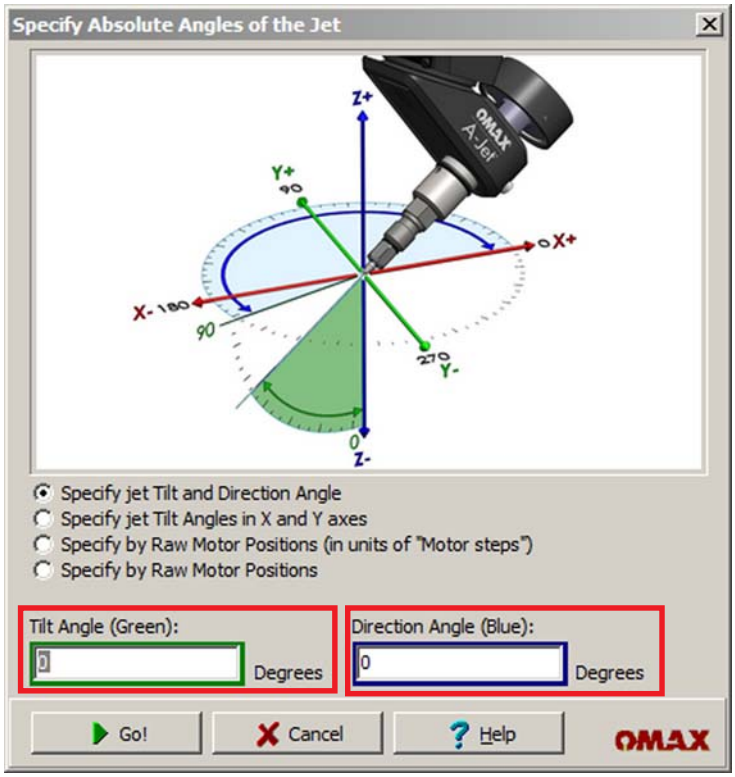


Figure 8

Display as Tilt in X and Tilt in Y

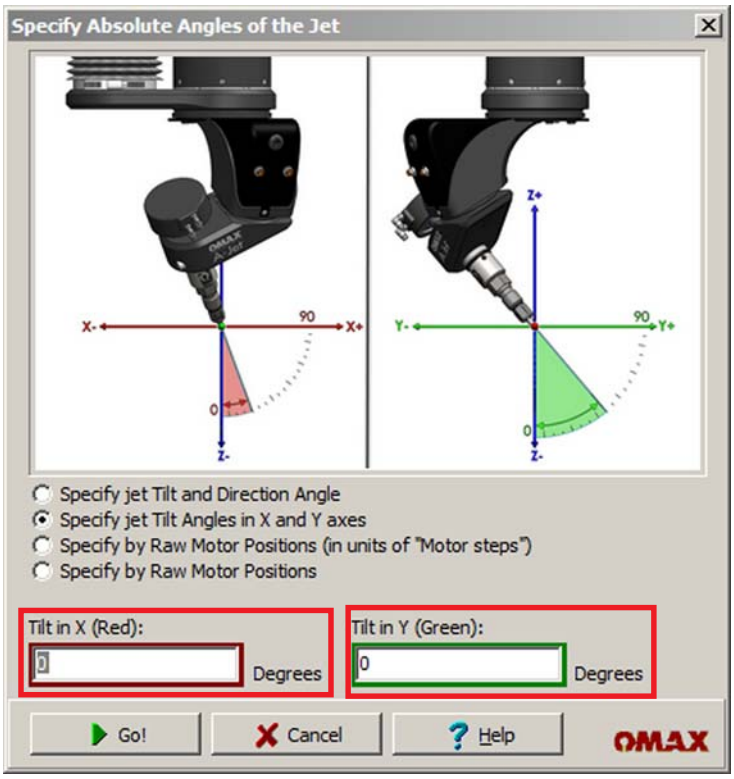


Figure 9

Square

Clicking **Square** on **Jet Nozzle Orientation,** prompts you to square the A-Jet axis.

Right-clicking **Square** provides additional squaring options:

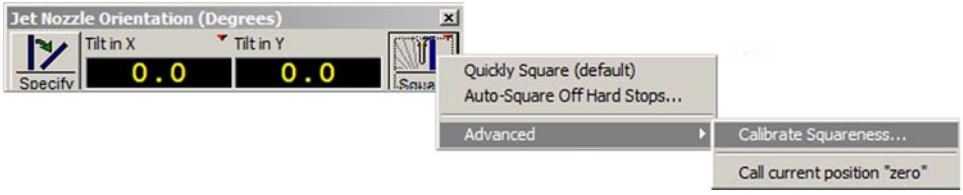


Figure 10

- **Quickly Square (default)**
  Squares the A-Jet axis.
- **Auto-Square Off Hard Stops**
  Automatically squares the axes to their hard stops.

WARNING! ***Nozzle motion begins as soon as you click OK!***

- **Advanced/Calibrate Squareness**
  Opens the **A-Jet Squareness Calibration Wizard**.
- **Advanced/Call current position "zero"**
  Defines the current A-Jet nozzle settings as the "zero" position.

The A-Jet Squareness Calibration Wizard

Always calibrate using the OMAX **A-Jet Squareness Calibration Wizard** upon initial use, or whenever there is a nozzle collision. Squaring the A-Jet requires the **OMAX A-Jet Squaring Kit**.

Calibrating the A-Jet

1. Clear the OMAX table of materials and other debris to allow room for A-Jet calibration.
2. Position the A-Jet at a location on the table that allows easy access.
3. Remove all dirt, abrasive, and water from the A-Jet and its components.
4. Cover the slat bed directly below the A-Jet with a piece of cardboard or stock, to prevent items from falling into the tank.
5. Remove the mixing tube from the nozzle.
6. Remove the slat covering from beneath the A-Jet.
7. In OMAX **Make,** on the **View** menu click **Show A-Jet Control**.

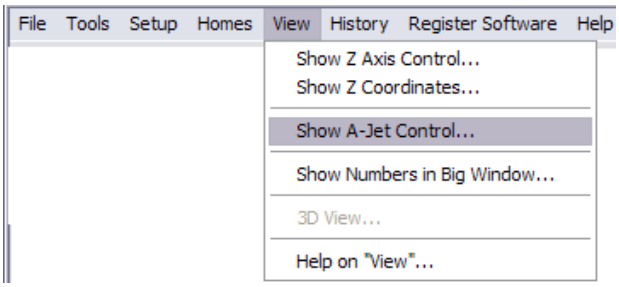


Figure 11

8. **Right-click** the **Square** button on **Jet Nozzle Orientation** to display the available options:.

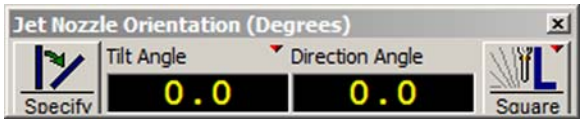


Figure 12

9. Right-click **Square**, point to **Advanced,** and then click **Calibrate Squareness.**

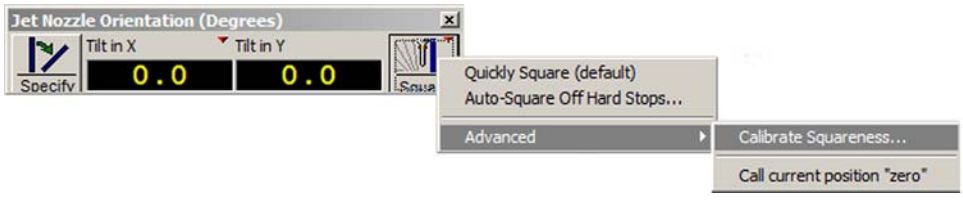


Figure 13

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A-Jet Squareness Calibration Wizard Option Tabs

Welcome Tab

The A-Jet Squareness Calibration Wizard provides seven tabs that support the squareness calibration process. Read the information provided on this tab prior to beginning calibration procedures. The tab contains introductory information on the need to run the calibration wizard periodically, especially following a machine crash or change of A-Jet hardware, it includes an important caution to ensure that the squaring is done correctly.

Figure 14

When finished reading the **Welcome** tab, click **Next,** or the **Square** tab.

The Square Tab

Provides a **Run Auto-Square** button to initiate the Auto-Squaring routine to ensure that the A-Jet is approximately squared and centered prior to using the more accurate A-Jet Squareness Calibration Wizard. Omit this step if your A-jet is already close to being squared and centered. Click **Next** to skip this step or click the **Rotational Setup** tab.

Click **Run Auto-Square** to start the Auto-Squaring routine.

WARNING! ***Stay clear of the A-Jet whenever "Run Auto-Square" is activated. Squaring initiates movement of both the A-Jet rotation and tilting motors.***

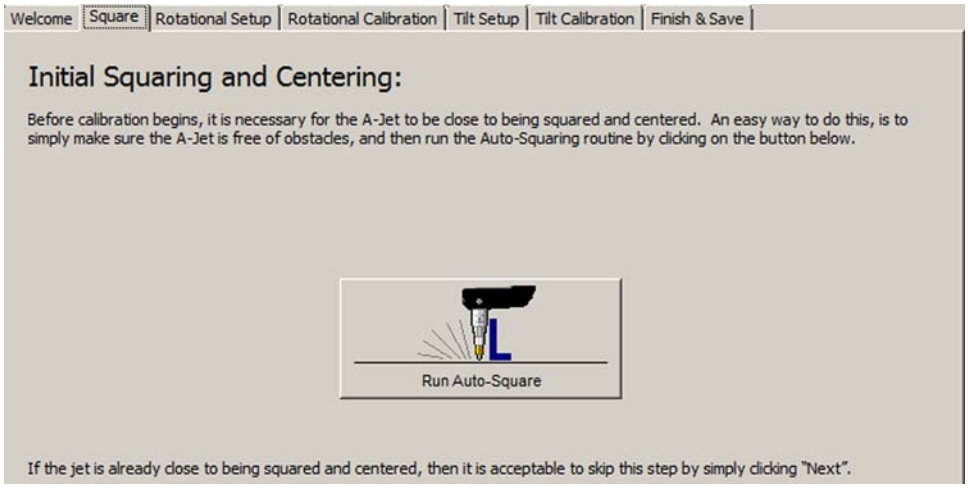


Figure 15

At the completion of the **Auto-Square** routine, click the **Rotational Setup** tab for instructions on positioning an indicator gauge to calibrate the A-Jet's rotational axis.

Rotational Setup Tab

This tab provides an illustration with instructions to correctly position the indicator gauge to calibrate the A-Jet's rotational axis.

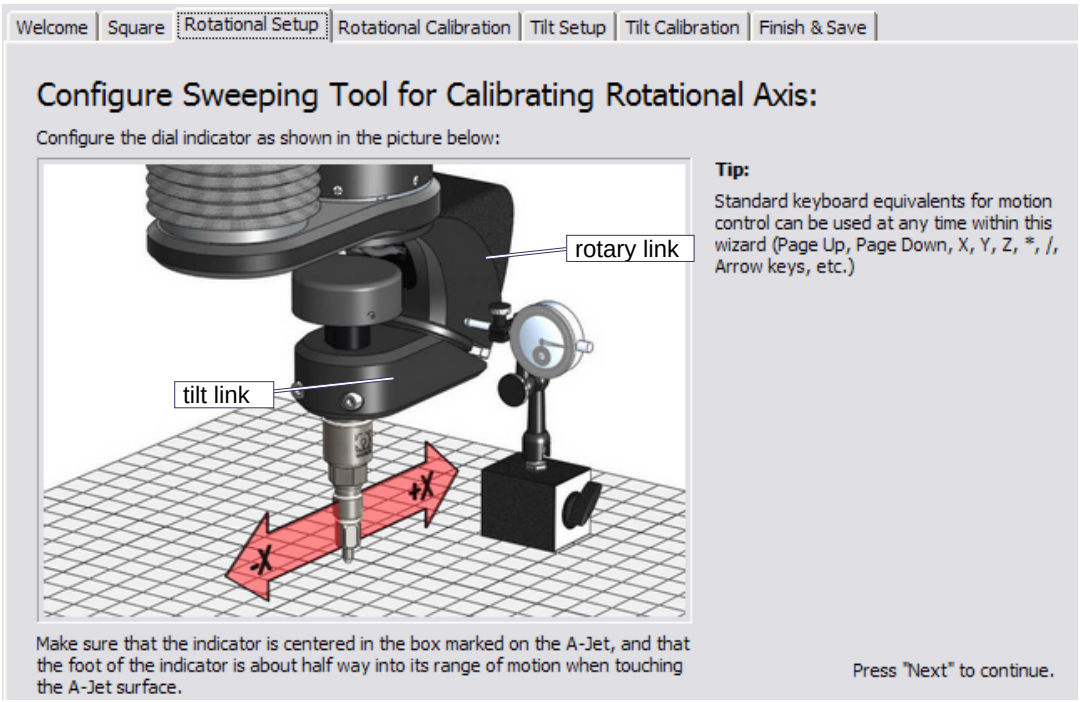


Figure 16

WARNING! ***Power to the OMAX table must always be shut down anytime it is necessary to reach in and make contact with the A-Jet.***

Setting up the gauge for calibrating the A-Jet's rotational axis

1. Ensure that the A-Jet was previously "auto-squared" if needed.
2. Position the A-Jet at a location on the table that provides easy operator access and allows placement of the calibration gauge.
3. Place a flat piece of material on the table adjacent to the A-Jet to serve as a "squaring block" to set the calibration gauge on.
4. Position the foot of the gauge along the right side of the A-Jet rotary link, as illustrated above, at a location that allows 2 inches of horizontal movement by the A-Jet without the gauge foot losing contact with the frame surface.
5. Push the foot in approximately half way when it initially makes contact with the A-Jet frame.

6. Verify the gauge is mounted securely and will not move during the calibration process.

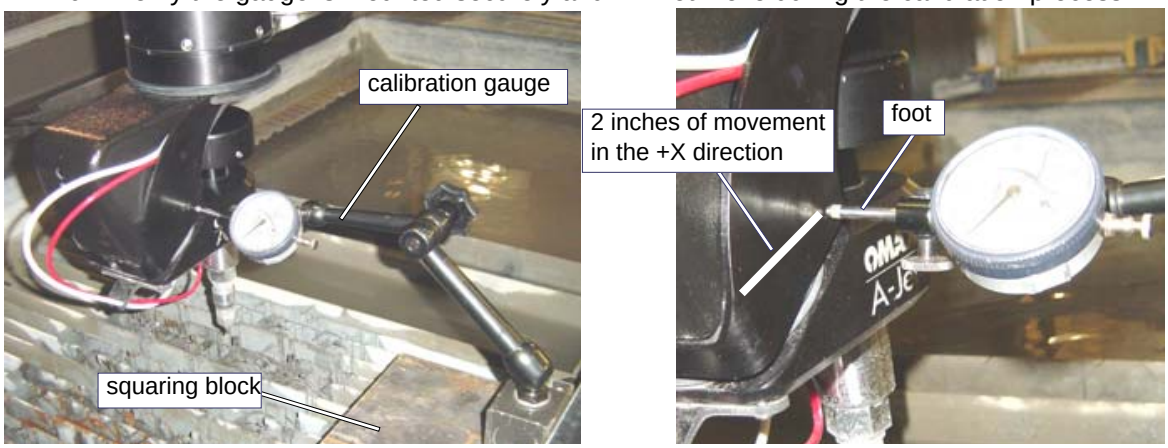


Figure 17

When the gauge is positioned as illustrated, in the calibration wizard, click the **Rotational Calibration** tab to continue.

Rotational Calibration Tab

This tab provides the rotational adjustments required to calibrate A-Jet movement along the X-axis. The **Move X-** and **Move X+** buttons allow adjustment of the rotational axis to achieve the least amount of motion on the indicator during calibration.

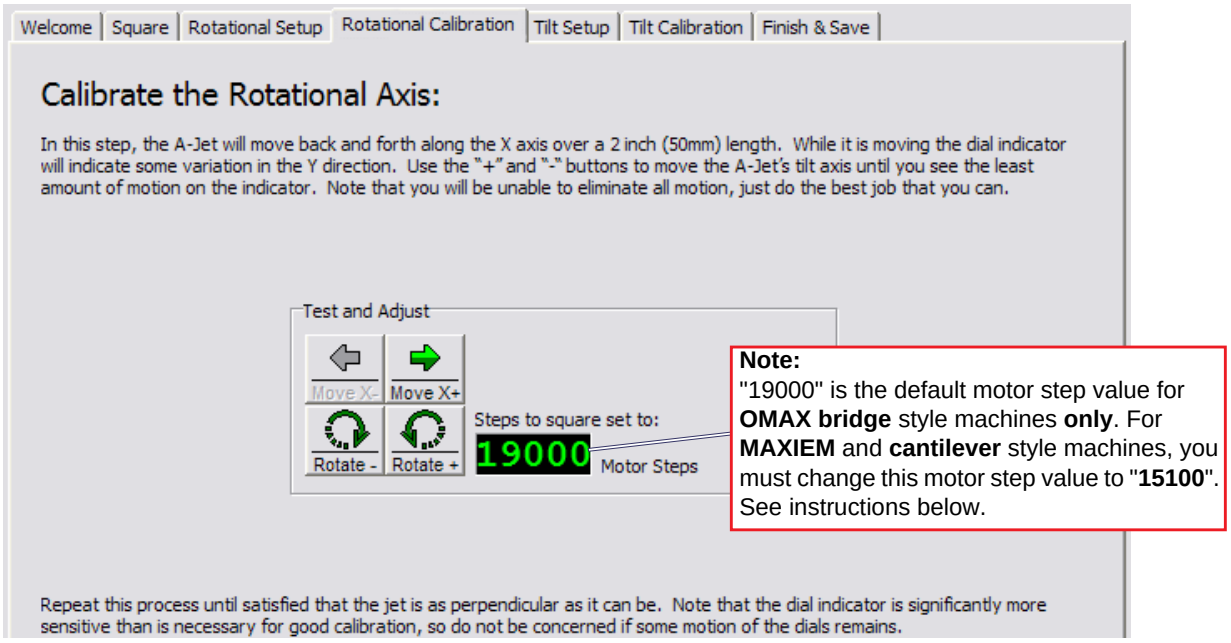


Figure 18

Change the Motor Step Value for the Rotation Axis Calibration

For OMAX bridge-style machines, the default value of "19000" is correct. if you have a bridge-style machine, do not change this value! Go to "Calibrating the A-Jet Rotational Axis".

Caution:

For OMAX cantilever-style and all MAXIEM machines, this value must be changed to "15100" as follows:

a. Click the **Finish & Save** tab, and then click the **Save** button to close the A-Jet Squareness Calibration Wizard.

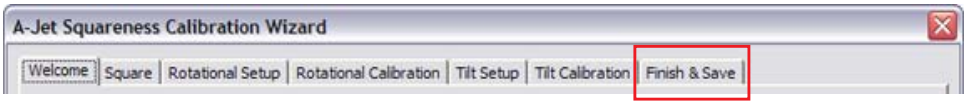


Figure 19

b. Press **Shift** + **~** (tilde) to access the **Testing & Diagnosis** menu, point to **Tilt-A-Jet/A-Jet**, and then click **Calibrate Tilt/A-Jet Parallel Factory Settings.**

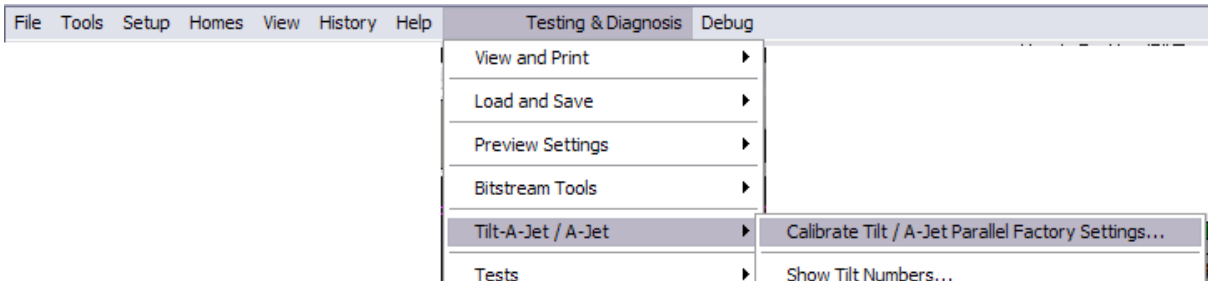


Figure 20

c. Enter your OMAX **password** to access administrator setup functions and click **OK**.

Figure 21

d. Type "**15100**" for the **Rotary** calibration value and click **Save** to exit the **Perpendicularity Calibration** window.

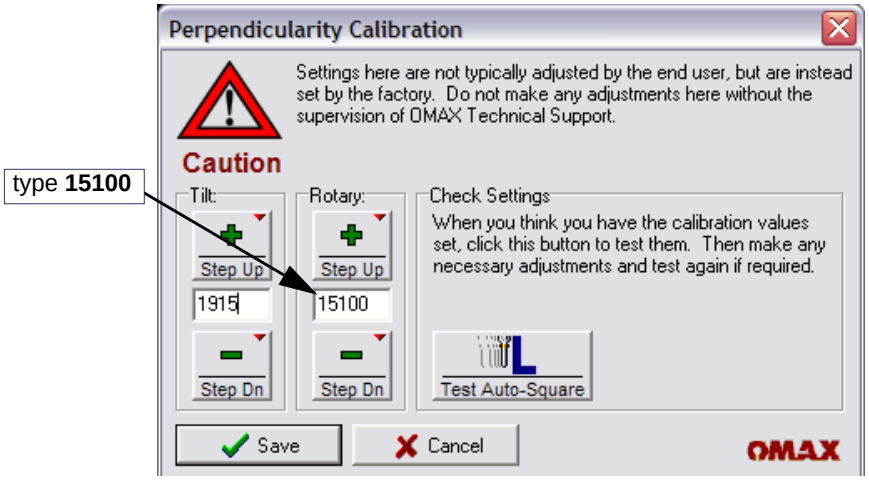


Figure 22

e. Right-click the **Square** button on **A-Jet Nozzle Orientation** and select **Calibrate Squareness to** reopen the A-Jet Squareness Calibration Wizard.

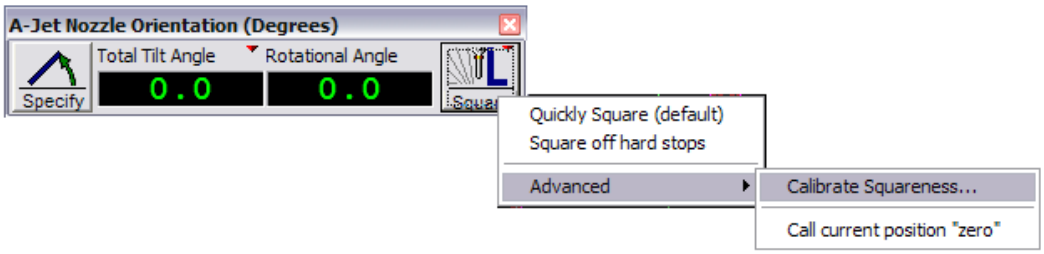


Figure 23

f. Click the **Rotational Calibration** tab.

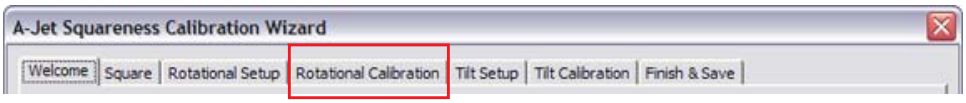


Figure 24

g. Verify "**15100**" now appears for **Motor Steps**.

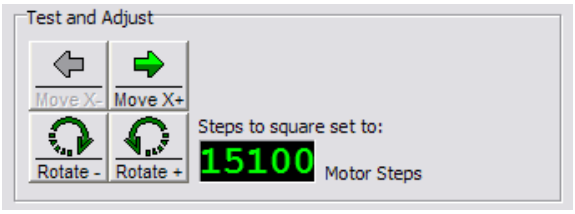


Figure 25

h. Complete the Calibrating the A-Jet Rotational Axis procedure which follows.

Calibrating the A-Jet Rotational Axis

1. With the calibration gauge setup as illustrated, click the **Move X-** and then the **Move X+** buttons to verify that the gauge foot remains against the A-Jet during the 2 inches of back-and-forth, horizontal movement of the nozzle.

Note: *If the foot does not remain against the A-Jet (i.e., A-Jet moves in the wrong direction or too far), either reposition the gauge, or move the A-Jet using standard keyboard motion controls to position the A-Jet frame so that the gauge foot remains against it for the required 2 inches of travel.*

2. Click either the **Move X-** or **Move X+** buttons and observe the calibration gauge for dial movement.
3. Through experimentation, determine if clicking the **Rotate -** or **Rotate +** buttons increase or decrease the range of dial movement when **Move X-** and **Move X+** are clicked.
4. Continue adjusting the motor steps using the **Rotate -** and **Rotate +** buttons until a minimum range of movement is achieved using the **Move X** buttons to move the A-Jet back-and-forth 2 inches horizontally.
5. When satisfied the A-Jet is as perpendicular as possible to the table (minimum dial movement), click the **Finish and Save** tab to save your current calibration settings. Once saved, click the **Tilt Setup** tab to continue.

Tilt Setup Tab

This tab provides an illustration and instructions for correctly positioning the indicator gauge to calibrate the A-Jet's tilt axis.

Caution: ***The indicator gauge must be positioned on the Y-axis.***

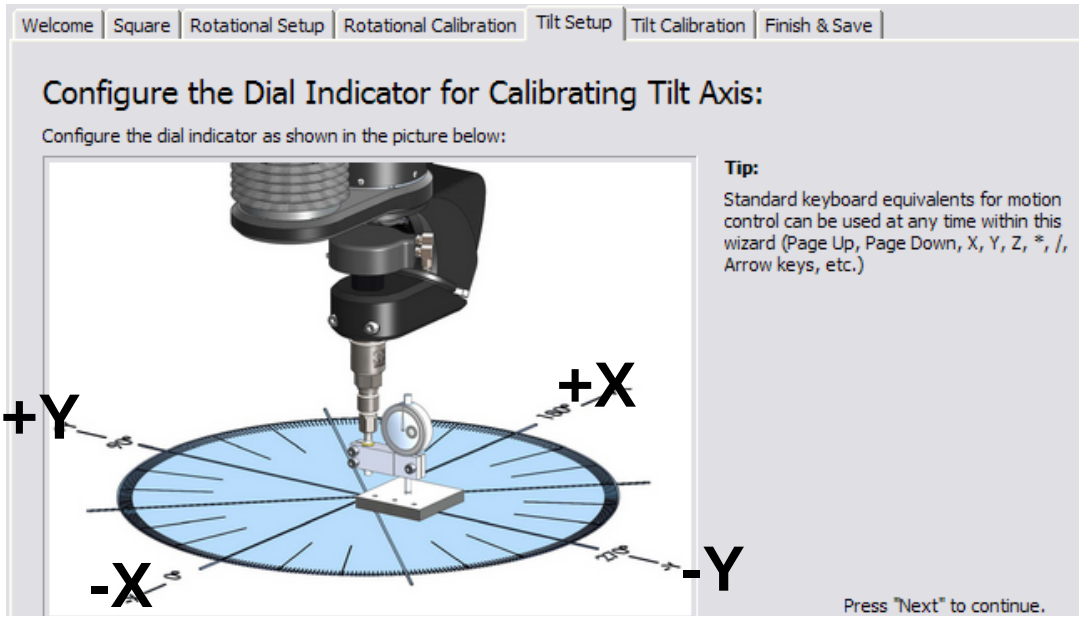


Figure 26

Setting up the gauge for calibrating the A-Jet's tilt axis

1. Position the nozzle to allow removal of the mixing tube.
2. Power down the machine.

Caution: ***Ensure that the settings determined for Rotational Calibration have been saved as previously instructed before powering down.***

3. Remove the gauge used to calibrate the rotational axis.
4. Place a piece of flat material beneath the nozzle to serve as a platform for the gauge assembly to sit on.
5. Remove the mixing tube from the nozzle, insert and tighten the dial arm for the tilt gauge as shown below.
6. Place the "dial plate" beneath the nozzle and set the gauge foot into the center hole. The dial indicator should be parallel with the Y-axis.

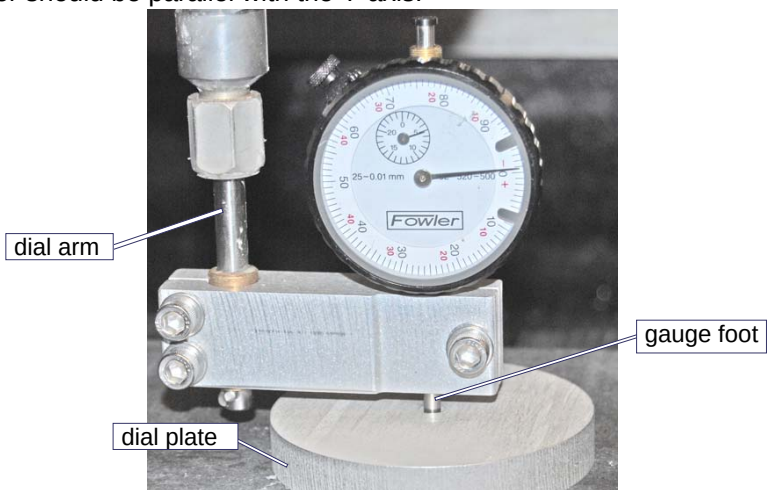


Figure 27

7. Lower the Z-axis until the tip of the dial indicator contacts the dial plate. Lower it about ¼" more. Ensure the dial indicator is firmly in contact with the surface plate, which should be in direct contact with the slats.
8. When this gauge is properly setup as illustrated and described, power up the machine, reopen the **A-Jet Squareness Calibration Wizard**, and click the **Tilt Calibration** tab to continue.

Tilt Calibration Tab

This tab enables the adjustments that ensure the A-Jet is perpendicular to the OMAX table. The **Tilt-** and **Tilt+** buttons allow adjustments to the tilt axis to achieve the least amount of motion on the indicator during calibration.

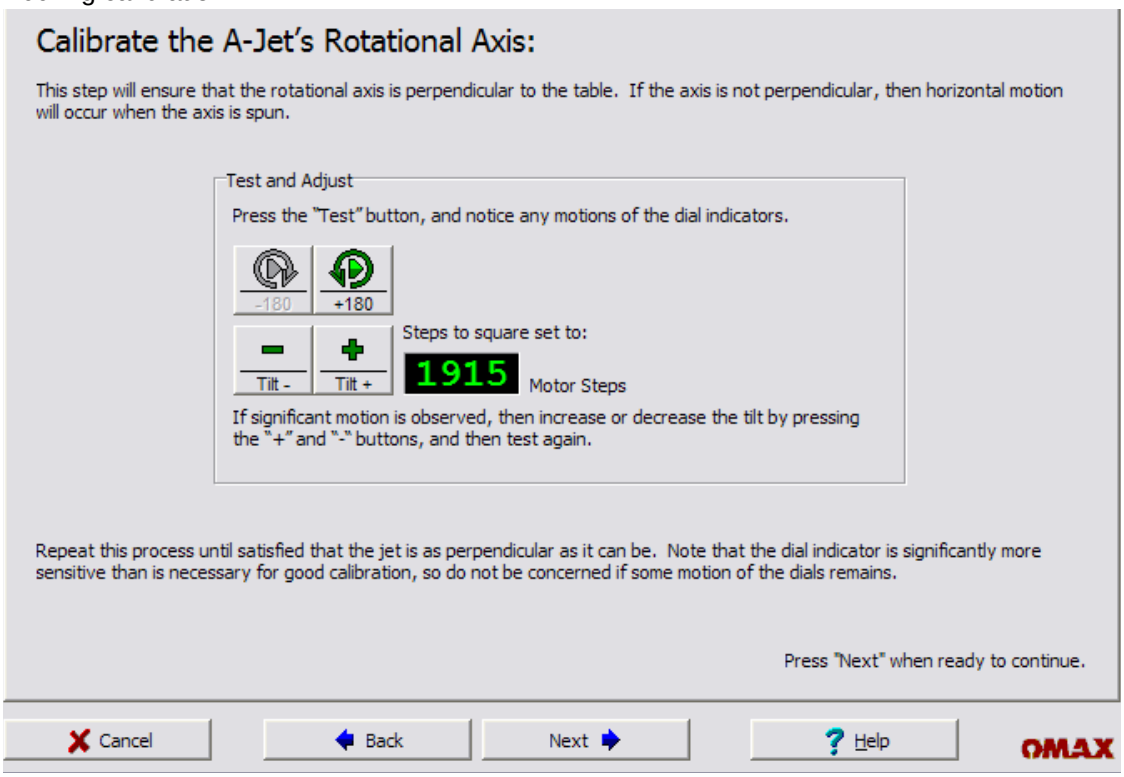


Figure 28

WARNING! ***The default value of "1915" shown above is for an A-Jet with a 30:1 ratio tilt actuator (refer to "Verifying the Correct Tilt Axis Step Value" for details). For A-Jets with the 50:1 ratio, the Motor Steps value must be increased to "3205". You can use the following procedure to quickly set this value.***

To quickly set your Motor Steps value to 3205:

Note: *Follow this procedure **only** to change the Motor Step value from 1915 to 3205. If 1915 is the correct value for your 30:1 A-Jet, skip ahead to **Calibrating the A-Jet Tilt Axis.***

a. Click the **Finish & Save** tab and click **Save** to close the A-Jet Squareness Calibration Wizard.

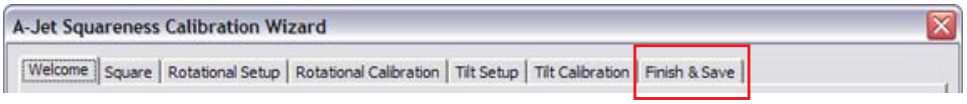


Figure 29

b. Press **Shift** + **~** (tilde) to access the "**Testing & Diagnosis**" menu, point to **Tilt-A-Jet/A-Jet**, and then click **Calibrate Tilt/A-Jet Parallel Factory Settings.**

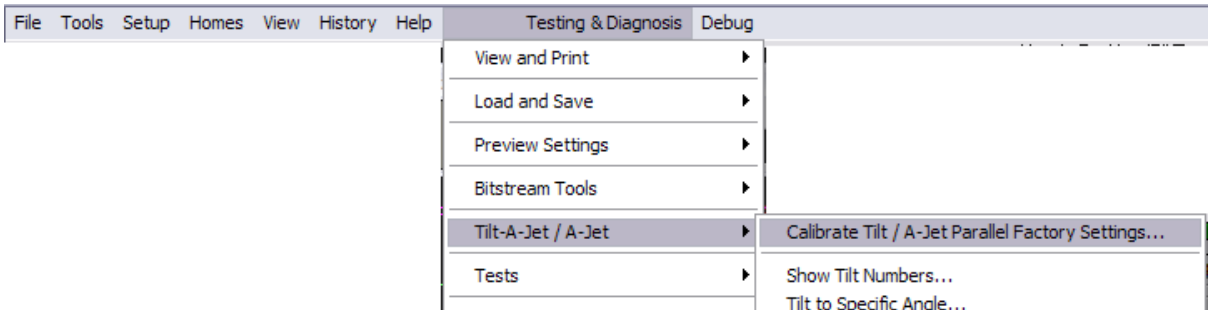


Figure 30

c. Enter your OMAX **password** to access administrator setup functions and click **OK**.

Figure 31

d. Type "**3205**" for the **Tilt** calibration value (for a 50:1 ratio A-Jet) and click **Save** to exit the Perpendicularity Calibration window:

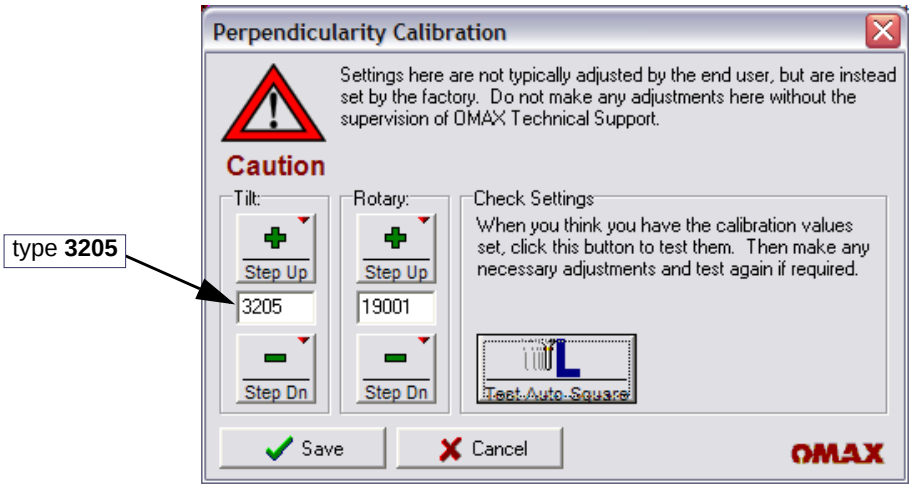


Figure 32

e. Right-click **Square**, point to **Advanced,** and then click **Calibrate Squareness.**

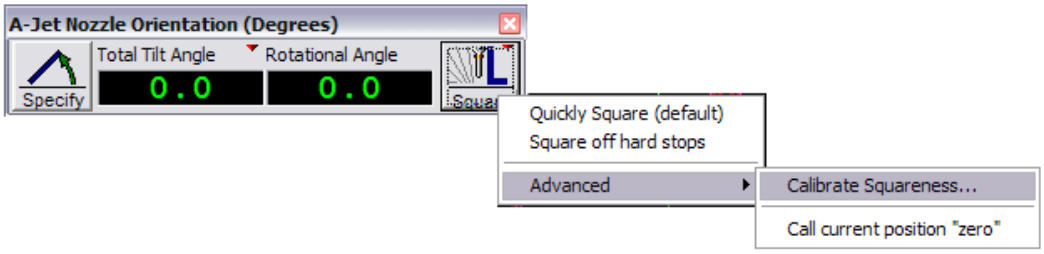


Figure 33

f. Click the **Tilt Calibration** tab:

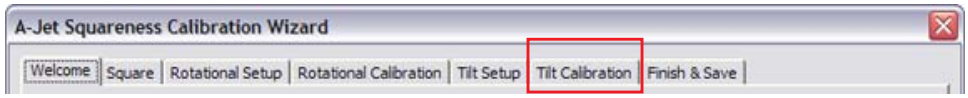


Figure 34

g. Verify that "**3205**" now appears for Motor Steps

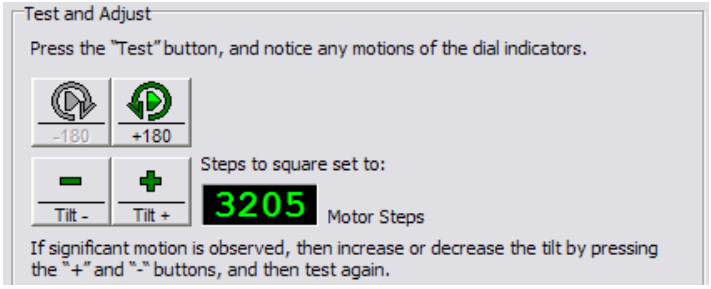


Figure 35

Calibrating the A-Jet Tilt Axis

1. With the calibration gauge setup as previously described, click the **- 180** and then the **+ 180** buttons and observe the calibration gauge for the range of dial movement.
2. Through experimentation, determine if clicking the **Tilt -** or **Tilt +** buttons increase or decrease the range of dial movement when the **- 180** and **+ 180** buttons are clicked.
3. Continue adjusting the motor steps using the **Tilt -** and **Tilt +** buttons until minimum movement is achieved when using the **-180** and **+180** buttons. When movement is achieved, the dial should swing back to the center of the range of movement after the A-Jet has moved the 180 degrees**.**
4. When satisfied that the tilt axis is as perpendicular as possible (minimum range of dial movement) to the table, click either the **Next** button or the **Finish and Save** tab to continue.

The Finish and Save Tab

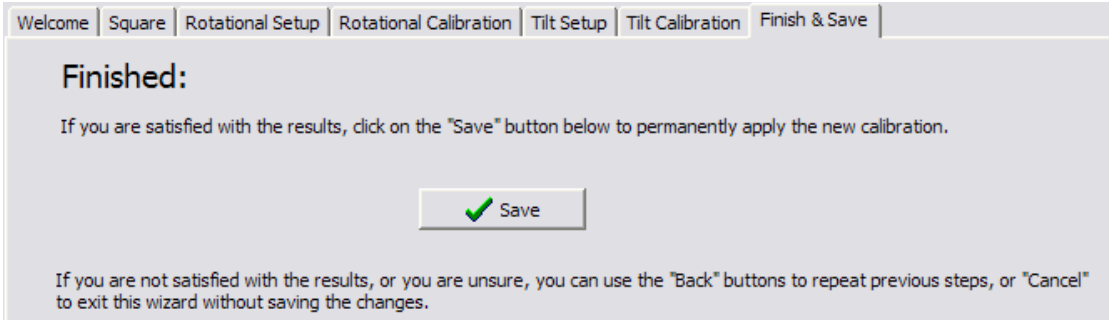


Figure 36

1. When finished calibrating the A-Jet, click the **Save** button to complete the process.

Note: *You will be prompted to save once more. Click **Save** again to close the dialogue box.*

2. Move the nozzle to a position allowing removal of the dial indicator.
3. Remove the dial indicator and other calibration components from the tank.
4. Replace the mixing tube.
5. Power up the machine for operation.

Operating the OMAX A-Jet

This section provides important information about setting up and using your A-Jet to cut beveled edges.

WARNING! ***Keep fingers, hands, and any body parts out of the area where there is A-Jet movement. Never work on the A-Jet when the machine is powered up.***

Note: *OMAX and MAXIEM machines can be programmed using a wide variety of supplied and 3rd party software. For many simple programming tasks, the supplied 3D Path Editor utility is often sufficient. However, for complex tasks, it is recommended to use a dedicated 3D CAD / CAM system with an OMAX/ MAXIEM OMX file post processor. For more information on 3rd party options, consult the OMAX Interactive Reference, or contact OMAX Technical Support. For training on use of the 3D Path Editor to program A-Jet operation, refer to the 3D Path Editor Training Video, OMAX P/N 307922.*

Programming Considerations

A-Jet operation demands a stronger knowledge of part pathing and geometric principles than is normally required for non-beveled abrasivejet cutting.

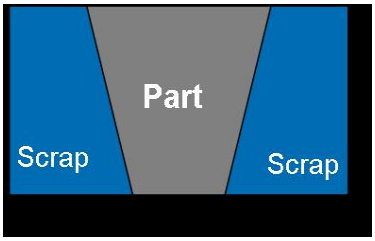
Notes about A-Jet Mechanics:

- The A-Jet for Bridge machines supports a rotation angle of 515/875 degrees. Cantilever machines support a rotation angle of +/-695 degrees. The A-Jet automatically starts with a zero degree position.
- The A-Jet unwinds during a traverse. If the traverse distance is too short to allow a complete unwinding, the A-Jet will pause before starting the cut to allow completion of the required unwinding.
- The A-Jet automatically positions itself in preparation for the next taper requirement.

Negative Taper

In a negative taper, the bottom of the part is smaller than the top:

Negative Taper Side View



Negative Taper Top View

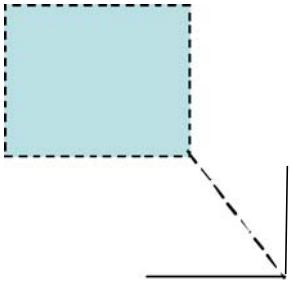
Cutting Non-beveled Sharp Corners

When cutting non-beveled sharp corners with no radius, the OMAX cuts around the corner using a radius the same width as the tool offset; however, it does not work this way when cutting sharp corners with bevel angles.

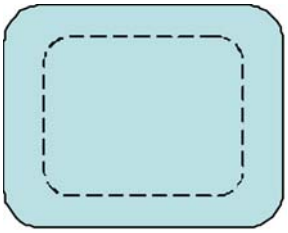
Cutting Beveled Sharp Corners

The A-Jet can mechanically tilt to a maximum of 59.5 degrees from vertical with the nozzle angle changing to match the angle of the bevel cut specified. However, when cutting with bevel taper, no radius is used to go around the outside corner. When programming square parts, consider the angle of your cut plus the angle needed for making the corner (more tilt is required for the corner). For example, if you have a square part and you are cutting a 45 degree angle bevel on all sides, the A-Jet will actually need to tilt to 57 degrees on the corners.

General Rule: The A-Jet can taper only 46 degrees when cutting 90 degree corners and even less on sharper corners due to the fact that combined angles create a tilt larger than 59.5 degrees.



Negative Taper, Radius Corners Top View

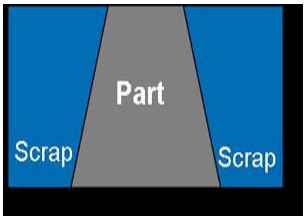


Note: *When programming a part with a radius on the corner(s), you can cut at a full 59.5 degree angle, however, you need a large enough radius on the top edge so the radius does not go to zero when it reaches the bottom corners of the part.*

Positive Taper

In positive taper, the bottom of the part is larger than the top:

Positive Taper Side View



Positive Taper Top View

Pathing Considerations

When doing multiple cuts, plan ahead to avoid cutting any material loose that still requires cutting.

3D Path with Tilt Checklist

The following checklist contains items to think about when creating drawings and machine tool paths containing tilt. These guidelines are in addition to guidelines provided for generating 2D tool paths.

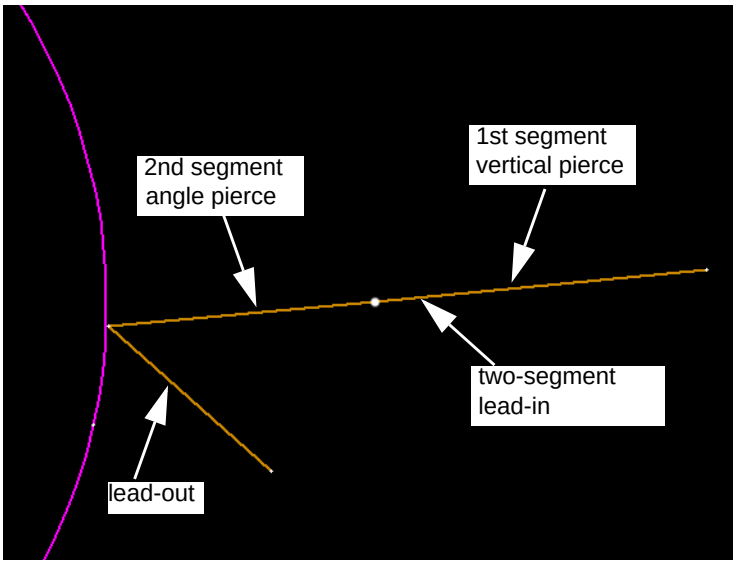
Use the “T” key when in MAKE to preview the tilt to the screen to identify potential problem areas prior to cutting. This works only when the A-Jet is enabled.

Drawing Considerations

Item	Suggestions	Notes
Is the geometric design doable with the equipment?		The A-Jet was designed for weld preparation and countersinks; maximum tilt 59.5 degrees.
Maximum angle for cutting sharp corners is less than 59.5 degrees	Limit angles on 90 degree corners to 46 degrees or even less on sharper corners	Applies when using the A-Jet. The 59.5 degree angle can be exceeded in compound geometry such as a corner where two 59.5 degree tilts combine to a larger angle.
When cutting a radius on a corner	Can cut at 59.5 degrees, but be careful so you have a large enough radius on the one edge so the radius doesn’t reach zero on the opposite edge	Applies when using the A-Jet
Corner passing is disabled	Extend geometry lines past on sharp external corners	Applies only when using the A-Jet. Make automatically disables corner passing temporarily for A-Jet paths.
Leading out on beveled geometry	Make sure to extend the geometry line past the geometry leading to a lead-out	This allows the jet stream to catch up and clear the geometry before turning off the path
Will I cut into the bottom of the part cutting at this angle?	Verify angles prior to cutting	Applies when using the A-Jet
Will I be able to remove this part from the material after it is cut?	In angled geometry such as a turbine blade wheel, you may need to cut around the edges of the part to be able to remove it from the material.	Applies when using the A-Jet
The jet can ‘cheat’ into open paths	Add a small segment of Quality 5 near end points of geometry that has already been cut.	Applies when using the A-Jet
Tilting can interfere with neighboring geometry on detailed geometry or small parts	Avoid using tilt in such detailed areas	Applies when using the A-Jet
Kerf width growth near edges of sharp tilt areas	Dwell for corners has a big impact on thin areas created by the tilt	Applies when using the A-Jet

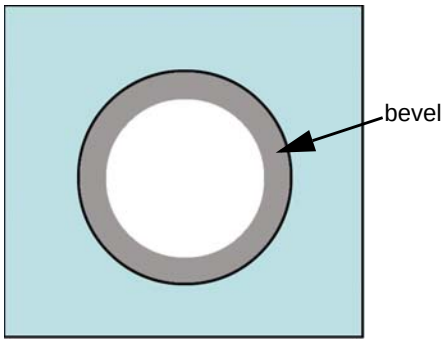
Pathing Considerations

Item	Suggestions	Notes
Intelli-pierce strategy is disabled		Applies only when using the A-Jet. The lead growing/shrinking portion is disabled only. The optimal pierce SPEED is still set to the length of the line drawn. Does not apply to the MAXIEM Basic software.
AutoPath does not work on 3D geometry with tilt	Draw the nozzle travel path manually (lead-ins/outs, traverses)	This is because AutoPath is part of Layout, and Layout is strictly 2D. Tilt geometry is considered 3D geometry.
Default behavior on single entity lead-in is to tilt to the angle of the attached geometry before piercing	Draw lead-ins past the edge of beveled geometry when possible	With a single entity lead-in, the following sequence is carried out: the nozzle moves to the start of the lead-in and tilts to the proper angle for the upcoming part. The jet turns on and moves along the lead-in to the part while piercing at an angle.
Cut vertical or angled geometry first?	This depends on the overall geometry of the part, but the general rule is to cut the vertical geometries first whenever possible (reduces standoff distance when cutting angled geometry)	Applies when using the A-Jet
Beveled geometry requires both a lead-in and a lead-out	All transitions between cutting and traversing must be made with a lead.	A lead-in is required because the nozzle tilts before piercing and cutting the angle; a lead-out is required so the jet does not straighten out before it stops cutting, causing a blemish on the part.
Lead-ins must be level	Draw lead-ins level (no variable Z-height)	Applies to 3D drawings in general
Lead-ins/outs can contain multiple entities	One end of the lead must touch a traverse, and the other must touch a cut entity	
Minimize blemishes on the part	Lead-ins should be attached to non-tilting entities whenever possible	Applies when using the A-Jet
Minimize the chance of blemishes on the part	Draw lead-ins/outs at sharp an angle as possible to avoid blemishes on the part	This is a general pathing guideline that applies to 2D drawings also
Piercing at an angle can cause excess splash out	Draw lead-ins direction-specific to avoid splash-out in an undesired direction	Applies when using the A-Jet. Refer to **Safety Issues** on page 2.
Vertical pierce required on angled geometry to reduce splashing	Draw dual-segment lead-in	With a multiple entity lead-in, the following sequence is carried out: The jet arrives at the end of the first lead entity in a vertical position. The jet pierces and remains vertical on the first segment of the lead-in; at the joint, the jet stays on but XY motion stops while the jet tilts to the angle required at the next geometry; XY motion resumes and the geometry is cut at the angle.
The A-Jet rotation angle is 515/875 degrees on bridge style machines. The A-Jet unwinds during traverses.	Some geometries cause the A-Jet to reach the rotational limits. Draw extra traverse lines in your nozzle travel path to allow the A-Jet to unwind.	Applies when using the A-Jet
Nesting beveled parts	To prevent cutting into other nested parts, ensure that the spacing between the parts is wide enough to accommodate the angled cut.	Applies to any nesting with tilt.



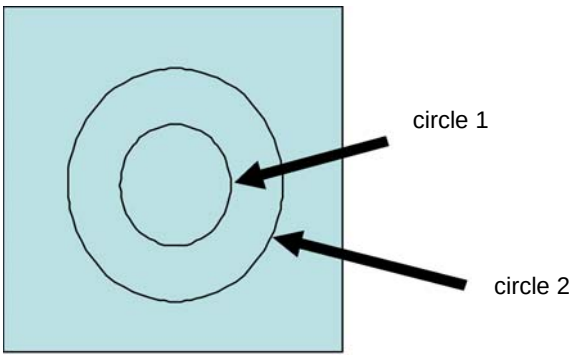
Countersink Parts

Top view of a countersink with a positive taper



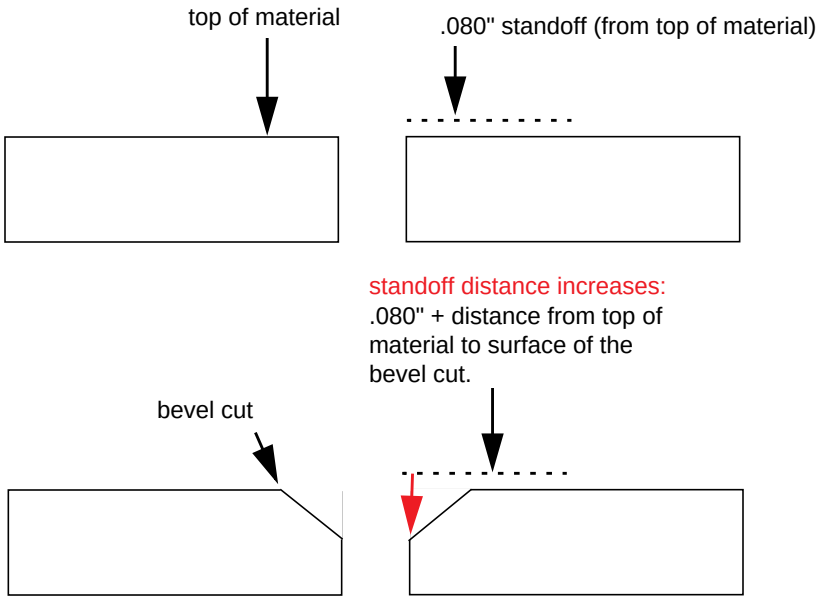
To draw a countersink with a positive taper:

1. Using **Layout**, draw the part. You need 2 circles to create the countersink: the inner circle (vertical/through) and the outer circle (angled).
   a. Inner circle = circle 1
   b. Outer circle = circle 2



2. Add the nozzle travel path (lead-ins/outs and traverse lines) to cut circle 1 first (the vertical cut), then cut circle 2, then finally cut the outside of the part.

The reason for cutting circle 1 first is to keep your standoff at a constant .080" to obtain a sharp corner on the bottom edge of the bevel when circle 2 is cut. If you cut the angle/bevel in circle 2 first, your standoff from the tip of the nozzle to the cutting surface includes the .080" standoff plus the distance of the material now cut away from doing the bevel cut. See the following illustration:

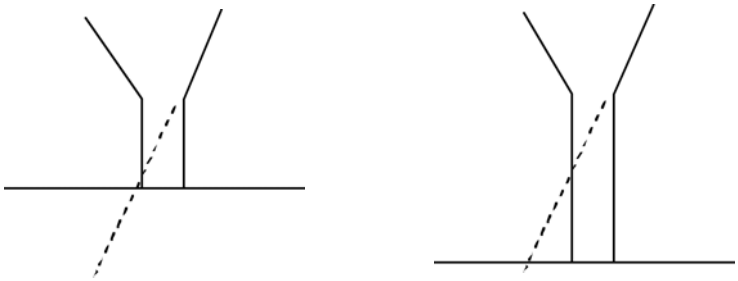


The higher the standoff, the wider the jet stream, resulting in a poorer quality cut at the point the circle 2 bevel and circle 1 cut meet.

3. Using the **OMAX 3D Path Editor** utility, program the bevel angles and the path angles needed.
   a. Program the angle of the top circle (circle 2) using the **Ts** and **Te** tools in the 3D Path Editor.
   b. Save the OMX file when finished.
4. Refer to the OMAX 3D Path Editor video for additional information.

Note: *The cutting angle in a countersink hole is limited by the thickness of your material and the diameter of the vertical (through) cut as shown in the following side view drawing.*

Side View



Note: *To determine the maximum angles for your bevel cuts when cutting countersinks, there are a couple of methods you can use: draw the side view of the part to dimension in Layout and use the measure tool, or use mathematical formulas. Both methods are explained next.*

Using Layout to Determine the Maximum Cut Angle:

The drawing tools in **Layout** can be used to determine the maximum cut angle for a given geometry and a given thickness of material.

1. Draw a side view of your material to the thickness of your material (Figure 46). For the following example, a two-inch thick material was used.

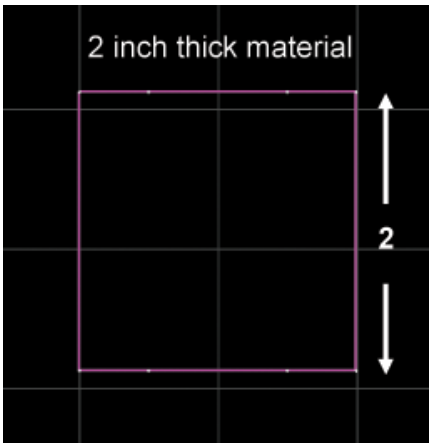


Figure 37

2. Draw a side view of the geometry the jet stream will be cutting at the selected angle. In this example, two vertical lines representing the width of the top of the countersink were drawn.

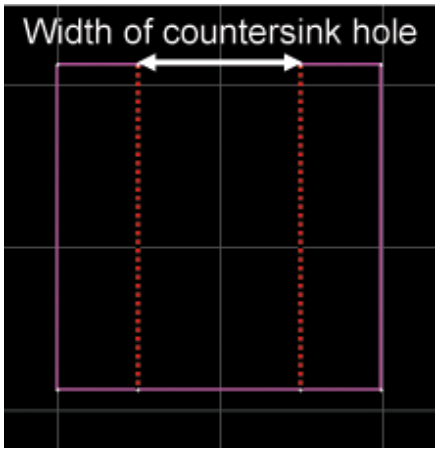


Figure 38

3. Draw a line from the top of the geometry, at an angle, to the opposite bottom point of the geometry as shown in Figure 48.

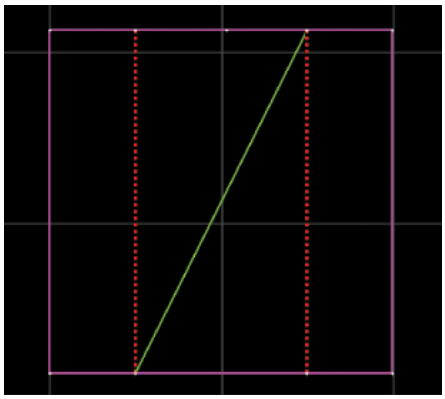


Figure 39

4. Use the Inquire or Measure tool to see the maximum angle you can cut before cutting into the bottom of your part.

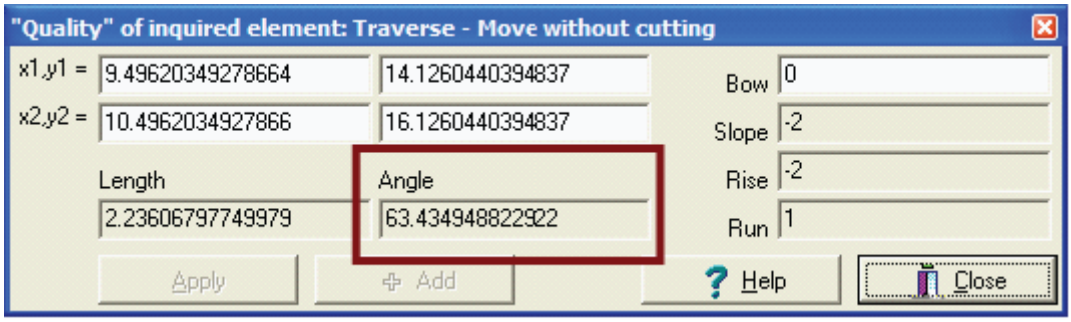


Figure 40

Note: *Subtract this angle from 90 degrees to find the maximum angle you can cut. In this example, 90 degrees minus 63.43 degrees equals 26.57 degrees.*

Using the Right Angled Triangle Formulas

The formula for right-triangle calculations, plus some basic trigonometric formulas, are listed below. All you need to know is the height and diameter of the vertical hole in your part.

1. To solve for lengths of a, b, or c use: **a2 + b2 = c2**
2. To find the angles for A, B, or C, calculate the ARC of the following (for whichever angle is applicable).

   Sin = Opposite/Hypotenuse

   Cos = Adjacent/Hypotenuse

   Tan = Opposite/Adjacent

Note: *You can use the **OMAX calculator** to determine these values.*

Example:

Material thickness = 3 inches

Nozzle Standoff distance = .080"

Diameter of vertical/through hole in the countersink = 1 inch

Height of through hole in the countersink = 1.5 inches

Question we are trying to answer: what is the maximum angle we can cut without cutting through the bottom of the material with our bevel cut?

Since we know the values for a and b in our triangle already, it is easiest to calculate the tangent Tan B = b/a and take the arctangent ARCTAN b/a of this value to get the maximum angle (B) that you can cut using the A-Jet without cutting through the bottom of this part.

ARCTAN B = ARCTAN b/a = ARCTAN 1.0/1.5 = 30 degrees

Note: *You can use variations of these formulas and calculations to solve for other angles for your parts.*

Weld Prep

A bevel cut is commonly used for welding two plates together. Two cuts are required: one to cut the edge, the other to cut the angle or the bevel. Refer to the 3D Path Editor Programming video (P/N *307922)* for additional information.

Cutting Parts with the A-Jet

Consider the following when cutting beveled parts using the A-Jet:

Caution: ***The fusible mixing tube that comes with the A-Jet is designed specifically for the A-Jet with a greater chamfered tip needed to provide clearance for the extreme tilting and features a "fusible" tip that breaks off in the event of a collision, minimizing stress to the A-Jet's internal parts. Cutting without the fusible mixing tube specified presents an exceptional risk of damage to the A-Jet's precision mechanism.***

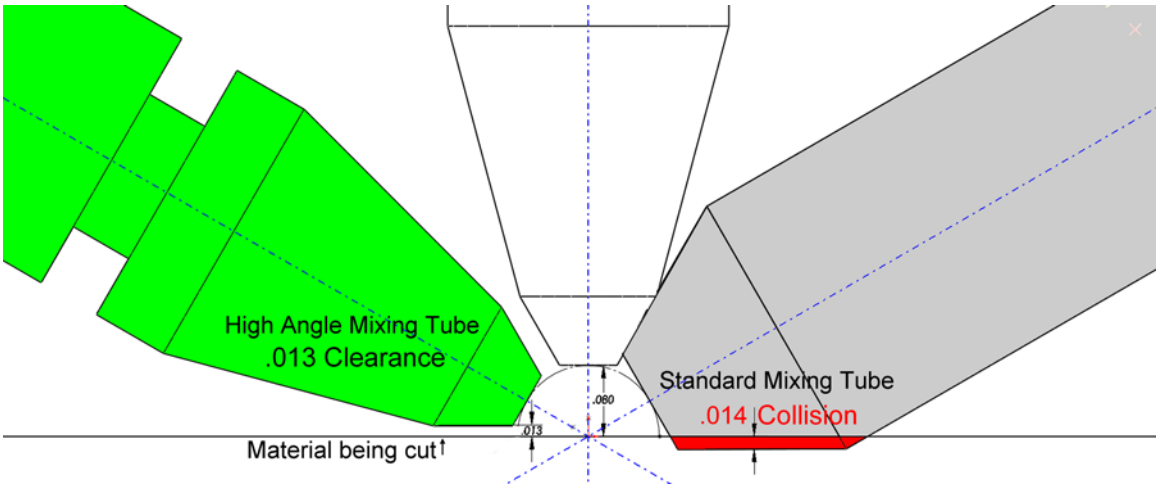


Figure 41

- **Use a High Angle Mixing Tube**
  At 59.5 degrees from vertical, the standard mixing tube will collide with the material being cut and damage the A-Jet. Use the OMAX High Angle Fusible Mixing Tube.
- **Shear Bolts**
  Shear Bolts are provided between the rotary axis drive motor and the Rotary Link. In a severe collision, these bolts will break causing the rotary link and tilt axis assembly to separate from the rotary axis mounting. An automatic safety circuit will then shut down the system and depressurize the high pressure plumbing. The shear bolts and shut down circuit should be considered as an emergency measure only. Damage may still occur to the A-Jet in spite of this safeguard.
- **Documentation**
  For all cutting procedures not specific to use of the A-Jet as presented in this document, follow information provided in your OMAX JetMachining Center User's Guide and the online OMAX Interactive Reference (OIR).
- **Best Practices for Increasing Mixing Tube Life**
  - Make sure the machine and material settings are set correctly. If the nozzle is not cutting all the way through the material, verify all machine and material settings and correct as needed. If the jet stream can not cut all the way through the material, it will begin to degrade the mixing tube.
  - Using a larger diameter fusible mixing tube, such as a .042" will extend the mixing tube life.
- **Nozzle Standoff**
  The pivot point of the A-Jet is 0.080" below the nozzle tip. The standoff distance should be set at 0.080" as measured between the mixing tube tip and the part being cut. Also verify the standoff setting for the A-Jet in OMAX **Make** is set at 0.080" by selecting **Setup**/**Motion Preference** and viewing the value entered for "Standoff Preferences".

- **Nozzles**
    - We do not recommend using the OMAX MAXJET®5 MiniJet Nozzle with the A-Jet. If you do use the MiniJet, you must recalibrate when you change nozzles.
    - Do not torque the MAXJET®5i nozzle on the A-Jet, to avoid damaging the nozzle.
- **Soft Limits**
  When cutting with the A-Jet, values set for the soft limits in **Make** must protect the A-Jet from colliding with tank sides, fixtures, etc., during its entire range of travel, rotation, and tilting. Soft limits must also protect the sides of the tank from being cut into by the A-Jet's cutting stream when at an angle that can reach the tank sides.
- **Splash Shield**
  Safety glasses should always be worn when cutting with an abrasivejet, and especially when using the A-Jet which can unexpectedly splash abrasive and water out of the tank at any time. Consider using a safety shield, available through OMAX as an option.
- **Fixturing Parts**
    - Ensure fixturing devices are beyond contact with the A-Jet throughout its entire range of rotating and tilting.
    - Ensure your part is adequately secured to prevent movement from all the cutting pressures being applied at different angles.
    - Consider using sacrificial material beneath your part to block splash back from marking or eroding away the bottom surface of your part due to the increased splash back from cutting at greater angles.
- **Prevent Water from Entering A-Jet Motors**
  To prevent the A-Jet tilt motors from being damaged by water, follow these best practices:
    - Ensure the funnel cover is in place between the balanced swivel and the tilt actuator.
    - Always remove the Tilt Nipple Shipping/Centering Tube after assembly.
    - Use care to not cut the tilt actuator cable insulation, and ensure the liquid tights are a little more than finger tight (if the tilt actuator cable is cut, it will wick water into the actuator).
    - Keep the guards in place, including the round guard on the top of the nozzle.
    - Never run with a leaky Tilt Nipple Set Screw Plug or swivel.
    - Never submerge the Tilt Head.

A-Jet On/Off Valve Rebuild Instructions

This document details the repair of the OMAX A-Jet On/Off Valve using the A-Jet Pull to Open Valve repair kit, P/N 307854. The A-Jet On/Off Valve requires component replacement whenever water begins leaking from either the nozzle tip or the nozzle weep hole.

Figure 42

Kit Contents

Verify that all required replacement parts are available in your On/Off Valve Rebuild Kit as identified in OMAX drawing, **P/N 400645**, which is provided with this A-Jet User's Guide and also available from the OMAX customer service web site.

Tools Required

Refer to the tool list in the A-Jet Appendix, and verify that all tools required for rebuilding the A-Jet On/Off Valve are available.

Getting Started

Completely read these procedures prior to rebuilding your A-Jet On/Off Valve to ensure you fully understand the rebuild requirements and have access to all the required parts and tools.

1. Clear the OMAX table of materials and other debris to allow sufficient room for A-Jet disassembly.
2. Position the A-jet at a location on the table that allows easy maintenance access.
3. Ensure that the main power, air and water for the OMAX pump are **OFF**.

WARNING! ***Never do maintenance on your OMAX A-Jet with the main AC disconnect ON or unlocked. Always follow standard lockout/tag-out procedures.***

4. Verify that your A-Jet On/Off Valve rebuild kit contains all required parts.
5. Verify that all the tools required to complete the rebuild task are available.
6. Cover the slat bed directly below the A-Jet with a sheet of cardboard or similar material to stop any dropped tools or nozzle components from falling into the tank.
7. Remove all dirt, abrasive, and water from the A-Jet and its components.

Rebuilding the A-Jet On/Off Valve

Follow these procedures to replace the seals in the A-Jet On/Off Valve.

Note: *Ensure that all the "Getting Started" steps have been followed before proceeding.*

Removing the Nozzle and Air Actuator

Follow these steps to remove the **nozzle** and **air actuator** from the A-Jet **inlet body**.

1. Pull the **garnet hose** from the **nozzle assembly**.

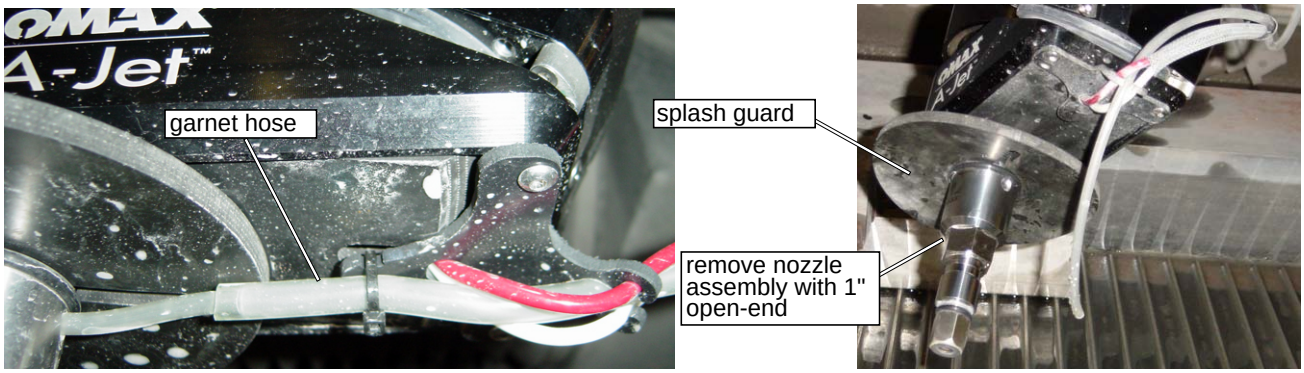


Figure 43

2. Rotate the A-Jet head to a hard stop before proceeding.

Note: *Always position the A-Jet head at a hard stop before loosening or tightening the nozzle.*

3. Remove the **nozzle assembly** using the 1" open-end wrench.
4. Remove the A-Jet **splash guard.**
5. Remove the **last chance screen** and **ring seal assembly** from the inlet body.

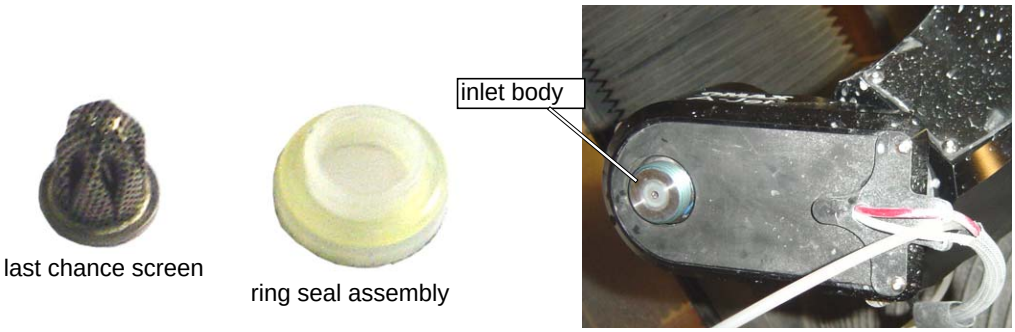


Figure 44

6. After A-Jet break-in is complete, clean the last chance screen at every maintenance.

Note: *Use either a small tool that can be inserted into the last chance screen allowing it to be pulled out, or use a small blast of air from an air nozzle to remove these two components (be careful to not drop them into the tank).*

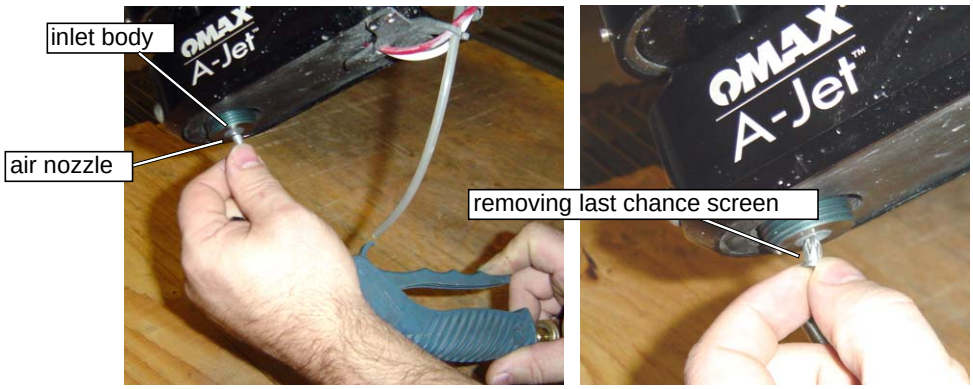


Figure 45

Caution: ***DO NOT remove the inlet body during this rebuild. Removing it will require recalibrating the A-Jet.***

7. Disconnect the **air lines** from the **air actuator** and twist the push-in fittings to point up, allowing enough clearance for the assembly to be rotated.

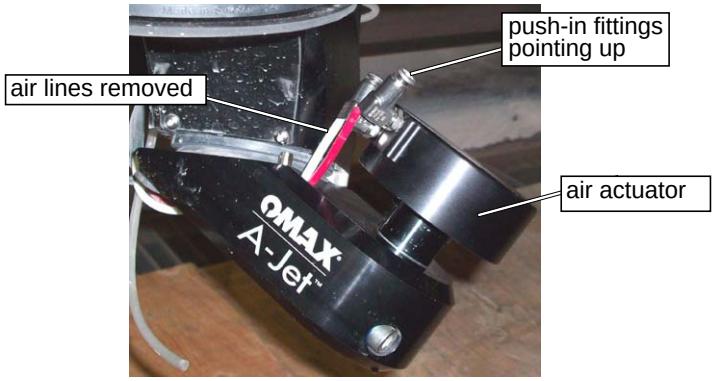


Figure 46

8. Loosen the **air actuator** from the **inlet body** using a 1-1/8" open-end wrench. Unscrew the air actuator and then carefully pull it straight out of the inlet body.

Caution: ***Always lift the air actuator straight out from the inlet body to avoid damaging the stem.***

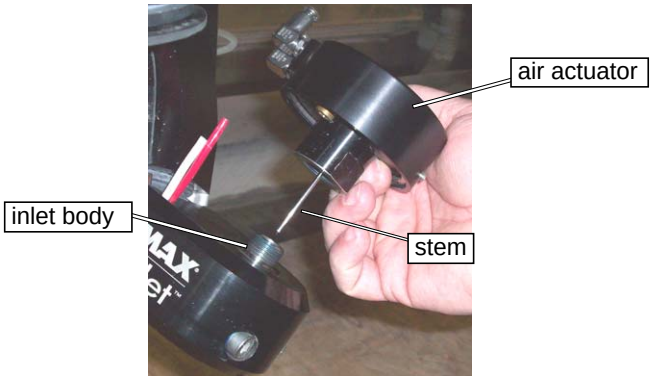


Figure 47

9. Move the **air actuator** to a clean workbench to remove the stem.

Figure 48

Replacing the Stem in the Air Actuator

Follow these steps to remove and replace the stem in the air actuator.

1. Remove the **snap-ring** holding the **stem assembly** in place using the snap-ring pliers included with your A-Jet.

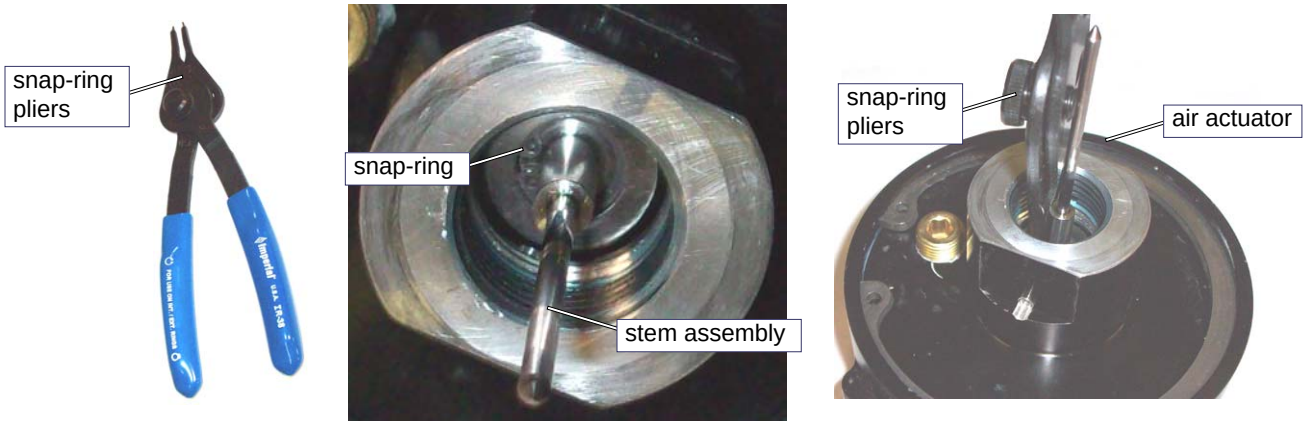


Figure 49

2. Pull the **stem assembly** from the center of the **air actuator** and discard it.

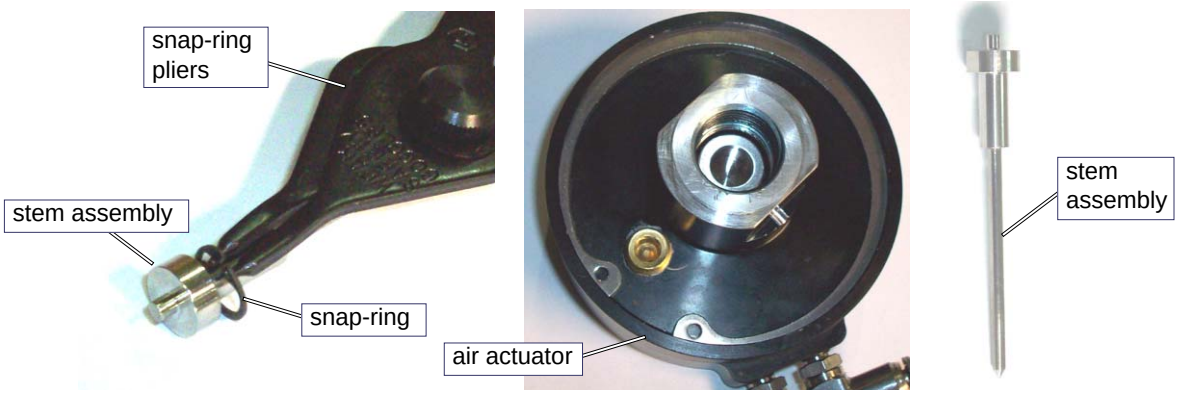


Figure 50

3. Insert the replacement **stem assembly** from the rebuild kit into the **air actuator**.
4. Install the snap-ring to hold the stem in place using the snap-ring pliers.

Caution: ***Ensure that the snap ring is inserted completely into its slot in the air actuator.***

Disassembling the Inlet Body

Follow these steps to remove the internal components from the A-Jet inlet body.

1. Insert the **retaining screw removal tool** (Figure 51) into the top of the **inlet body** and rotate it until the tool slips onto the retaining screw.
2. Unscrew the **retaining screw** with the removal tool using a ½" socket or open-end wrench.

Figure 51

3. Insert the **on/off valve service tool** into the bottom of the **inlet body** and push it up to remove the loosened **retaining screw**, the **backup ring**, the **seal**, the **seal support**, and the **nozzle seat** from the inlet valve body.

Figure 52

Rebuilding the Inlet Body

Follow these steps to rebuild the internal components of the A-Jet's inlet body.

1. Push the **on/off valve service tool** up through the bottom of the empty **inlet body** and place the **nozzle seat** on the end of the tool with the chamfer edge down.

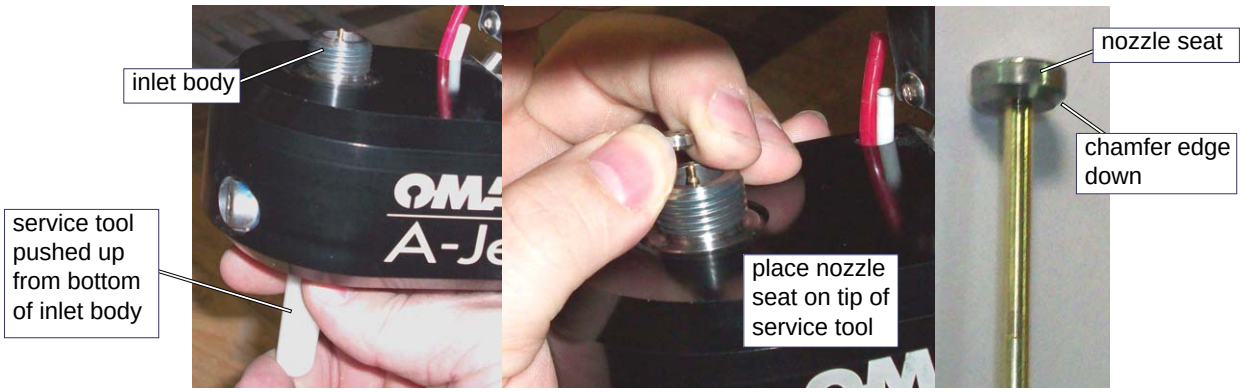


Figure 53

2. Slowly pull the service tool out of the inlet body with the **nozzle seat** attached until the nozzle seat rests flat at the bottom of **inlet body**. Remove the service tool completely from the inlet body.

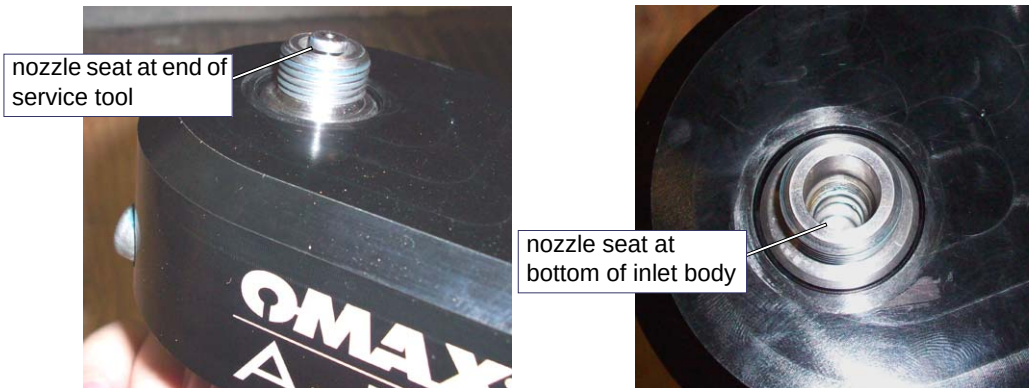


Figure 54

3. Insert the **seal support** (either end) into the inlet body to rest on top of the **nozzle seal**.

Figure 55

4. Apply a thin layer of Blue Goop onto the threads of the retaining screw.
5. Slide the remaining inlet body components onto the service tool as illustrated below: the **retaining screw** (threads away from tool handle), the **backup ring assembly** (notch away from tool handle), followed by the **seal assembly** (o-ring side away from the tool handle):

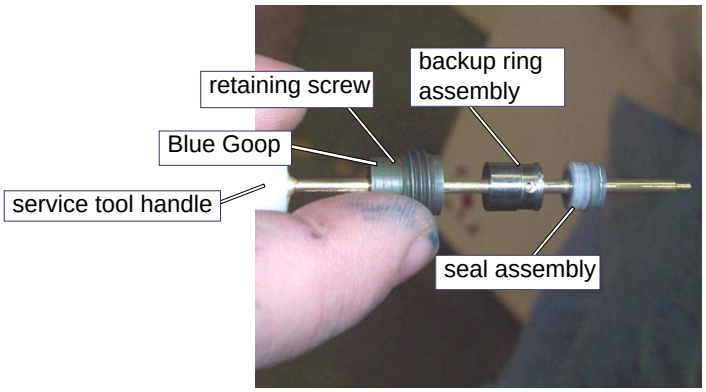


Figure 56

6. Lubricate the seal assembly components using Lubriplate®.

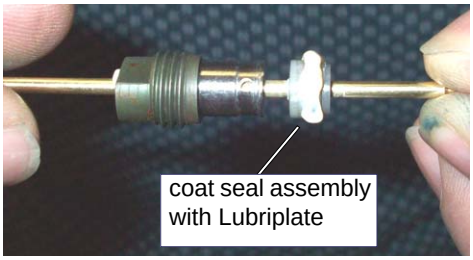


Figure 57

7. With your finger holding the inlet body components up against the service tool handle, insert the tool with components into the top of the **inlet body**, then push all components deep into the inlet body.

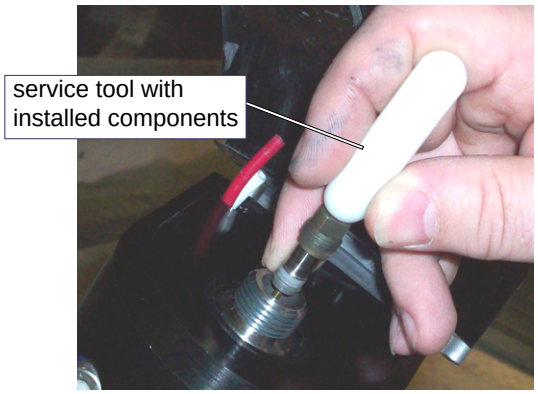


Figure 58

8. Remove the **service tool** from the inlet body, leaving all components in place.
9. Thread the **retaining screw** into the top of the inlet body using the **retaining screw tool** with a 1/2" socket and torque wrench; torque the retaining screw at 25 inch/lbs (2.1 ft/lbs; 2.8 Nm).

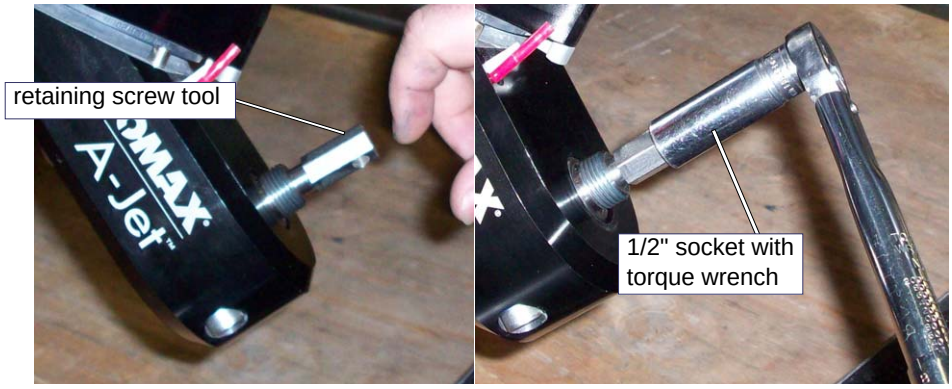


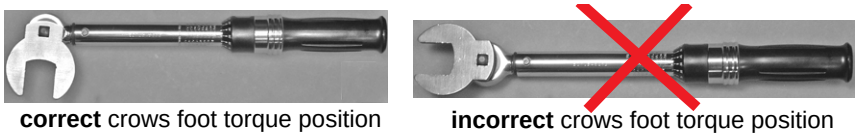
Figure 59

Reattaching the Air Actuator

Follow these steps to reattach the rebuilt air actuator to the inlet body.

1. Apply a thin coat of **Lubriplate** onto the air actuator **stem**.
2. Insert the air actuator **stem** into the inlet body. Thread the air actuator onto the inlet body.
3. Position the actuator head to its hard stop and torque the air actuator using a 1-1/8" crows foot to 225 inch/lbs (18.8 ft/lbs; 25.4 Nm).

Caution: ***For accurate results when using a crows foot to set a torque value, always rotate the crows foot at a 90 degree position in relation to the torque wrench as illustrated below; never take a torque reading with it set in the same direction as the wrench:***



correct crows foot torque position

incorrect crows foot torque position

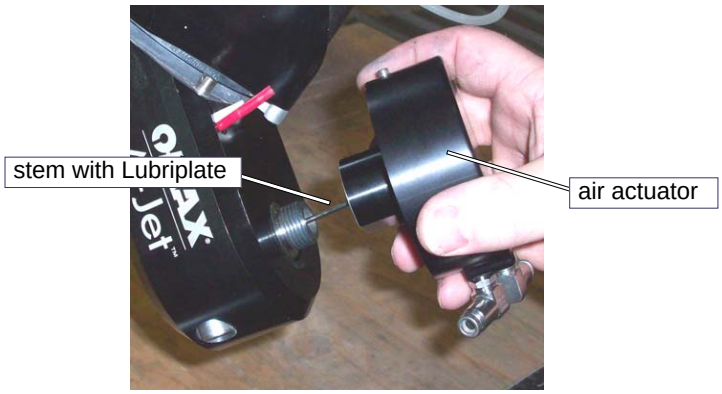


Figure 60

4. After installing the **air actuator**, ensure that the **air fittings** do not make contact with the A-Jet frame during operation.

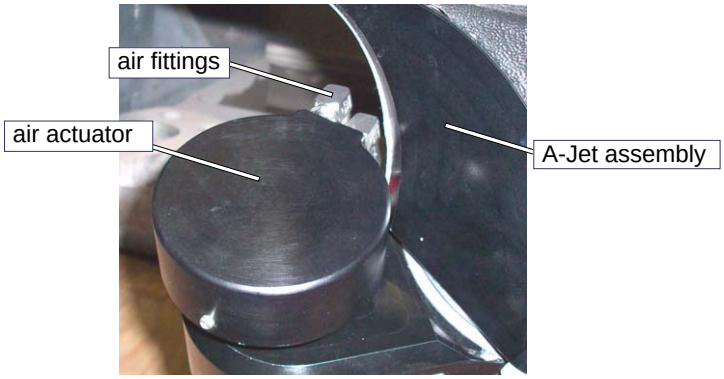


Figure 61

Note: *If the actuator cover has rotated causing the air fittings to make contact, loosen the set screw (Figure 61) and reposition the cover so that contact is no longer possible. Gently re-tighten the set screw with the cover pulled all the way up.*

5. Re-attach the air hoses to the air actuator's air fittings.

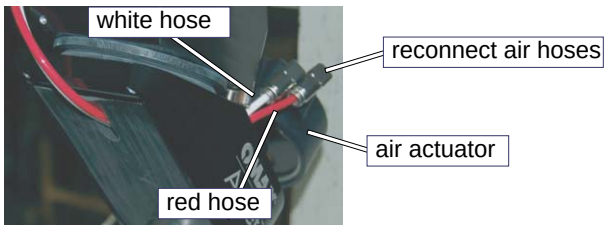


Figure 62

Testing the A-Jet On/Off Valve for Leaks

Follow these procedures to ensure that the on/off valve was successfully rebuilt without leaks.

Caution: ***Do not install the last chance screen, ring seal assembly, and nozzle until after the on/off valve has been tested for leakage and the water lines flushed of possible debris.***

1. Turn **ON** the OMAX main power, air, and water.
2. Power **ON** the pump and PC Controller.
3. Launch the **Make** software.
4. Rotate the A-Jet to its vertical position in preparation for testing:

Figure 63

5. Refer to Tools Required for A-Jet Maintenance, page 75, of the A-Jet Appendix and follow those instructions verifying operation of the rebuilt on/off valve.
6. If water leaks show up during these on/off valve tests, refer to "Troubleshooting Tips, page 39.
7. Flush the high-pressure plumbing following the on/off valve rebuild procedure. To correctly flush your plumbing system, refer to the OMAX document, "Pulse/Surge Flushing of the UHP System", P/N 400571B. This document can be downloaded from the OMAX web site, *www.omax.com*.

Note: *It is important that the high-pressure plumbing be flushed of any debris possibly introduced into the system during assembly.* ***This must be done prior to installation of the last chance screen and nozzle components.*** *Contaminates left in the plumbing system can cause damage to the nozzle orifice and other critical components.*

Final Assembly

Follow these steps to complete the On/Off valve rebuild following a successful pressure test and plumbing flush.

1. Remove the blocking material from beneath the nozzle in preparation for nozzle tests.
2. Close **Make**, shut down **Windows**, and power **OFF** the OMAX equipment.

WARNING! ***Never work on the A-Jet with the OMAX power ON.***

3. Apply **Lubriplate** to the nozzle **ring seal** assembly and around the outer edge of the flange to prevent the seal from falling out of the inlet body.

4. Insert the nozzle **ring seal** assembly into the **inlet body** (seal end first) followed by the last chance screen.

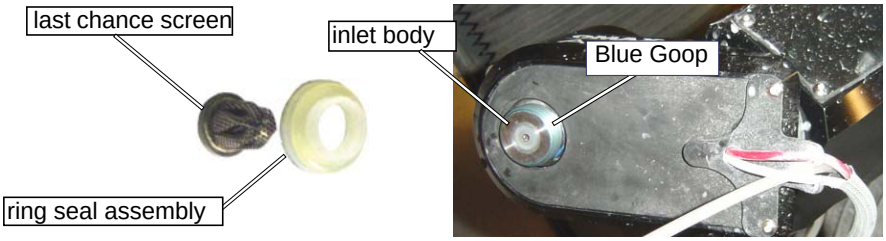


Figure 64

5. Apply a thin coat of **Blue Goop** onto the threads on both the inlet body and nozzle assembly.
6. Thread the **nozzle assembly** onto the **inlet body** and tighten it using an 1" open-end wrench. Slide the **splash guard** over the nozzle assembly and insert the **abrasive feed hose** through the splash guard and into its nozzle opening.

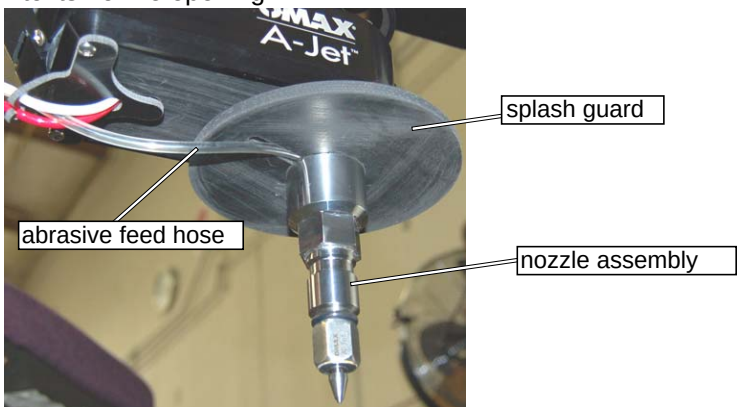


Figure 65

7. Recalibrate the A-Jet using the The A-Jet Squareness Calibration Wizard on page 7.

Troubleshooting Tips

On/Off Valve leaking following rebuild:

Inspect the inlet body from underneath the A-Jet to locate the weep hole. Water leaking from this weep hole indicates either the seal was installed incorrectly or was damaged during installation

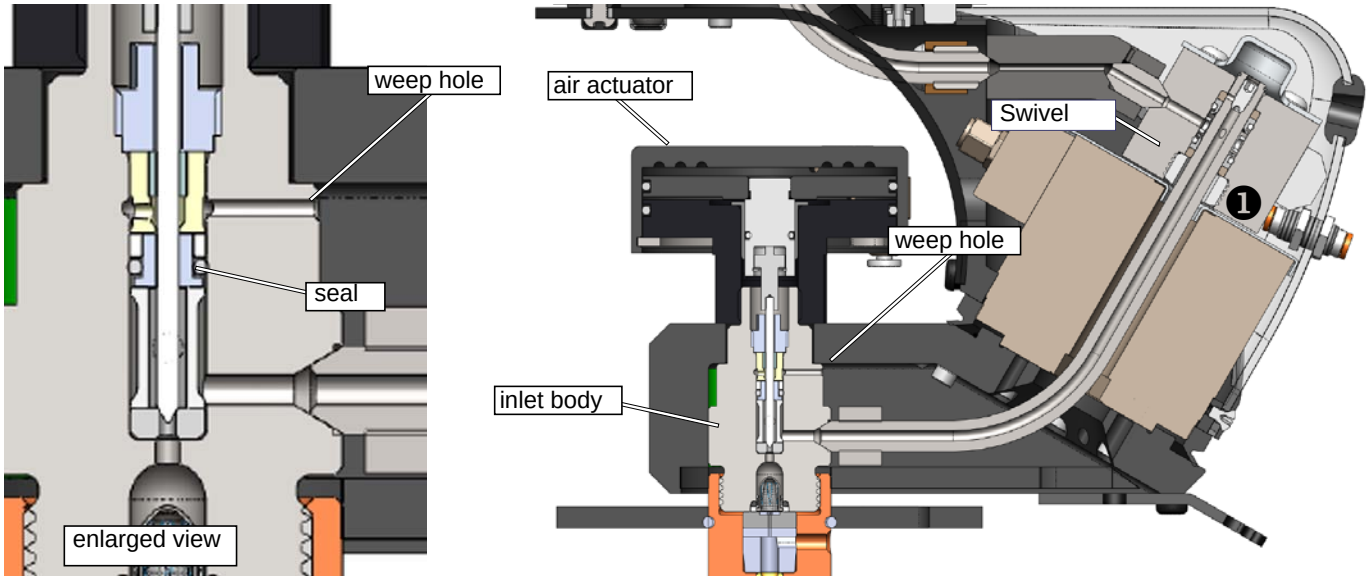


Figure 66

❶ The swivel should sit down on the aluminum funnel cover. If it does not, the seal will be damaged by the cross port or the weep hole in the tilt nipple.

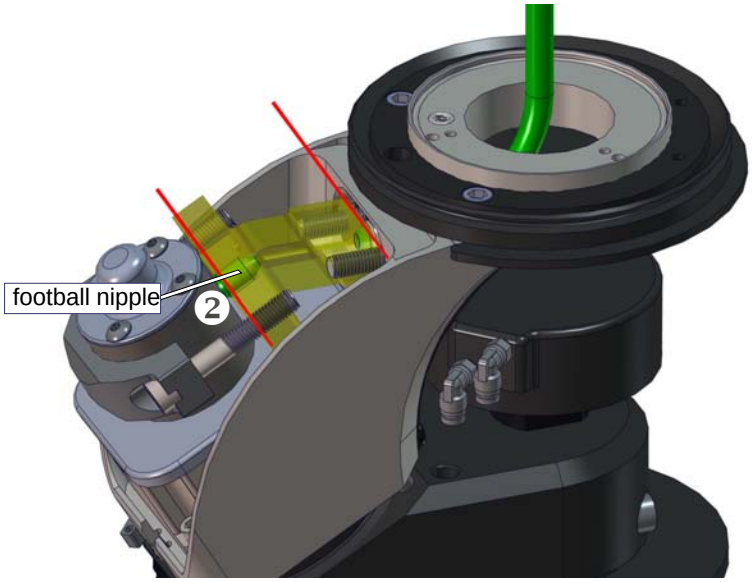


Figure 67

❷ The gaps at either end of the manifold must be parallel and evenly tightened to avoid leaks. The alignment of the swivel to the manifold needs to be fairly close for the football nipple to seal properly

A-Jet Nipple Replacement Instructions

This document details the replacement of the OMAX A-Jet nipple, P/N 307841. The A-Jet nipple requires replacement whenever large quantities of water begin leaking from the A-Jet swivel, indicating a broken nipple.

Note: *The A-Jet swivel seals also need to be replaced with the nipple. Refer to the A-Jet Swivel Rebuild Instructions on page 51.*

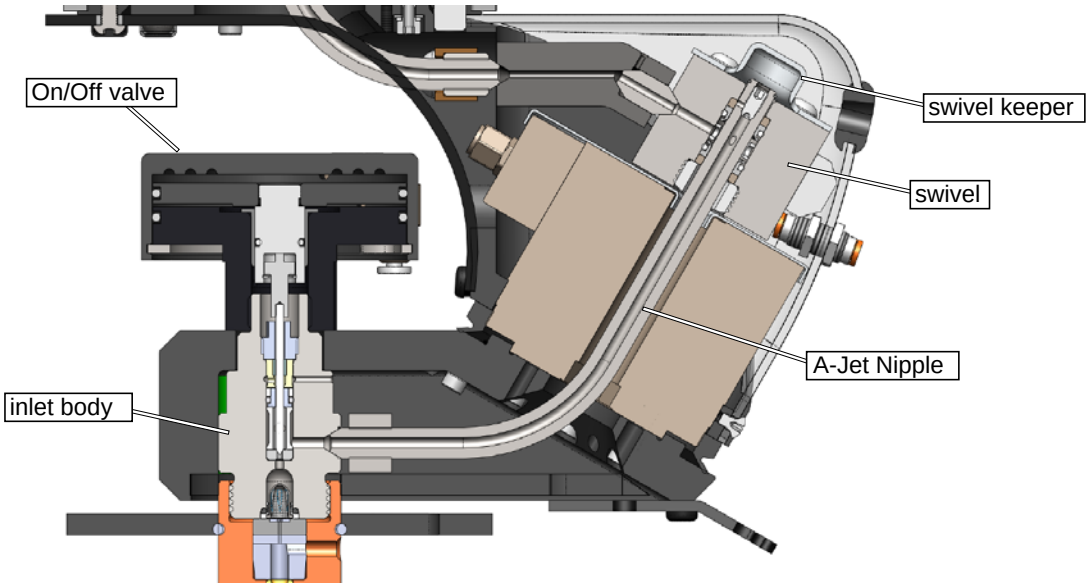


Figure 68

Parts Required

Verify that the following replacement parts are available prior to beginning these rebuild procedures:

Description	Quantity	Part Number
Nipple and Plug, A-Jet	1	308639
Swivel Keeper	1	308649

WARNING! ***The Swivel Keeper must be replaced each time a nipple break repair is made.***

Tools Required

Refer to the tool list in the A-Jet Appendix, page 75, and verify that all tools required for rebuilding the A-Jet Nipple replacement are available.

Replacing the A-Jet Nipple

Completely read these procedures prior to rebuilding your A-Jet swivel to ensure you fully understand the rebuild requirements and have access to all the required parts and tools.

1. Clear the OMAX table of materials and other debris to allow sufficient room for A-Jet disassembly.
2. Position the A-jet at a location on the table that allows easy maintenance access.
3. Ensure that the **main power**, **air** and **water** for the OMAX pump are **OFF**.

WARNING! ***Never do maintenance on your OMAX A-Jet with the main AC disconnect ON or unlocked. Always follow standard lockout/tag-out procedures.***

4. Verify that you have the replacement nipple part on hand.
5. Verify that all the tools required to complete the rebuild task are available.
6. Cover the slat bed directly below the A-Jet with a sheet of cardboard or similar object to stop any dropped tools or nozzle components from falling into the tank.
7. Ensure that all dirt, abrasive, and water are removed from the A-Jet components.
8. Remove the **abrasive feed hose** from the **nozzle assembly**.

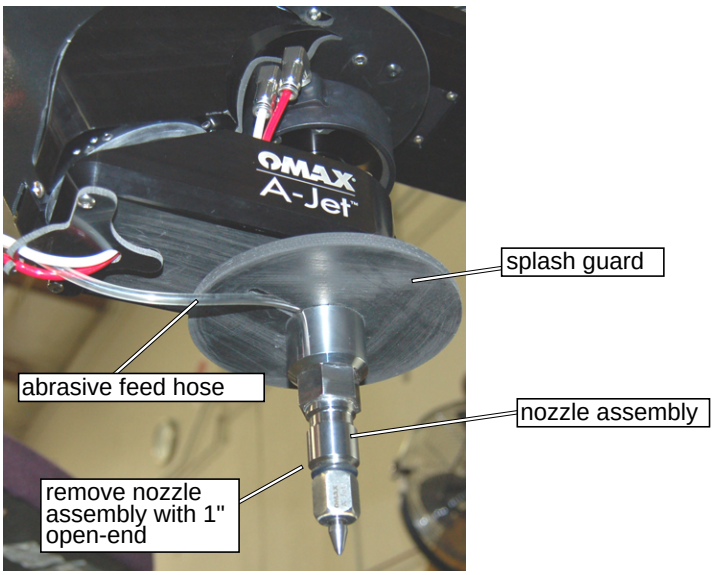


Figure 69

9. Remove the **nozzle assembly** using the 1" open-end wrench.
10. Remove the A-Jet **splash guard**.
11. Remove the **last chance screen** and **ring seal assembly** from the inlet body.

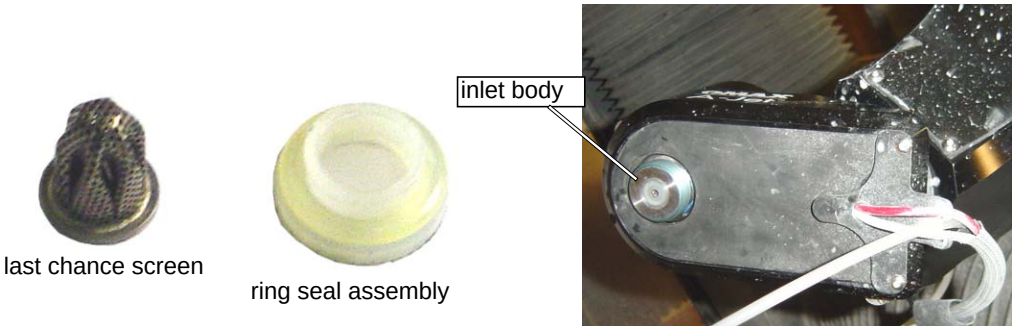


Figure 70

12. After A-Jet break-in is complete, clean the last chance screen at every maintenance.

Note: *Use either a small tool that can be inserted into the last chance screen allowing it to be pulled out, or use a small blast of air from an air nozzle to remove these two components (be careful to not drop them into the tank).*

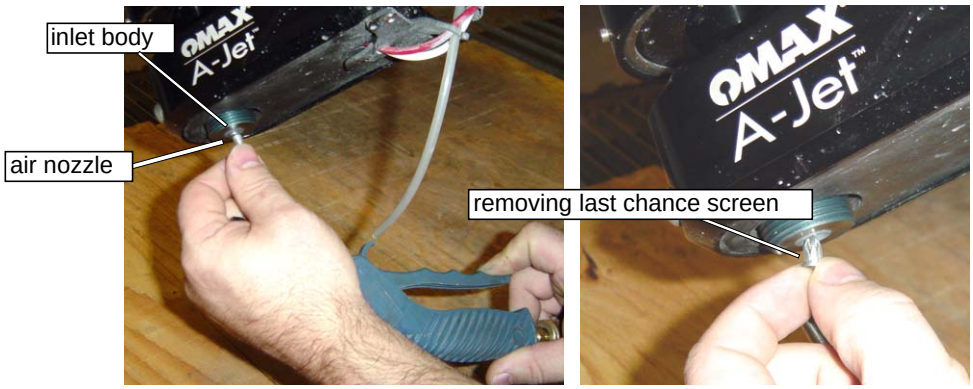


Figure 71

Caution: ***DO NOT remove the inlet body during this rebuild. Removing it will require recalibrating the A-Jet.***

13. Remove the **hose bracket** by unscrewing the two **M3 screws** (2.5mm Allen).

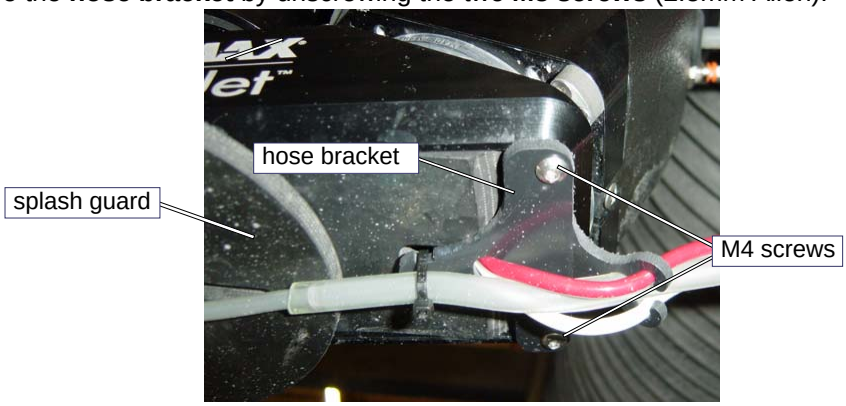


Figure 72

14. Remove the rubber splash guard.
15. Remove the **mounting screw** that keeps the **molded cover** in place using a #2 Phillips screwdriver and remove the molded cover leaving all hoses connected.

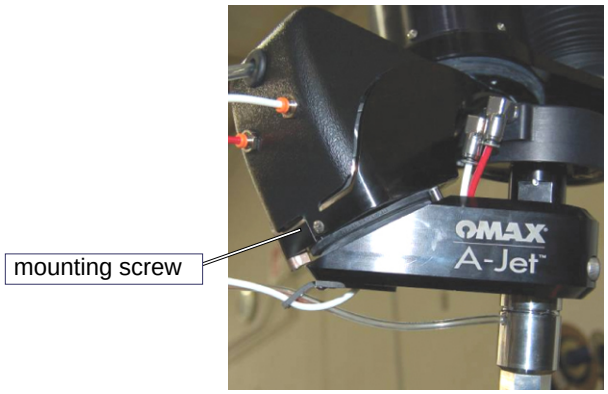


Figure 73

Note: *Always verify the tightness of the **on/off valve** to ensure that the inlet body remains in place during nipple replacement.*
*To aid in removing the nipple, remove the swivel. Refer to page 53 in the **A-Jet Swivel Rebuild Instructions** chapter for instructions.*

16. Remove the two M8 screws holding the tie bar in place using the 6mm Allen wrench.

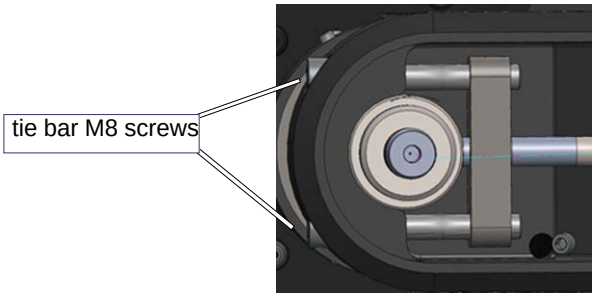


Figure 74

17. Push up on the nipple in the swivel body, then pull the **nipple** free from the **inlet body** allowing the tie bar to be rotated to one side and pulled from the swivel and out of the housing.

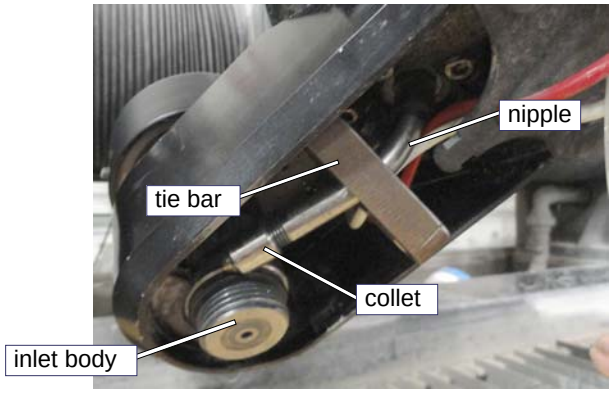


Figure 75

18. Remove the **tie bar** from the removed **nipple**.

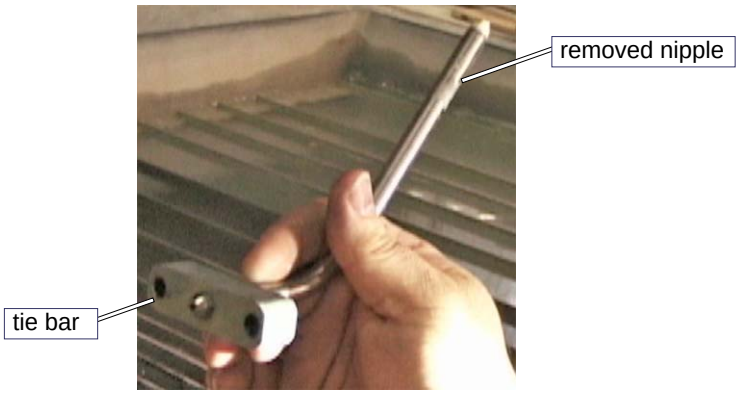


Figure 76

19. Discard the nipple being replaced.
20. Apply Blue Goop to the threads of the new nipple.

Figure 77

21. Slide the tie bar on and thread the **collet** onto the new **nipple** assembly. Ensure the beveled side of the tie bar screw holes face toward the inlet body. Leave three threads between the **collet** and the inlet body.

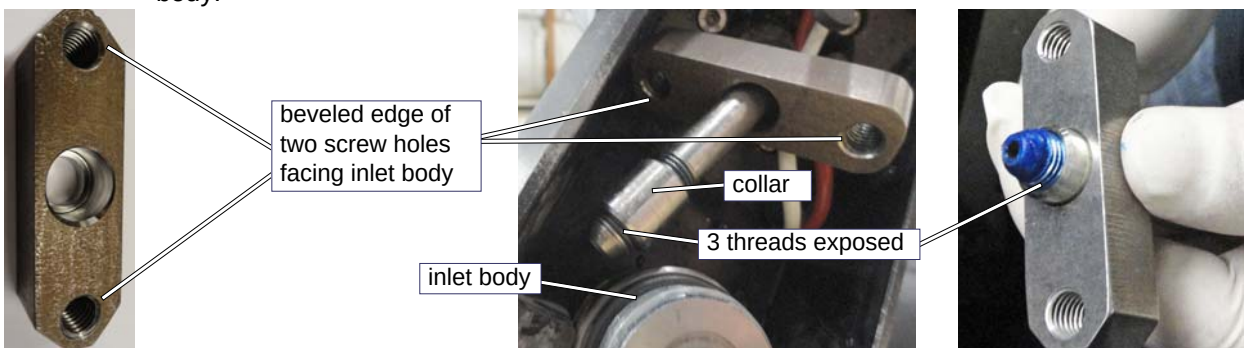


Figure 78

22. Prepare a 2" length of tubing used for protection of the nipple during installation as follows:
    a. Cut out a notch from one end of the tubing as illustrated below.
    b. From the middle of that notch, cut a slit in the tubing from one end to the other as illustrated.

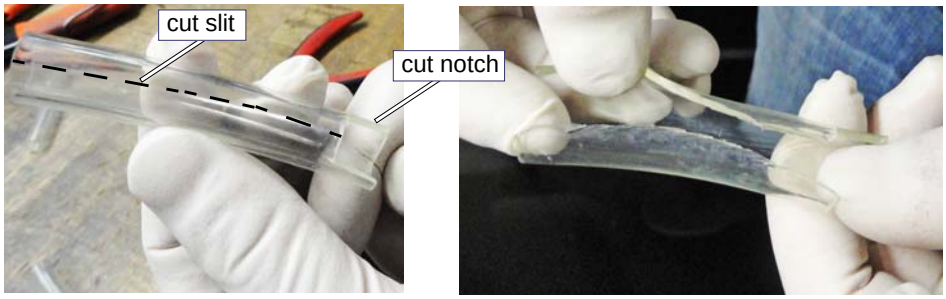


Figure 79

23. Apply a thin coating of Lubriplate to the nipple end that will insert into the swivel.

Figure 80

24. Slide the protection tubing, notched end first, onto the lubricated nipple with the bend of the nipple curving up into the tubing's notch.

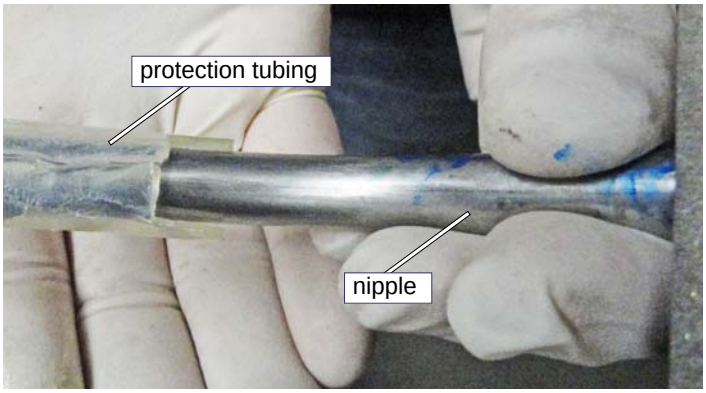


Figure 81

25. Remove the old protection tubing from the A-Jet assembly and discard it.

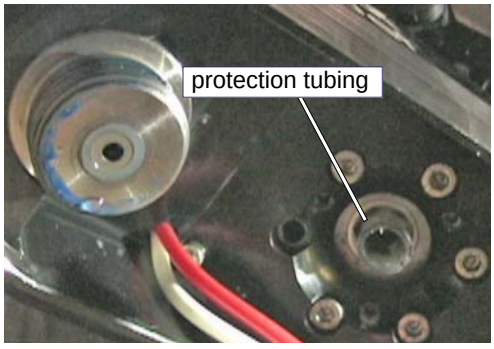


Figure 82

Caution: ***The tubing protects the nipple assembly from surface scratches, etc. Even a small scratch can cause the swivel seals to leak.***

26. Insert the nipple assembly into the A-Jet. Ensure that the notch cut in the protective tubing faces down allowing room for the bend in the nipple.

Figure 83

27. With one hand pushing down to secure the swivel in position, push the nipple assembly up into the swivel using your other hand. Once in position, rock the nozzle housing from side-to-side to walk the tie bar and nipple into position.

Caution: ***Do not push the protection tubing in all the way. Leave a minimum of a half inch sticking out, allowed it to be grabbed and removed later in these instructions.***

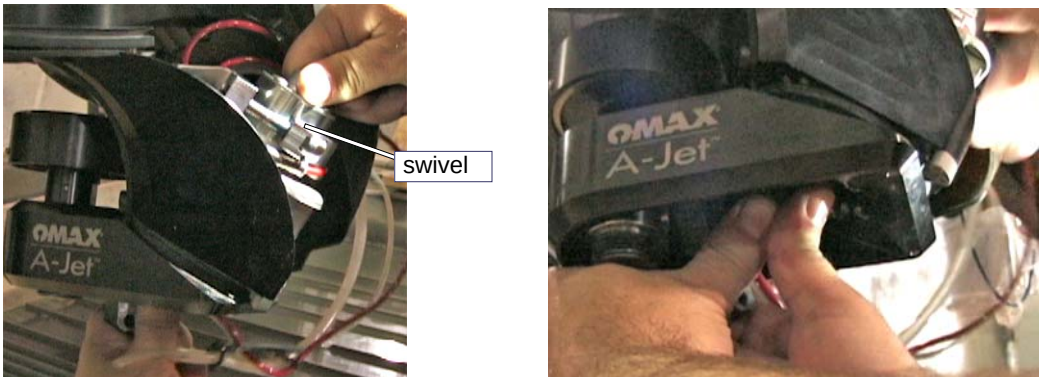


Figure 84

28. Attach the swivel and ensure that it is tightened in accordance to instructions provided on, page 59.
29. Line the **nipple** up with the **cone** in the inlet body and position the tie bar with the screw holes in the A-Jet frame.

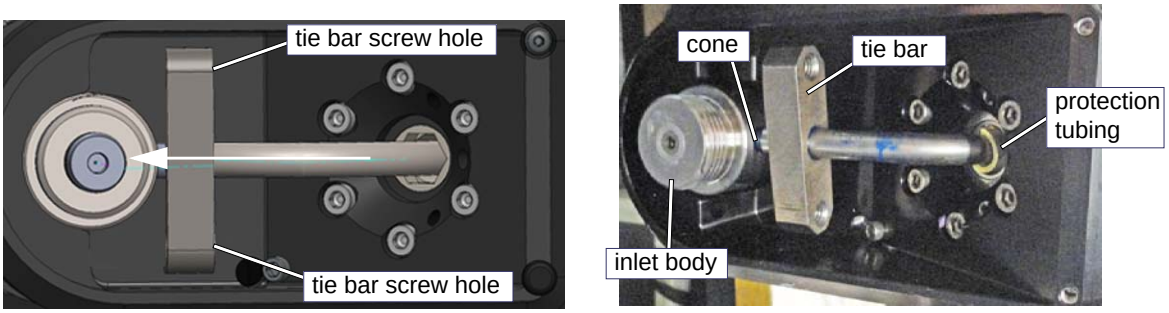


Figure 85

Caution: ***Avoid damaging the end of the cone. This will ruin its water seal.***

30. Apply a light coating of **Blue Goop** on both tie bar screw heads and insert the two screws into the tie bar. Hand tighten at this time.

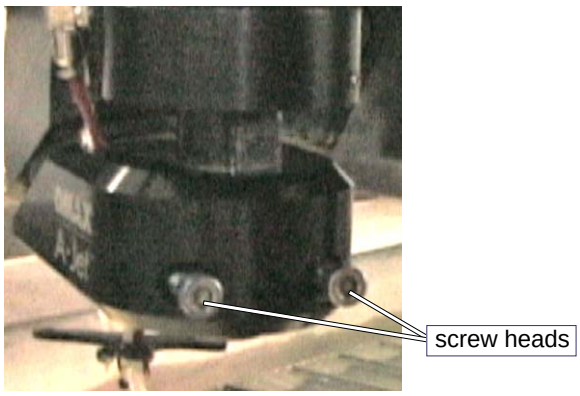


Figure 86

31. Verify that the **nipple** and **inlet body cone** remain in proper alignment while the two screws are being tightened.
32. Slowly begin tightening the two **tie bar screws** using the 6mm Allen wrench by rotating back-and-forth between screws, being careful to keep the tie bar space between it and the inlet body even on both sides.

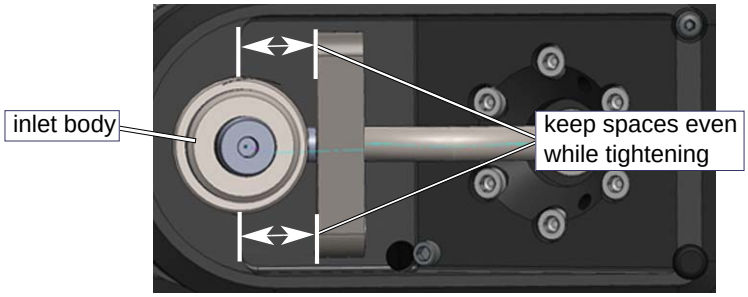


Figure 87

Caution: ***Tightening one end of the tie bar more than the other results in uneven pressure applied to the nipple and cone resulting in a faulty water seal.***

33. Ensure that **inlet body** has not rotated during tightening and the nipple and cone remain correctly aligned.
34. Once both the swivel and the inlet body ends of the nipple are securely mounted, remove the protection tubing as follows:
    a. Grasp onto an exposed part of the protective tubing using a pair of needle-nosed pliers.

Figure 88

b. Pull the protective tubing from around the nipple assembly and discard.

35. Remove the blocking material from beneath the nozzle in preparation for conducting nozzle tests.

Testing the A-Jet Assembly for Leaks

Follow these procedures to ensure that the nipple was successfully replaced and works without leaks.

WARNING! ***Never high-pressure test the A-Jet with the swivel keeper removed (Figure 68). If the nipple has a broken piece in the swivel assembly, that piece could come flying out with extreme force.***

Caution: ***Do not install the last chance screen, ring seal assembly (Figure 70), and nozzle until after the nipple has been tested for leakage and flushed of possible debris.***

1. Turn **ON** the OMAX main power, air, and water.
2. Power **ON** the pump and PC Controller.
3. Launch the **Make** software.
4. Rotate the A-Jet to its vertical position in preparation for testing:

Figure 89

5. Refer to A-Jet Leak Tests, page 75, of the A-Jet Appendix and follow those instructions verifying operation of the replaced nipple and swivel.
6. Flush the high-pressure plumbing following the nipple rebuild procedure. To correctly flush your plumbing system, refer to the OMAX document, “Pulse/Surge Flushing of the UHP System”, P/N 400571B. This document can be downloaded from the OMAX web site, *www.omax.com*.

Note: *It is important that the high-pressure plumbing be flushed of any debris possibly introduced into the system during assembly.* ***This must be done prior to installation of the last chance screen and nozzle components.*** *Contaminates left in the plumbing system can cause damage to the nozzle orifice and other critical components.*

Final Assembly

Follow these steps to complete the nipple replacement procedures following a successful pressure test and plumbing flush.

1. Close **Make**, shut down **Windows**, and power **OFF** the OMAX equipment.

WARNING! ***Never work on the A-Jet with the OMAX power ON.***

2. Apply **Lubriplate** to the nozzle **ring seal** assembly and around the outer edge of the flange to prevent the seal from falling out of the inlet body.

3. Insert nozzle **ring seal** assembly into the **inlet body** (seal end first) followed by the last chance screen.

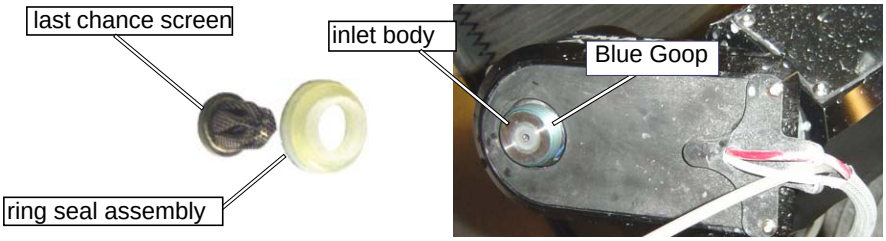


Figure 90

4. Apply a thin coat of **Blue Goop** onto the threads on both the inlet body and nozzle assembly.
5. Thread the **nozzle assembly** onto the **inlet body** and tighten it using an 1" open-end wrench. Slide the **splash guard** over the nozzle assembly and insert the **abrasive feed hose** through the splash guard and into its nozzle opening.

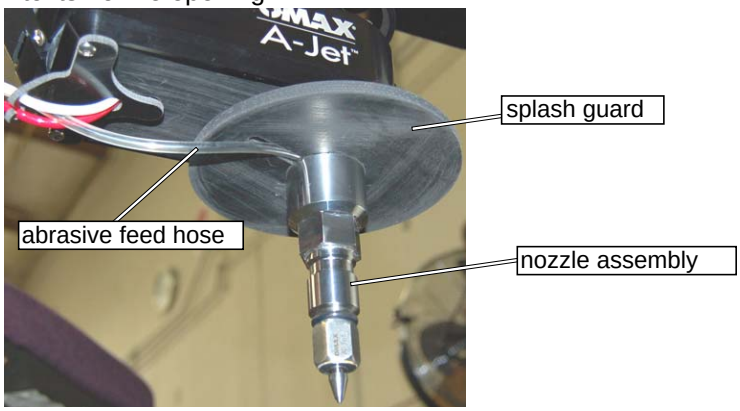


Figure 91

6. Recalibrate the A-Jet using the The A-Jet Squareness Calibration Wizard on page 7.

A-Jet Swivel Rebuild Instructions

This document details the repair of the high-pressure swivel in the OMAX A-Jet using the rebuild kit, P/N 307907. The A-Jet swivel requires seal replacement whenever water leaks from the seals are detected.

Figure 92

Caution: ***Water leaks can appear to be coming from the A-Jet swivel, when, in fact, they are caused by other seal failures. To avoid rebuilding the A-Jet swivel unnecessarily, always ensure that the swivel is actually leaking, especially when leaks occur early in the life of the A-Jet. Use the steps which follow to help rule out other causes.***

Verifying a Leaking A-Jet Swivel

- Retighten and inspect all A-Jet high-pressure joints to ensure they are not the source of the leak. Repair any problems noted and recheck for leaks.
- Ensure that the swivel screw plug is seated correctly (see Figure 93 for location).
- Ensure that the swivel keeper is in place and securely tightened.

WARNING! ***Never high-pressure test the A-Jet with the swivel keeper removed (Figure 93). If the nipple has a broken piece in the swivel assembly, that piece could come flying out with extreme force.***

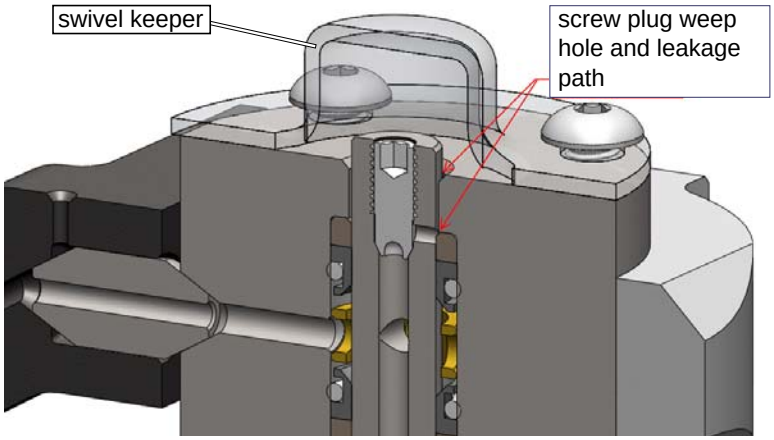


Figure 93

Note: *Water from a leaking screw plug will not exit through the threads but through the weep hole identified in Figure* 93.

- If water is exiting through the seal plug weep hole, remove and reinstall the screw plug. When tightening the screw plug, it should go in easily until it stops. At that point, it can be tightened another

1/4 to 1/2 turn. If a lot of drag is felt while tightening the screw but it can still be turned with a moderate force more than 90 degrees, there may be a problem with the threads. Remove the screw and inspect the threads for damage.

- When all logical troubleshooting steps have been followed, and it appears that the swivel seals are actually the problem, call OMAX Technical Support for additional information, or proceed with the following A-Jet swivel rebuild procedures.

Kit Contents

Verify that all required replacement parts are available in your Swivel Rebuild Kit as identified in OMAX drawing, **P/N 400646**, which is provided with this A-Jet User's Guide and also available from the OMAX customer service web site.

Tools Required

Refer to the tool list in the A-Jet Appendix, page 75, and verify that all tools required for rebuilding the A-Jet swivel are available.

Getting Started

Completely read these procedures prior to rebuilding your A-Jet swivel to ensure you fully understand the rebuild requirements and have all the required parts and tools available.

1. Clear the OMAX table of materials and other debris to allow sufficient room for A-Jet disassembly.
2. Position the A-jet at a location on the table that allows easy maintenance access.
3. Ensure that the main power, air and water for the OMAX Pump are **OFF**.

WARNING! ***Never do maintenance on your OMAX A-Jet with the main AC disconnect ON or unlocked. Always follow standard lockout/tag-out procedures.***

4. Verify that your A-Jet Swivel Rebuild Kit contains all listed parts.
5. Verify that all the tools required to complete the rebuild task are available.
6. Cover the slat bed directly below the A-Jet with cardboard or similar material to stop any dropped tools or nozzle components from falling into the tank.
7. Ensure that all dirt, abrasive, and water are removed from the A-Jet components.

Rebuilding the A-Jet Swivel

Follow these steps to replace the seals in the A-Jet high-pressure swivel.

Note: *Ensure that all the "Getting Started" steps have been followed before proceeding.*

Removing the Swivel from the A-Jet Assembly

1. Disconnect the two air hoses and abrasive feed hose from the molded cover housing the swivel.

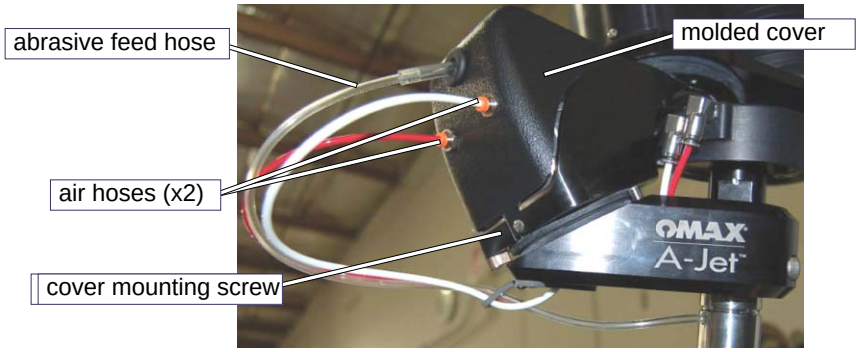


Figure 94

2. Remove the single cover mounting screw using a Phillips #2 screwdriver and carefully pull back (do not lift up) the swivel cover exposing the swivel and internal hoses.

Figure 95

3. Disconnect the internal hoses from the hose fittings inside the swivel cover. Remove the cover.
4. Remove the two M8 screws holding the swivel collar using a 6mm Allen wrench.

Caution: ***Use a 5/8" open-end wrench to stabilize the clamp and prevent twisting the A-Jet as you loosen the screws.***

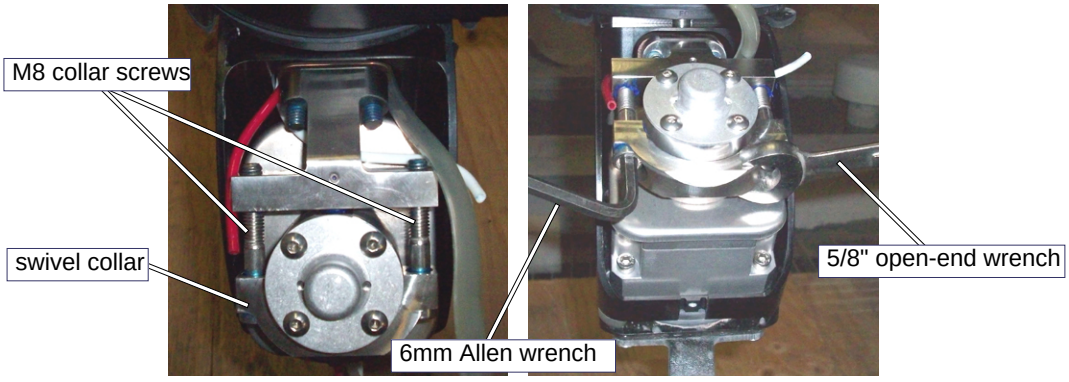


Figure 96

5. Using a large, flat-tip screwdriver, push back the manifold from the swivel body to expose the ‘football’ nipple connecting the manifold with the swivel body.

Caution: ***If the manifold is removed from the bent nipple, realignment of the bent nipple is required.***

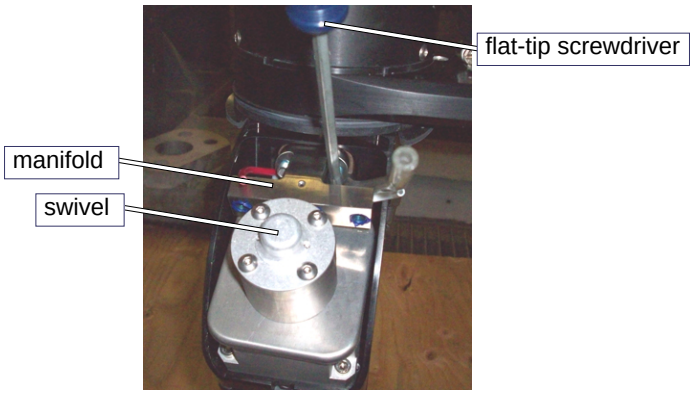


Figure 97

6. When the football nipple no longer makes contact with the swivel, pull the swivel up, removing it from the bottom nipple.

Figure 98

7. Remove the football nipple, clean and set it aside to ensure it does not get lost.

Caution: ***Do not damage the ends of the football nipple.***

8. Move the **swivel body** to a clean work bench for disassembly and rebuilding.

Rebuilding the A-Jet Swivel

1. On a clean work bench, remove the four M4 screws holding the swivel keeper to the swivel body using the 3mm Allen wrench.

Figure 99

2. Place the swivel body in a vise with the flat side of the swivel against the flat jaw of the vice and tighten it securely to allow removal of the hollow set screw using a 3/8" Allen wrench.

Note: *The hollow set screw is held in place with #2760 Loctite®. You may need to use a breaker bar to remove it.* ***Do not use heat!***

Figure 100

Note: *If the vice jaws are unable to hold the swivel tight enough, a vise's pipe jaws can be used for a tighter grip.*

3. Push the **seal pack ejector tool** into the swivel (non-threaded hole) to remove the internal seals (2 ea.), back-up rings (2 ea.) and cage.

Figure 101

4. Clean the swivel body of all debris, oil and grease.
5. Inspect the bore of the swivel body for scratches. If you can feel a scratch, replace the swivel body.

Reassembling the A-Jet Swivel

1. Locate the 2 seal packs in your swivel rebuild kit:

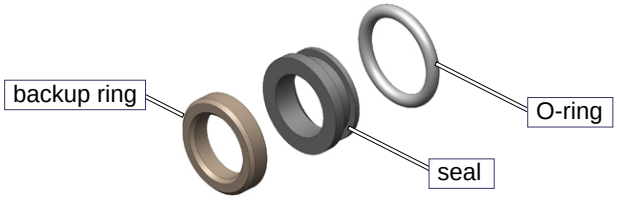


Figure 102

2. Apply Lubriplate (in kit) to the two seal pack components then mount both O-rings onto the seals.

Figure 103

3. Insert the seal components into the swivel body as follows:

Note: *The five seal components must be inserted into the swivel body one component at a time using the provided push tool to prevent the seals from being pulled out as the push tool is removed.*

a. Place the swivel push tool on the work bench with the base down and the slider in place. Mount the first **backup ring** onto the push tool with the **chamfer up**.

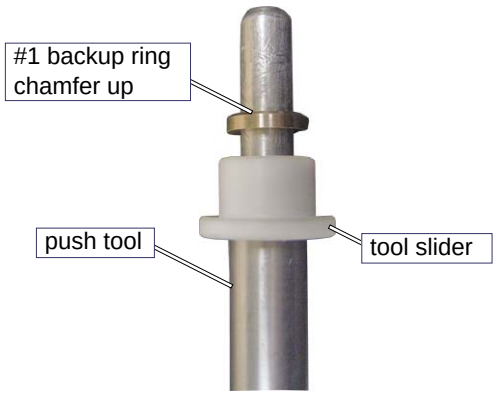


Figure 104

b. Place the swivel body down on the workbench, threaded hole up. Hold the backup ring and slider (Figure 105) in place on the push tool with your finger. Then insert the push tool slider backup ring into the swivel body

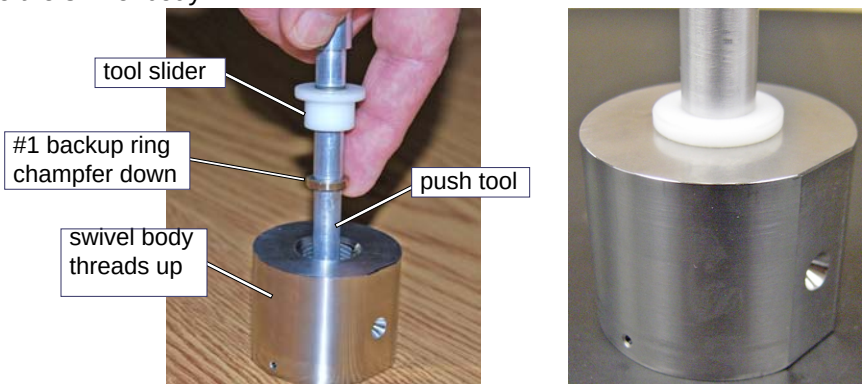


Figure 105

Caution: ***Use care not to damage the backup ring!***

c. Hold the push tool slider onto the swivel body with a finger and pull the tool from the swivel body and slider. Then remove the slider, leaving the backup ring in place:

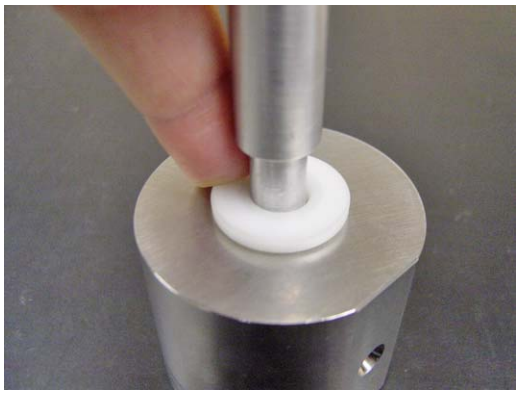
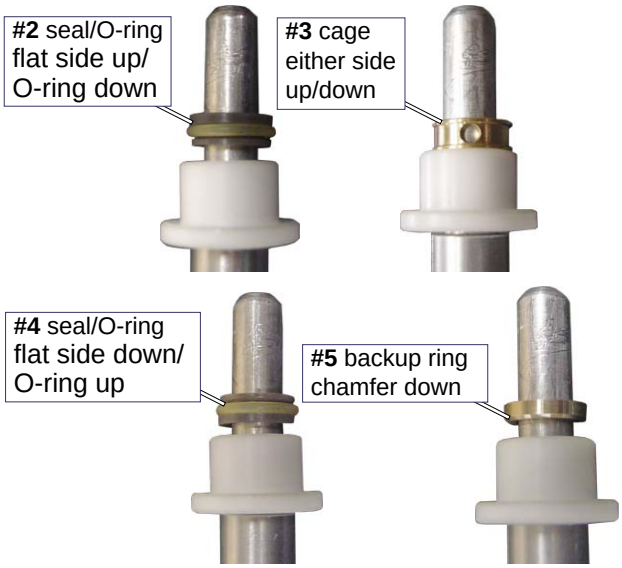
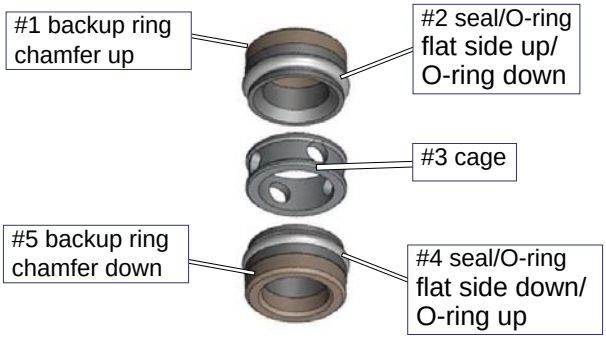


Figure 106

d. Using the same install/withdraw procedure for each component, finish installing the four remaining seal components, one at a time, in the order illustrated in Figure 107 below:





component placement order

Figure 107

4. Using a Q-tip®, remove any excess Lubriplate from the threaded area of the swivel body and coat the threads of the new hollow set screw with Loctite 2760 (in kit).

Caution: ***Do not drip Loctite into the swivel body.***

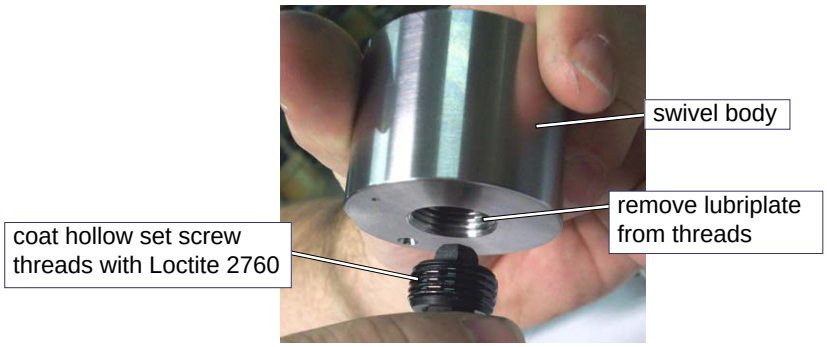


Figure 108

5. Screw the hollow set screw into the swivel body hand tight. Place the swivel body into your vise and using a 3/8" Allen hex bit socket, torque the hollow set screw to 25 foot pounds.

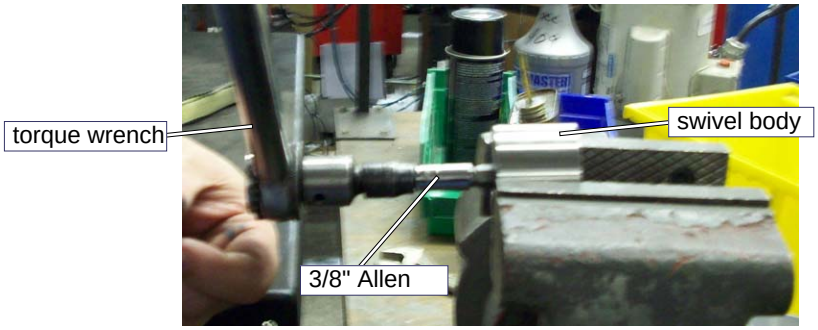


Figure 109

6. Wipe off the excess Loctite from the hollow set screw and swivel body.
7. Add one bead of Lubriplate around the hollow set screw cavity to aid re-mounting the swivel body onto the A-Jet assembly.

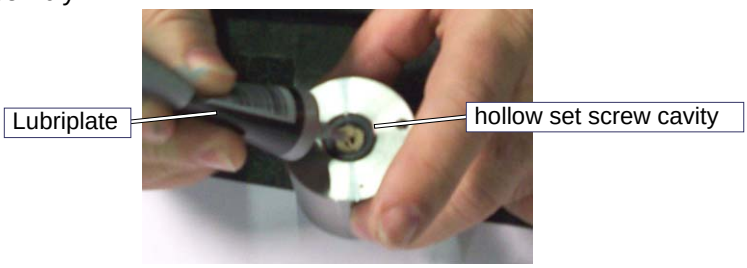


Figure 110

8. Apply a thin coat of Blue Goop to the conical surfaces of the football nipple and re-insert it into the manifold.
9. Apply Lubriplate to the tip of the bottom nipple.

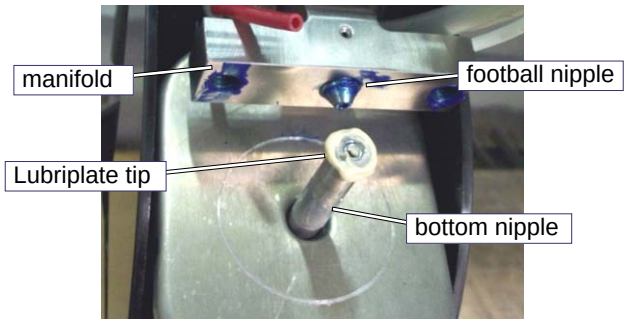


Figure 111

10. Using a large flat-tip screw driver, push back the manifold to open enough space to enable mounting of the swivel body onto the A-Jet bottom nipple (see page 54 for an example).
11. Rotate the swivel body until its flat side becomes parallel to the face of the manifold.

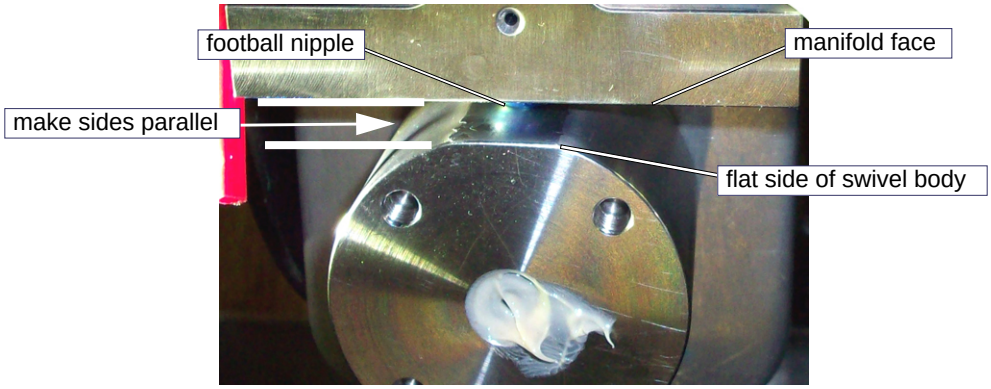


Figure 112

12. Apply Blue Goop to the threaded area and under the head of the two M8 screws. Position the swivel body collar onto the swivel body and insert the two M8 screws through the collar and into the holes in the manifold. Hand tighten at this time with a 6mm Allen wrench.

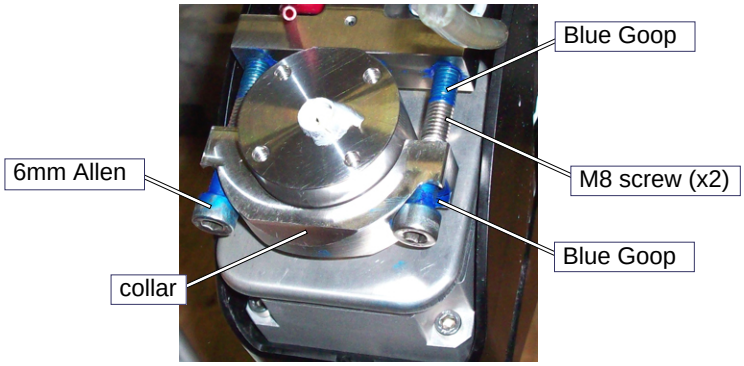


Figure 113

13. Begin tightening the two M8 screws (6mm Allen) slowly, a little at a time to apply an even pressure on both sides of the collar until the swivel is held securely in place and remains parallel to the manifold.

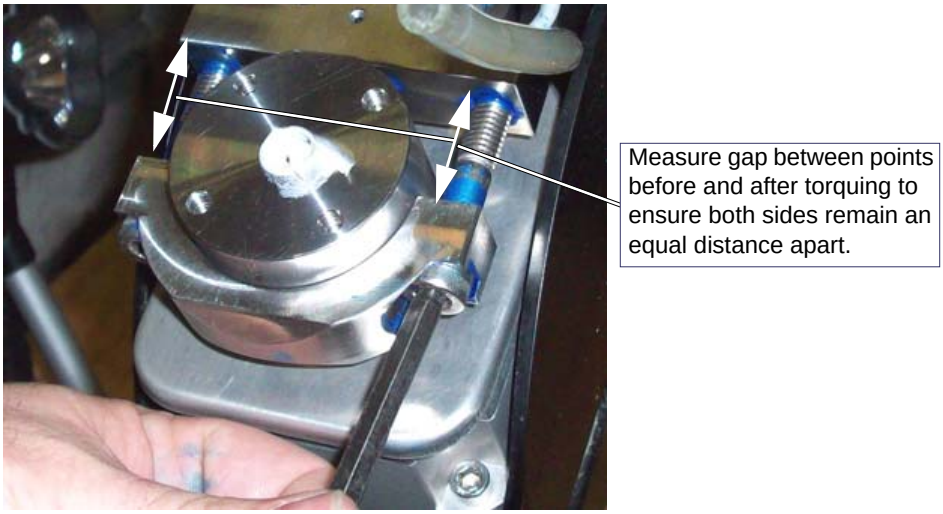


Figure 114

14. Mount the swivel keeper onto the top of the swivel body using the four M4 screws (4mm Allen).

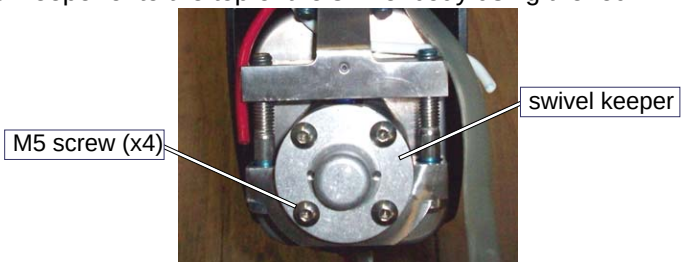


Figure 115

15. Reconnect the air lines to both the inside and outside of the cover.

Note: *Do not install the molded cover over the swivel at this time. Wait until completion of the following leakage test.*

WARNING! ***Never high-pressure test the A-Jet with the swivel keeper removed. If the nipple has a broken piece in the swivel assembly, that piece could come flying out with extreme force.***

16. Remove the blocking material and tools from beneath the nozzle and position the A-Jet vertically in preparation for nozzle tests.

Testing the A-Jet Swivel for Leaks

Follow these procedures to ensure that the swivel rebuild was successfully rebuilt without leaks.

Caution: ***Do not install the last chance screen, ring seal assembly and nozzle until after the on/off valve has been tested for leakage and the water lines flushed of possible debris.***

1. Turn **ON** the OMAX main power, air, and water.
2. Power **ON** the pump and PC Controller.
3. Launch the **Make** software.
4. Rotate the A-Jet to its vertical position in preparation for testing:

Figure 116

5. Refer to A-Jet Leak Tests, page 75, of the A-Jet Appendix and follow those instructions verifying water tight operation of the rebuilt swivel.
6. Flush the high-pressure plumbing following the swivel water pressure test. To correctly flush your plumbing system, refer to the OMAX document, “Pulse/Surge Flushing of the UHP System”, P/N 400571B. This document can be downloaded from the OMAX web site, *www.omax.com*.

Note: *It is important that the high-pressure plumbing be flushed of any debris possibly introduced into the system during assembly.* ***This must be done prior to installation of the last chance screen and nozzle components.*** *Contaminates left in the plumbing system can cause damage to the nozzle orifice and other critical components.*

Final Assembly

1. Ensure that the OMAX equipment is powered **OFF**.

WARNING! ***Never work on the A-Jet with the OMAX power ON.***

2. Carefully coil the air hoses around the swivel.

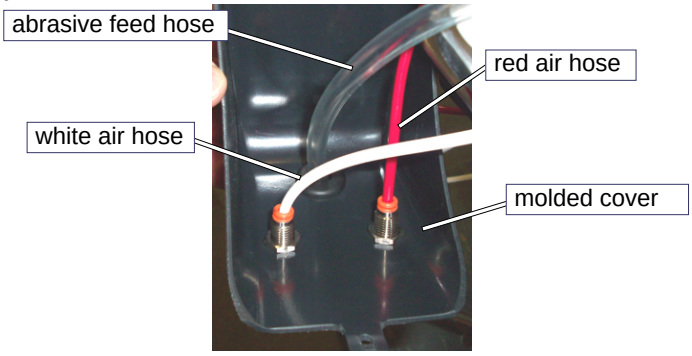


Figure 117

Caution: ***Ensure that the hose connected to the inside fittings match the color of the hose attached on the outside of the molded cover.***

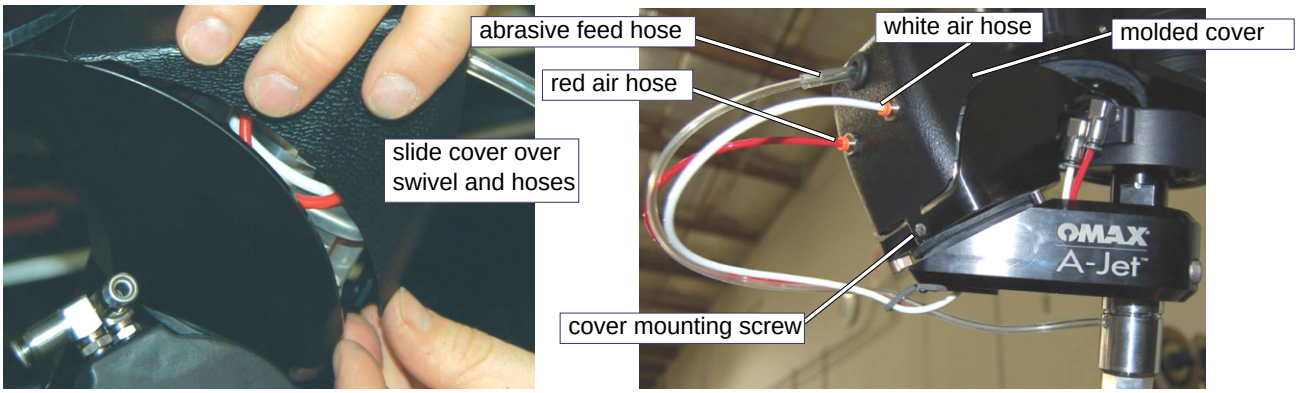


Figure 118

3. Push the abrasive feed hose through the grommet opening at the top of the molded cover.
4. Carefully slide the molded cover in place and secure it using the single mounting screw at the bottom.
5. Recalibrate the A-Jet using the The A-Jet Squareness Calibration Wizard on page 7.

A-Jet Abrasive Feed Hose Replacement

This document details the replacement of the abrasive feed hose in the OMAX A-Jet. The abrasive feed hose requires replacement when abrasive wear weakens its walls causing the tubing to collapse or allows air to be sucked in resulting in erratic abrasive flow.

Figure 119

Replacement Parts Required

Description	Quantity	Part Number
Abrasive Feed with Sleeve Assembly	1 ea.	302240

Tools Required

Refer to the tool list in the A-Jet Appendix, page 75, and verify that all tools required for replacing the A-Jet abrasive feed hose are available.

Getting Started

Completely read these procedures prior to replacing your A-Jet abrasive feed hose to ensure you fully understand the rebuild requirements and have all the required parts and tools available.

1. Clear the OMAX table of materials and other debris to allow sufficient room for the A-Jet disassembly.
2. Position the A-jet at a location on the table that allows easy access both to it and the abrasive hose components.
3. Position the A-Jet head at its **center position** by squaring it to its hard stops.

Note: *This unwraps the abrasive hose coiled inside the cover assembly.*

4. Ensure that the main power, air, and water for the OMAX are turned **OFF**.

WARNING! ***Never do maintenance on your OMAX A-Jet with the main AC disconnect ON or unlocked. Always follow standard lockout/tag-out procedures.***

5. Verify that you have all the parts required to replace the A-Jet abrasive feed hose.
6. Verify that all the tools required to complete replacing the hose are available.
7. Cover the slat bed directly below the A-Jet with a sheet of cardboard or similar material to stop any dropped tools or nozzle components from falling into the tank during the replacement procedure.

8. Ensure that all dirt, abrasive, and water are completely removed from the A-Jet and components associated with the abrasive feed hose.

Replacing the A-Jet Abrasive Hose

1. Before proceeding, ensure that all the “Getting Started” steps have been followed.
2. Tilt the A-Jet to a position making the splash guard accessible.
3. Remove the **splash guard clamp bar** by unscrewing the two **M4 screws** (2.5mm Allen) and cutting the **tie wrap**.

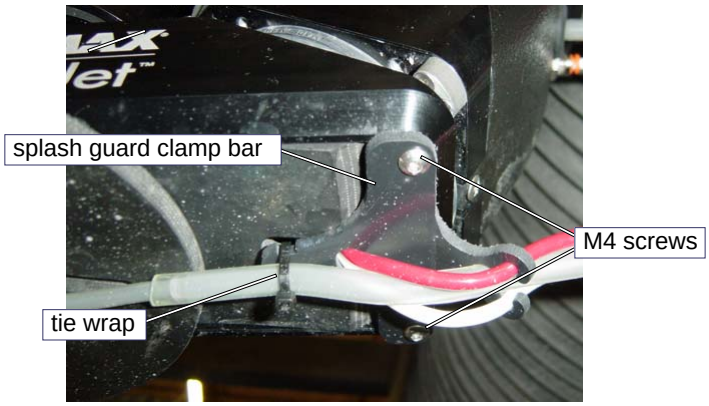


Figure 120

4. Remove the **splash guard** by unscrewing the **2.5 mm screws** with plastic covers. Pull the splash guard off the **3mm screws** with metal stand-offs.

Caution: ***Do not remove the shear screws. Remove only the screws securing the splash guard.***

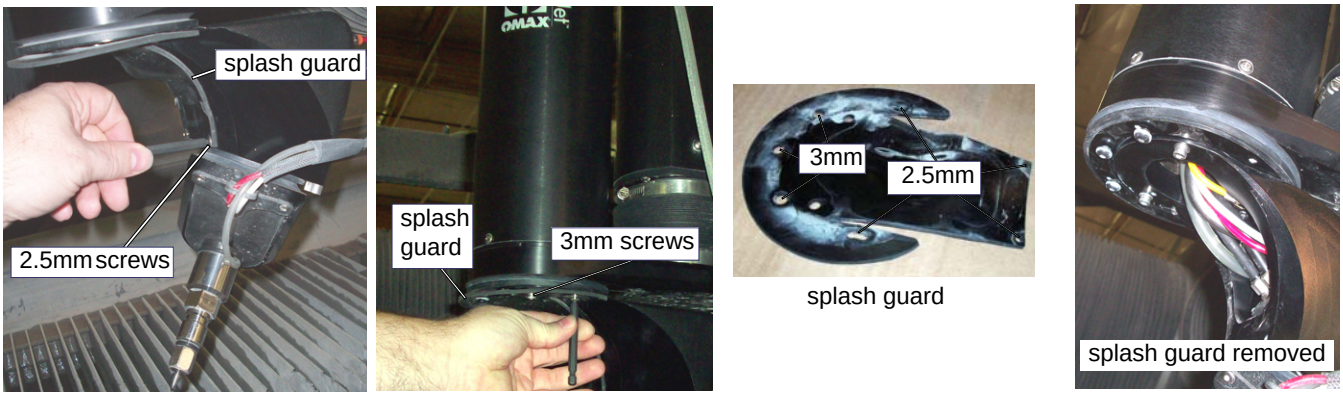


Figure 121

5. Remove the **mounting screw** that keeps the **molded cover** in place using a Phillips screwdriver. Disconnect the 2 **air hoses** from inside the cover. Disconnect the abrasive hose from the **nozzle**. Cut the **tie wrap** securing the abrasive hose. Pull the **abrasive hose** from the nozzle assembly and through the molded cover, then pull it through the articulated arm.

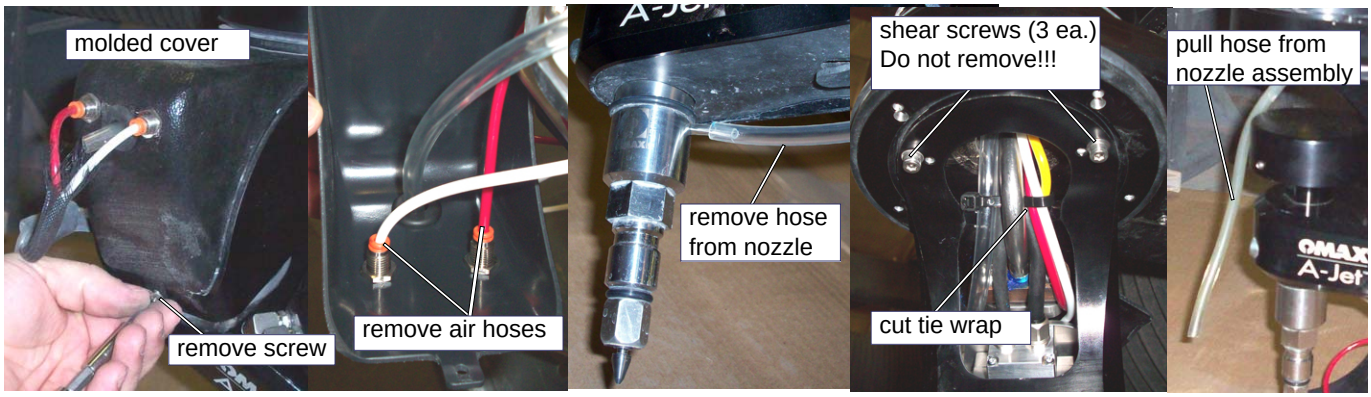


Figure 122

6. At the top of the A-Jet assembly, remove the two screws holding the clamp bar at the top of the swivel assembly using a 5mm Allen wrench.

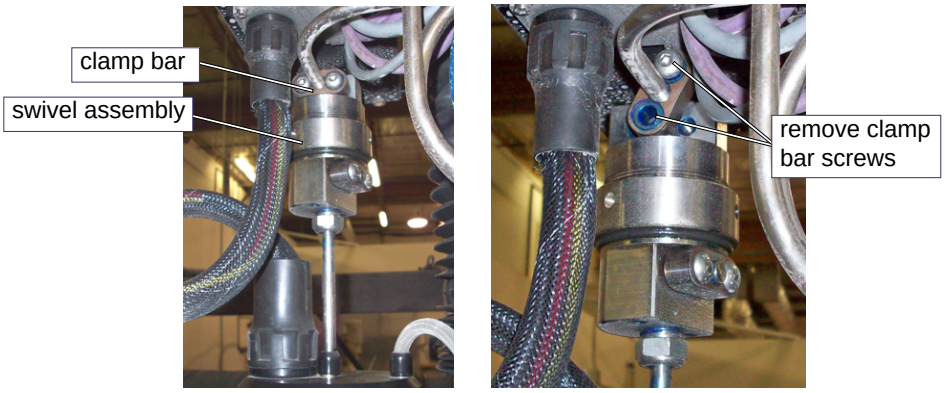


Figure 123

7. Remove the **swivel assembly** by unscrewing the bottom **gland nut** on the high-pressure plumbing using a 13/16" open-end wrench.

Caution: ***Use the swivel spanner wrench to support the swivel assembly as you loosen the gland nut.***

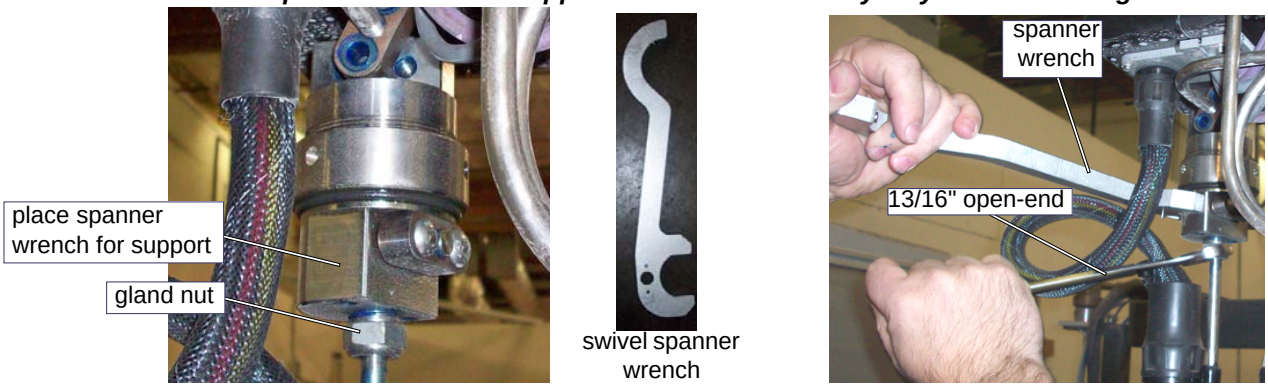


Figure 124

8. Remove the **collet**, **collar**, **gland nut** and **black boot** from the high pressure nipple.

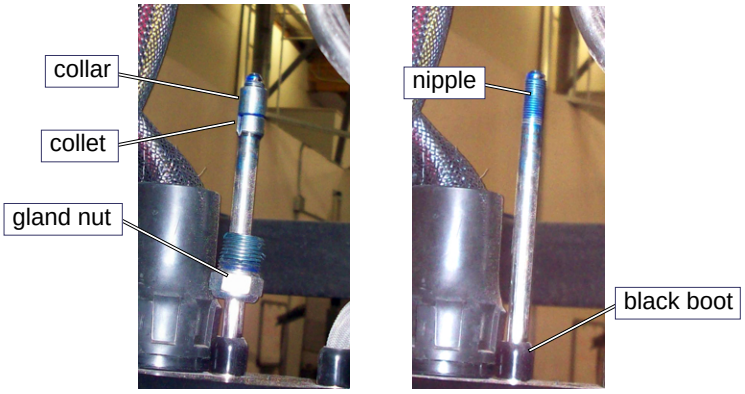


Figure 125

9. Remove the six top Phillips head **screws** securing the **cap** to the A-Jet cylindrical cover.

Caution: ***These are short screws that come out quickly and are easily dropped.***

10. Remove the six bottom Phillips head **screws** securing the base of the A-Jet to the cover.

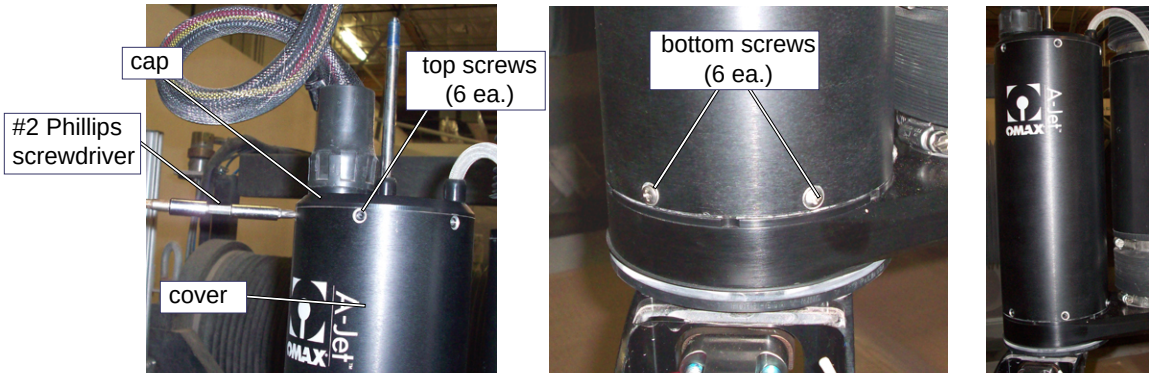


Figure 126

Note: *The bottom cover screws have washers; the top screws do not.*

11. Cut and remove the **tie wrap** from around the **cable assembly** going into the cap of the A-Jet cover.

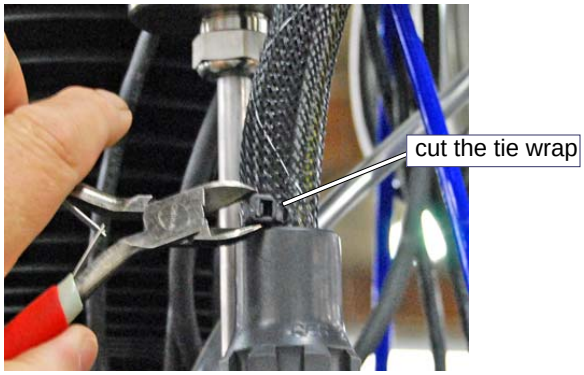


Figure 127

12. Raise the A-Jet **cap** to expose the inside of the A-Jet body.

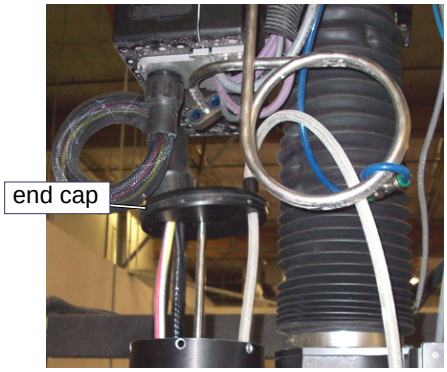


Figure 128

13. Pull the old **abrasive hose** out the top of the A-Jet **cap** until it is completely removed.

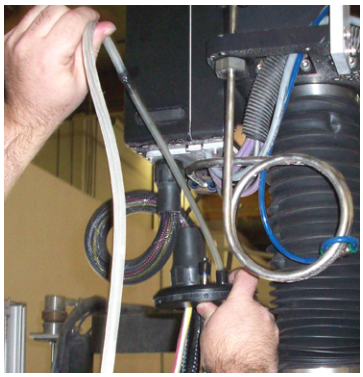


Figure 129

14. Disconnect the **abrasive hose** from the **hopper** and pull it out of the bottom slot of the **Y-carriage**.

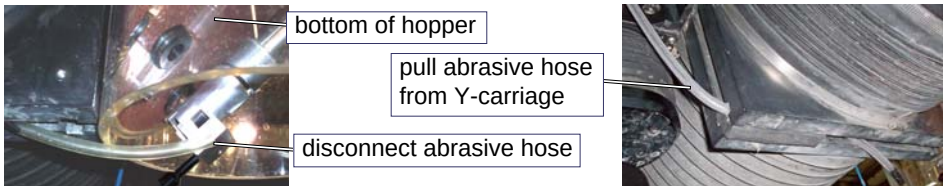


Figure 130

15. Replace the abrasive hose and sleeve with your new one.
16. Feed the end of the **abrasive hose** with the 26 inches of uncovered tubing exposed through the molded cover's grommet from the inside.

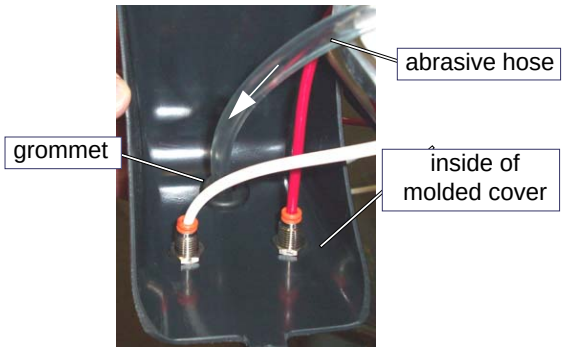


Figure 131

17. Secure the splash guard clamp bar using the two M4 screws.
18. Continue to feed the line through the air line/feed line hole in the **splash guard clamp bar**. Insert the **smaller tubing** into the end of the **abrasive hose** then insert it into the nozzle body.
19. Position the clamp bar and adjust the length of the abrasive hose to the nozzle body.
20. Secure the feed line to the end of the clamp bar using a **tie wrap**.

Caution: ***Adjust the tie wrap tight enough to hold the abrasive hose in position, but not so tight that it restricts the abrasive flow.***

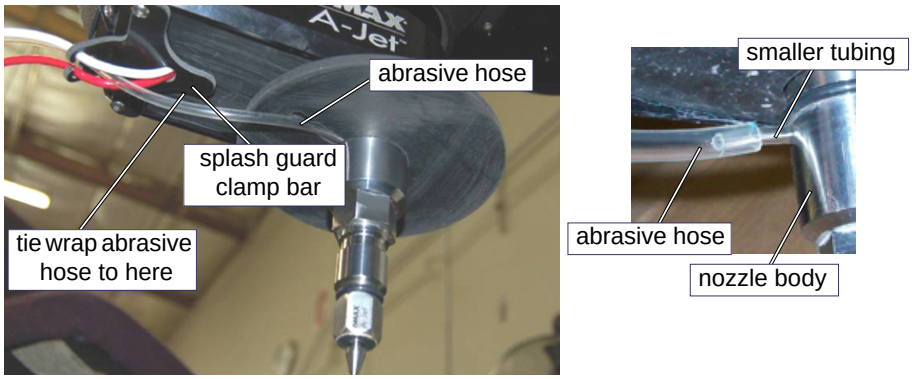


Figure 132

21. From inside the **molded cover**, route the abrasive feed hose over the **swivel assembly** and through the articulating arm on the right side of the swivel assembly as shown below.

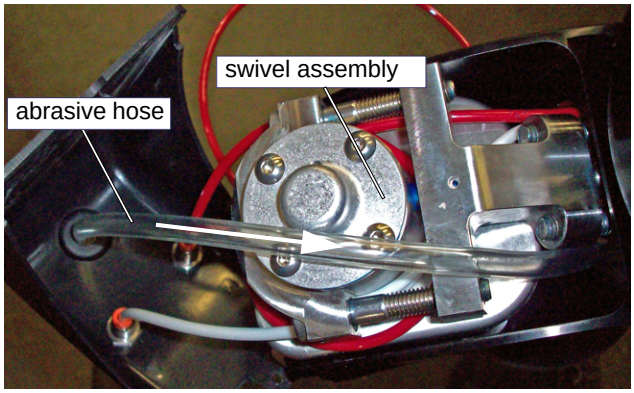


Figure 133

22. Reattach the two air hoses to the fittings on the inside of the molded cover as shown below:

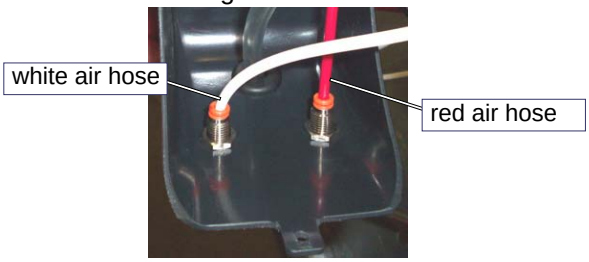


Figure 134

23. Install and secure the **molded cover** using the single Phillips screw removed in step 5 above.

Caution: ***Slide the molded cover horizontally into place; do not drop it down into position. Ensure that the two air lines are routed below the swivel assembly and do not get in the way as the molded cover is slid into place.***

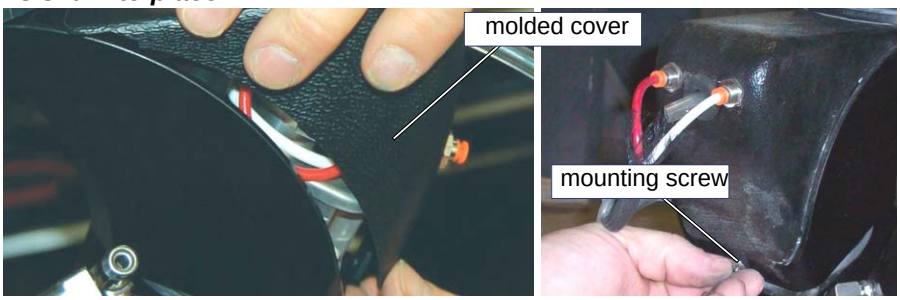


Figure 135

24. Rotate the tilt-head to various positions between the hard-stop extremes to verify that sufficient slack exists in the hoses to prevent them from binding or causing flow restrictions.

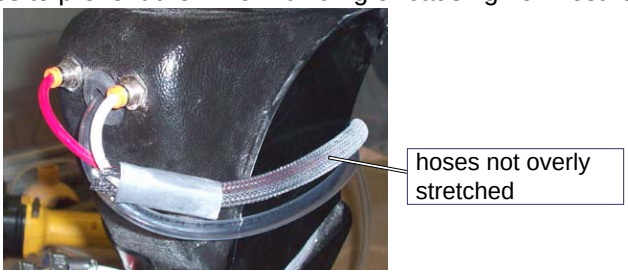


Figure 136

25. Continue to run the **abrasive hose** up into the rotary motor assembly.

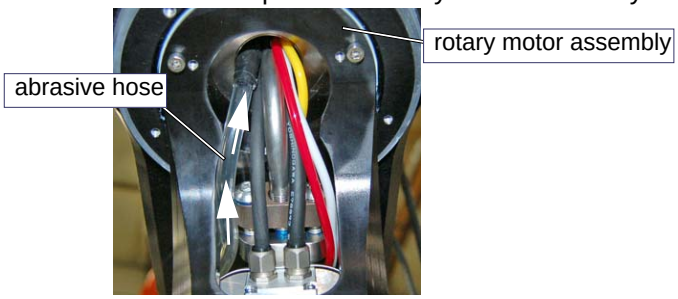


Figure 137

26. Secure the **air hoses**, and **abrasive hose** by tucking a tie wrap underneath and then back around the high pressure line. Then feed the tie wrap back up and around all cable and hoses before connecting the tie wrap. Slide the tie wrap to where the high pressure line bends.

    Tighten the tie wrap. Do not over tighten and compress the abrasive hose, etc.

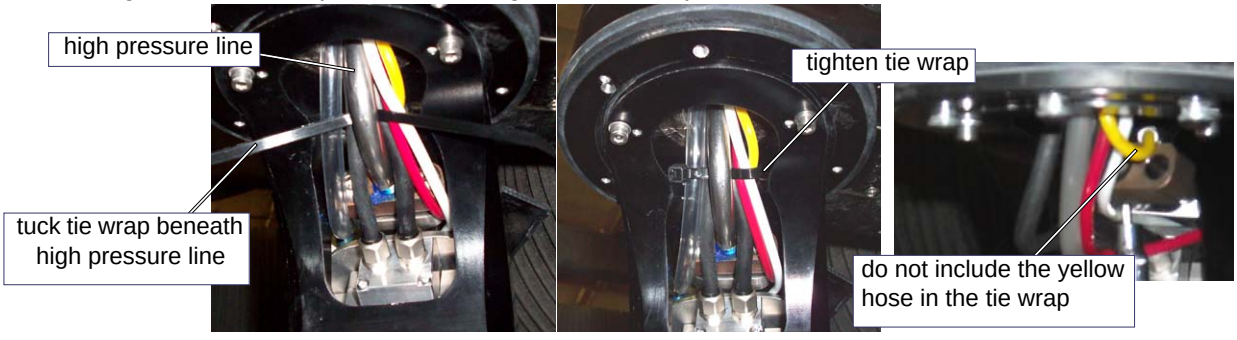
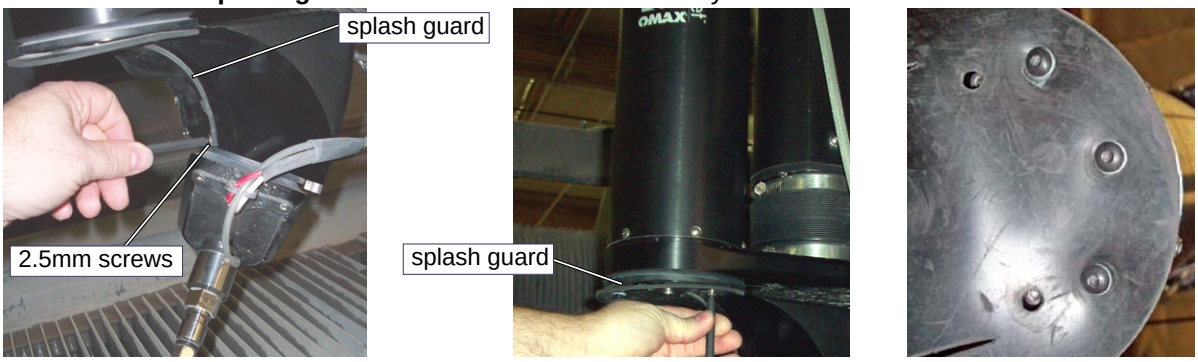


Figure 138

Note: *The yellow hose should not be included in the tie wrap.*

27. Install the **splash guard** onto the A-Jet axial assembly.



28. Attach the bottom of the A-Jet **body cover** to the mounting frame using the six Phillip head screws and washers removed in step 10.

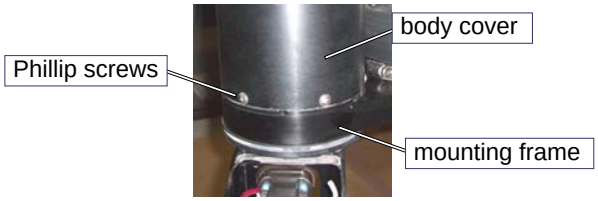


Figure 139

29. Feed the **abrasive hose** up the A-Jet **cylinder body** and through the **body cap**.

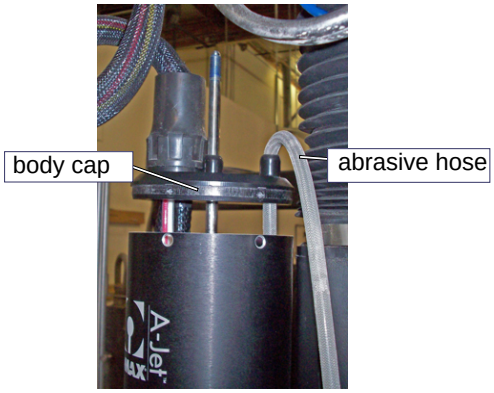


Figure 140

30. Rotate the A-Jet head assembly from **hard-stop** to hard-stop, while preventing body cap from rotating. This action will draw in the abrasive feed hose from the top as it wraps around the high-pressure tubing inside the cylinder cover. Help feed the abrasive hose as it's drawn into the cylinder.

Note: *You may want too put a cap screw in place to help hold the cap in place during this process.*

Caution: ***Allow sufficient abrasive hose to be pulled inside the A-Jet body during rotation to prevent it from becoming wrapped so tightly that it binds and constricts abrasive flow. Do not feed the Teflon sleeving down into the actuator. It needs to remain inside of the A-Jet body.***

31. Lift the A-Jet **body cap** and look down inside the cylinder when the rotary axis is against each hard-stop. Ensure that the feed line is not binding or constricting other components inside.

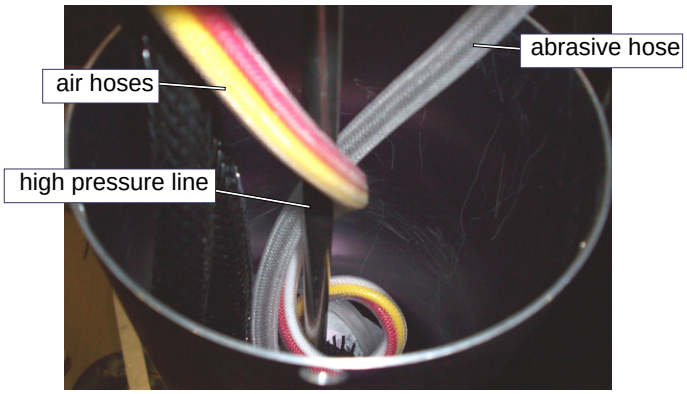


Figure 141

32. Install the A-Jet **top cap** to the body cover using the Phillip head screws removed in step 9.

Caution: ***Tighten the top screws snug only. The threads can be easily stripped or damaged if overly tightened.***

Figure 142

33. Install a **tie wrap** through the sleeving and around only the braided rotary cable at about an inch above the cord grip and then feed it down as illustrated:

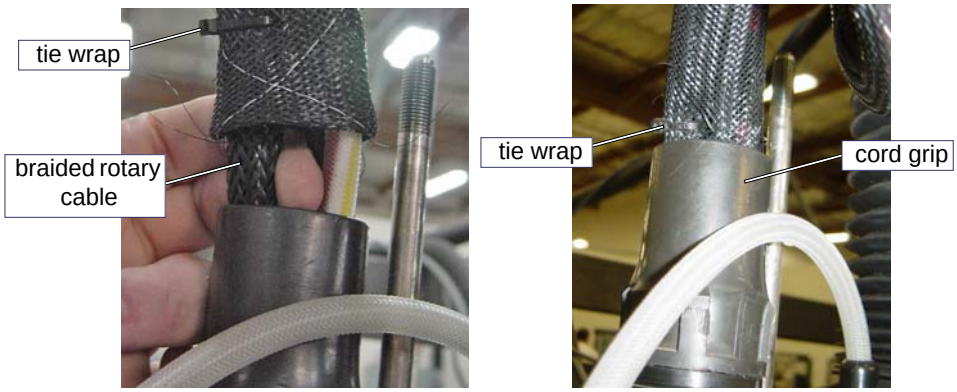


Figure 143

34. Continue running the **abrasive hose** up and through the coiled nipple loop.

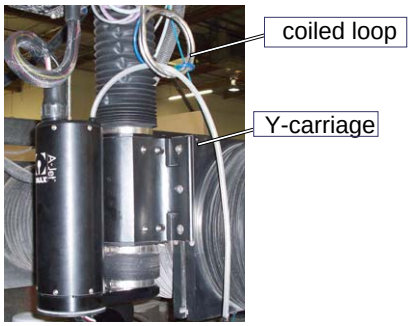


Figure 144

35. Run the **abrasive hose** down to the bottom of the Y-carriage and place it inside the bottom slot on the Y-carriage.

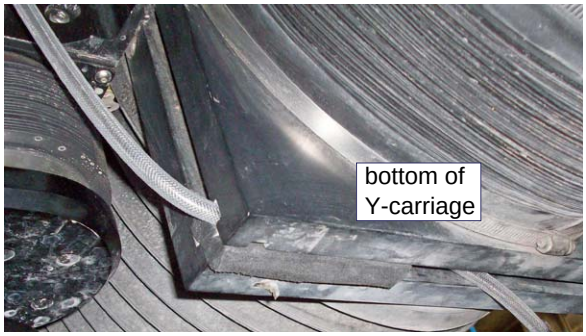


Figure 145

36. insert its end into the **hose** into the abrasive valve at the bottom of the hopper.

Caution: ***Ensure that you have enough abrasive hose length to reach the hopper with the A-Jet Z-axis lowered.***

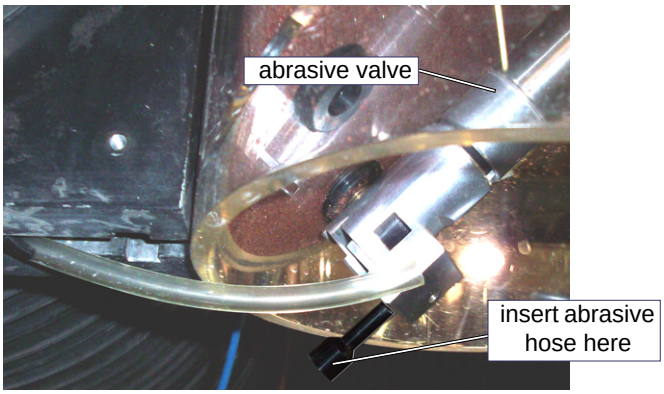


Figure 146

37. Clean and **Blue Goop** the gland nut, collet, and collar and place them onto the **rotary nipple**.

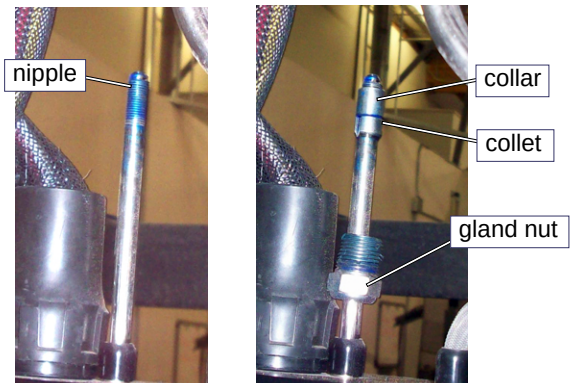


Figure 147

38. Place the **swivel assembly** onto the rotary nipple and thread the **gland nut** in place. Using the spanner wrench and 13/16" open-end wrench, tighten the swivel assembly in place.

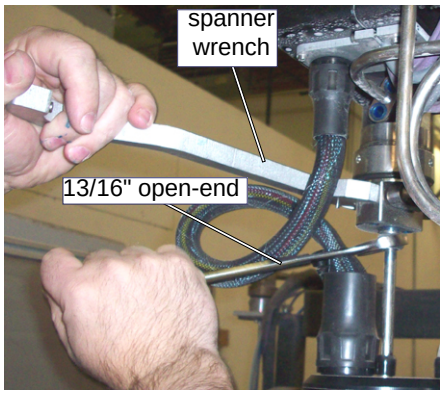


Figure 148

39. Replace the **clamp bar** and **nipple** at the top of the **swivel**. Replace and tighten the two clamp bar screws.

Caution: ***Ensure that these two screws are evenly tightened by going back and forth from one to the other until the clamp bar is adequately tightened.***

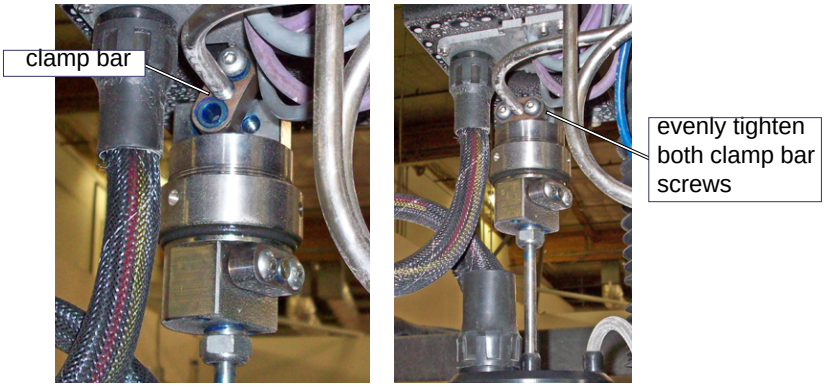


Figure 149

Testing the A-Jet Swivel and Abrasive Hose

Follow these steps to ensure that the abrasive hose was successfully replaced and now provides good abrasive flow.

1. Remove the nozzle assembly.
2. Run the water and abrasive tests checking for leaks around the plumbing.
3. Verify that garnet flows adequately through the abrasive hose.
4. Recalibrate the A-Jet using the The A-Jet Squareness Calibration Wizard on page 7.
5. Run various test cuts to verify success of the abrasive tube replacement.

A-Jet Appendix

Tools Required for A-Jet Maintenance

Tool	On/Off Valve Rebuild *(page 29)*	Nipple Replacement *(page 41)*	Swivel Rebuild *(page 51)*	Abrasive Tube Replacement *(page 63)*
Assembly Drawing	☑ P/N 400645		☑ P/N 400646	
A-Jet Tooling Kit *	☑ (provided with A-Jet at purchase; P/N 307926)			
1/2" socket	☑			
5/8" open-end wrench			☑	
13/16" open-end wrench				☑
1" open-end wrench	☑	☑		
1-1/8" open-end wrench	☑			
1-1/8" crows foot	☑			
Torque wrench	☑ (to set 25 in/lbs; 225 in/lbs)		☑ (to set 25 ft/lbs)	
Blue Goop®	☑	☑	☑	☑
Lubriplate®	☑	☑	☑	
Loctite® #2760			☑ (provided in kit)	
2.5mm Allen wrench		☑		☑
3mm Allen wrench		☑	☑	☑
5mm Allen wrench				☑
6mm Allen wrench		☑	☑	
3/8" Allen wrench			☑	
3/8" Allen bit socket			☑	
Screwdriver, large flat-tipped			☑	☑
Screwdriver, #2 Phillips			☑	☑
Vise			☑	
Seal Pack Ejector tool			☑ (provided in rebuild kit)	
Seal Pack Push tool			☑ (provided in rebuild kit)	
Spanner Wrench				☑ P/N 304512
Tie wraps		☑		☑
electrical tape				☑
measuring tape				☑ (to measure 8 ft)
diagonal cutters		☑ (to cut tie wraps)		☑ (to cut tie wraps)

A-Jet Leak Tests

Testing the A-Jet for Water Leaks

Follow these procedures to ensure that your A-Jet was successfully rebuilt without leaks.

1. Do not install the last chance screen components and nozzle at this time.
2. Turn **ON** the OMAX main power, air, and water.
3. Power **ON** the pump and PC Controller.
4. Launch the **Make** software.

5. Rotate the A-Jet to its vertical position in preparation for pressure testing:

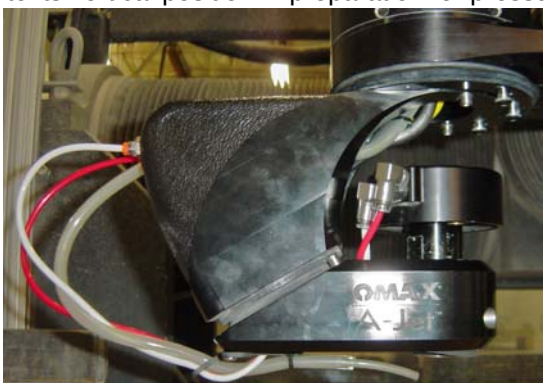


Figure 150

6. Power **ON** the **charge pump** and inspect the inlet body and A-Jet bottom for water leaks.
7. If no leaks are apparent, click the **Test** button in **Make**: 

8. From the **Test and Nozzle** dialog box, select **Pump Only** and **Low Pressure**:

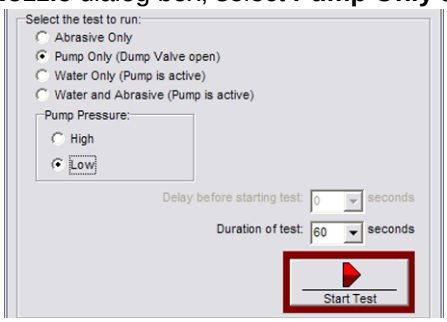


Figure 151

9. Click the **Start Test** button and inspect the inlet body and A-Jet bottom for water leaks.
10. If no leaks are apparent, again click the **Test** button in **Make**: 

11. From the **Test and Nozzle** dialog box, select **Pump Only** and **High** Pressure:

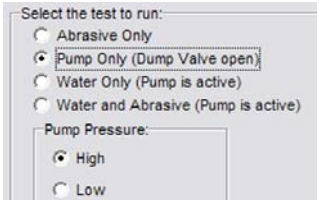


Figure 152

12. Click the **Start Test** button and inspect the inlet body and A-Jet bottom for water leaks.

Lubricating the A-Jet Lead Screw

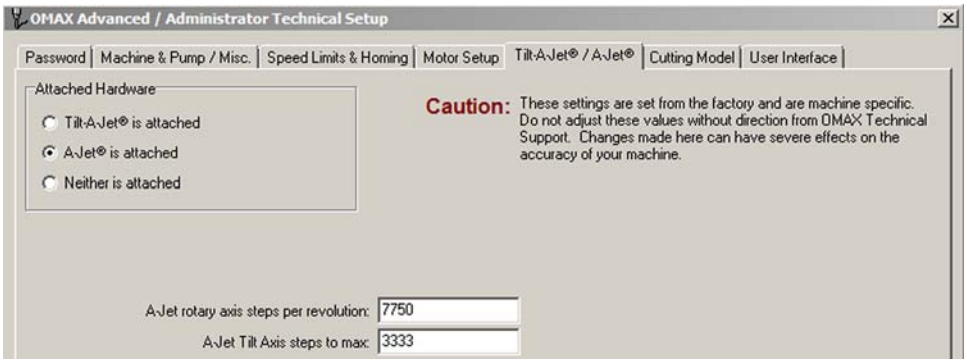
The lead screw in the motorized Z-axis is responsible for raising and lowering the A-Jet during operation. This lead screw requires periodic lubrication to keep it functioning smoothly without squeaking or moving with a jerky motion. It is recommended that the lead screw be routinely lubricated yearly or sooner if problems with the lead screw's up/down motion are noticed. Lubrication procedures for the Z-axis lead screw are available in the following user's guides: OMAX JetMachining Center User's Guide, P/N 400433, and MAXIEM Waterjets User's Guide, P/N 400588. Please refer to the appropriate document.

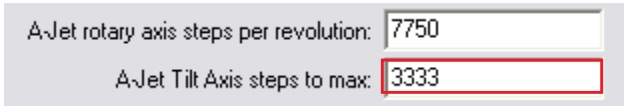
Verifying the Correct Tilt Axis Step Value

Use this test to verify that the value entered for the **A-Jet Tilt Axis steps to max** input matches the requirement of the A-Jet installed on your machine. Earlier A-Jets were provided with tilt actuators having 30:1 gear ratios requiring a rotary axis step value of 2000; later gear ratios were changed to a 50:1 ratio requiring a 3333 value for the tilt axis step.

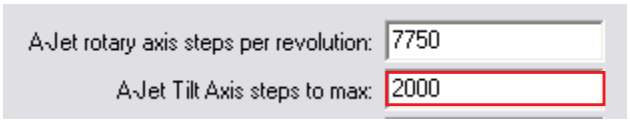
Typically, the **A-Jet Tilt Axis steps to max** value should be set at **3333** for A-Jets with serial number **AZ110538** and above (50:1 ratio A-Jets); or set at **2000** for A-Jets with serial # **AZ110537** and below (30:1 ratio A-Jets).

Caution: ***Since some earlier A-Jets may have been refurbished with a 50:1 tilt actuator, it is recommended that this test be done for all A-Jets to verify the correct tilt axis step value.***





3333 for A-Jets with 50:1 ratio tilt actuators



2000 for A-Jets with 30:1 ratio tilt actuators

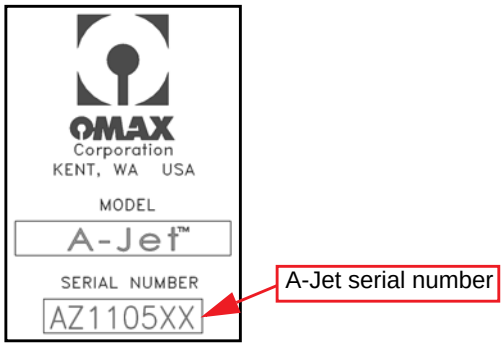
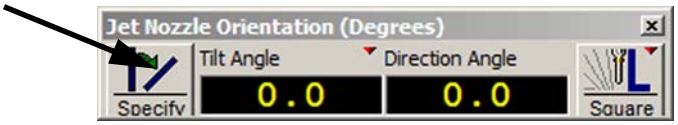


Figure 153

Verify the correct step axis step value for your A-Jet configuration

1. Position the A-Jet at a table location where it can rotate freely and its rotation position easily observable.
2. Click the **Specify** button in the **A-Jet Nozzle Orientation (Degrees)** window.



3. In the **Specify Absolute Angles of the Jet** window, enter 42 for the **Tilt Angle** and 0 for the **Direction Angle**.

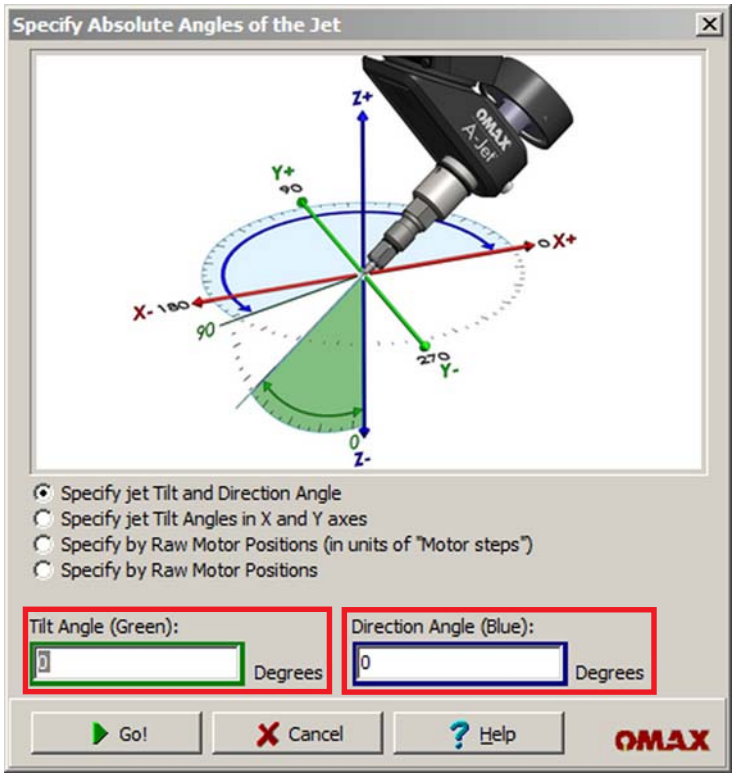


Figure 154

4. After entering the correct angles, click **Go**.
5. Once the A-Jet becomes positioned at its specified tilt and rotation angles (42 and 0), compare the alignment of the lower part of the A-Jet (nozzle) with the upper part:
   a. When the A-Jet has the **correct tilt axis step value** entered, the sides of both the top and bottom surfaces **will be** aligned flush, and the top edge will be parallel to the bottom edge. See below.

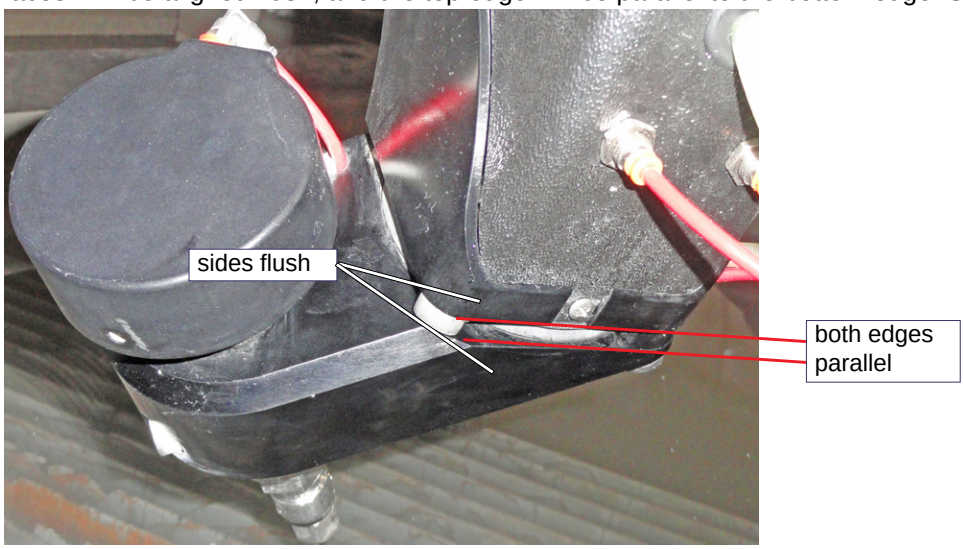


Figure 155

b. When the A-Jet has the **incorrect tilt axis step value** entered, the sides of both the top and bottom surfaces **will not be** aligned flush, and the top edge will not be parallel to the bottom edge. See below.

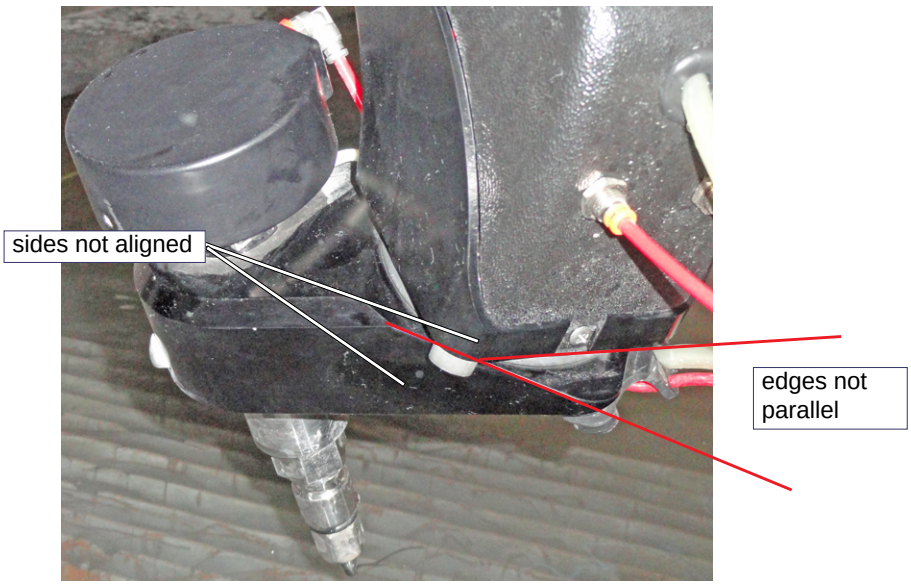


Figure 156

6. If your A-Jet matches the alignment illustrated in Figure 155, the correct tilt axis step value has been entered and this test is complete.
7. If your A-Jet matches the alignment illustrated in Figure 156, the wrong tilt axis step value has been entered. You must re-enter the alternative value (2000 or 3333) and repeat this test to obtain the expected results. You should also verify perpendicularity calibration settings are correct. See "Tilt Calibration" section, page 14 for details.

A-Jet Service

Customer Support

For assistance with your A-Jet:
Customer Support personnel can be reached Monday through Friday between the hours of 5:00 a.m. and 5:00 p.m., and Saturday and Sunday between the hours of 5:00 a.m. and 2:00 p.m., Pacific Standard Time.

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