OMAX®

A-Jet® Installation Setup and Maintenance Guide

OMAX Corporation
21409 72nd Avenue South
Kent, WA USA 98032
Web: http: //www.omax.com
E-mail: omax@omax.com

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OMAX Corporation
Technical Publications
21409 72nd Avenue South
Kent, WA, USA 98032

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Original Instructions in English
October 2017

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OMAX A-Jet Installation Setup

This document provides procedures necessary for installation setup, and performing routine A-Jet maintenance activities. For safety and operator instructions, please refer to the *OMAX A-Jet User's Guide*, P/N 400610.

A-Jet Safety

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. 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.***

Refer to your equipment user's guide for safety requirements.

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

A-Jet Installation Settings

A-Jet Initial Settings for Make

Launch **Make**:

1. In the **Setup** tab, select **Advanced** / **Advanced/Administrator Setup**. Then provide your administrator password to log in.

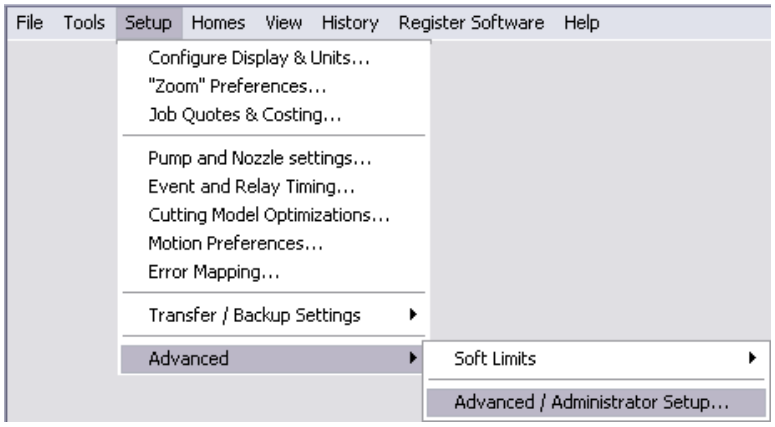


Figure 1

2. In the **Motor Setup** tab, ensure that **A-jet** is selected in **Z-Axis Setup** for either **Z1**, or **Z2**, depending upon your system's configuration.

Figure 2

3. Choose the orientation of the A-Jet according to your machine's configuration, either right or left-hand side.
4. Select the **A-Jet** tab:

Note: ***The Tilt-A-Jet and A-Jet tabs do not show when not selected for either Z1 or Z2 in Z-Axis Setup.***

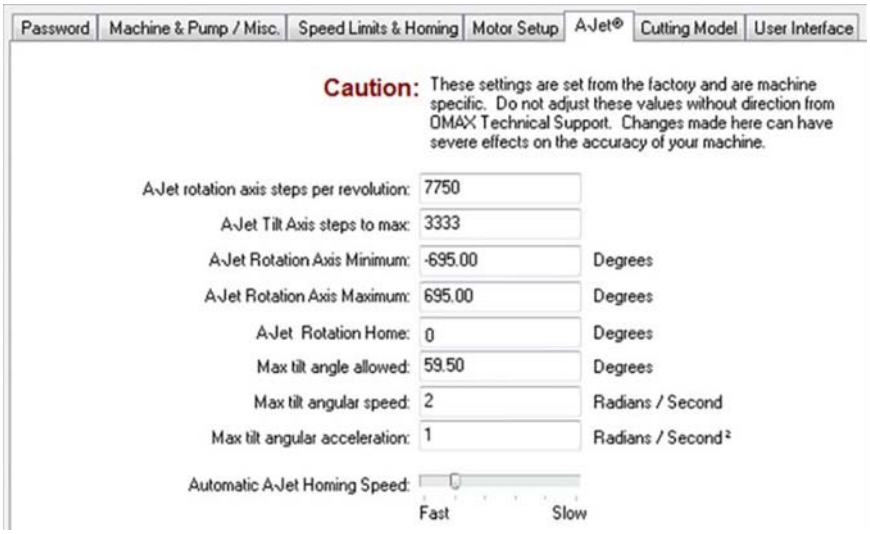


Figure 3

5. Set the **A-Jet Tilt Axis steps to max** value to **3333** (see **Caution** below).

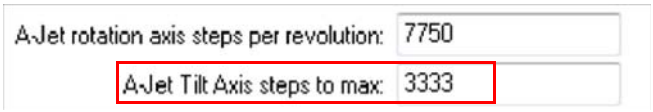


Figure 4

Caution: ***Currently, Make provides "3333" as the default value. Earlier A-Jets may require that this value be set at "2000". Refer to Verifying the Correct Tilt Axis Step Value, page 5, for instructions on determining if your A-Jet is correctly configured using "3333".***

6. On the **A-Jet** tab for all **OMAX** machines, set the **Minimum** and **Maximum rotation axis** degrees as follows:

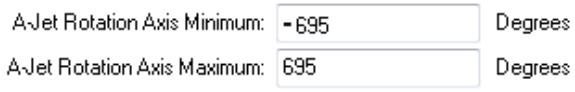


Figure 5

Note: *In earlier version of the software (MAKE V23 and earlier) the dialog was different. The user entered different numbers for Maximum/Minimum rotation angle for left and right-hand side configurations (695/695 for left-hand side and 515/875 for right hand-side).*

7. Select the **Motor Setup** tab in **Administrator Setup** and set the **inches/step for Z axis** value to either **0.001** or **0.0005** depending on the type of lead screw installed in your A-Jet.

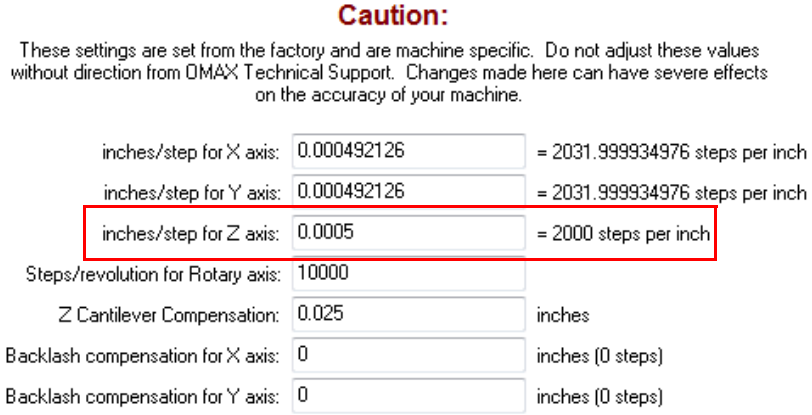


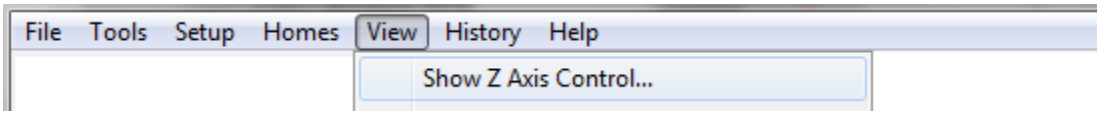
Figure 6

Caution: ***You must verify that the inches/step value entered for your A-Jet is accurate using the procedure that follows:***

To verify the correct Z-axis step value for your A-Jet:

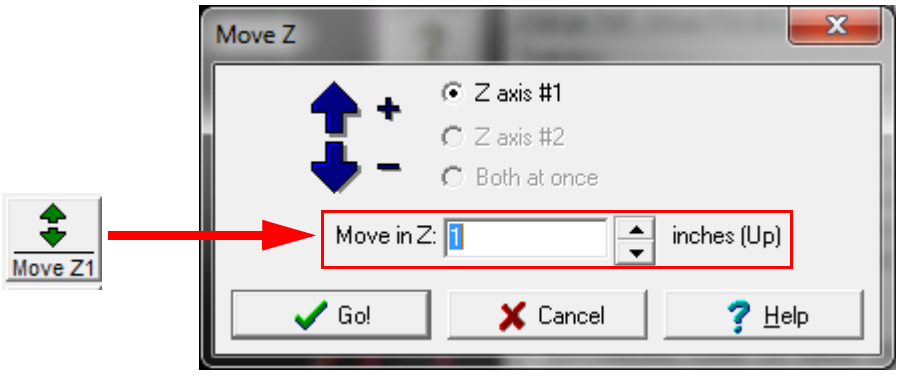
a. Enter **0.0005** for the **inches/step for Z axis** value (see Figure 6).

b. In **Make**, click **View** and select **Show Z Axis Control**.



c. Ensure that the **Z-axis** is not raised near the top of its height limit and has at least 3 inches of upward travel still available.

d. With the **Move Z** controls, click **Move Z1** and enter **1** for **inches (Up)**:



e. Click **Go!** to raise the **Z-axis** 1 in.

f. Measure the actual distance raised by the **Z-axis**.

g. If the distance is exactly 1 in., the **inches/step** value is correct and you can continue to Step #8. If a distance other than 1 in. was measured, multiply 0.0005 by [the distance measured/the distance entered for **Move Z**]. Enter that value for **inches/step for Z axis**.

8. In **Make**, click the **Change Path Setup** button. For **Enter your Material Setup here**, be sure to check **Using Tilting on Path**:

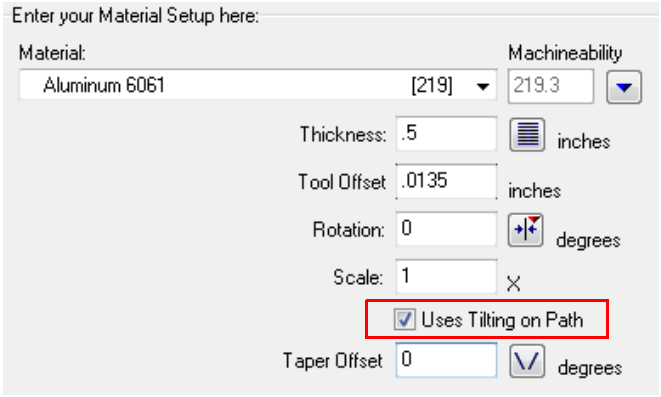


Figure 7

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. Lead length optimization is only available if no purposeful tilting is applied.*

9. If cutting angles, the stand-off distance for the **A-Jet** must be set at 0.080 in. Use the **Motion** tab in **Make** to display **Stand-Off Preference**:

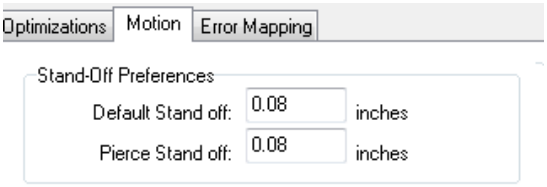


Figure 8

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

10. In **Make** on the **Event & Relay Timing** tab (Setup/Event and Relay Timing), increase the dwell time to provide ample time for clearing the **abrasive** out of the **feed line** to 3.0 second.

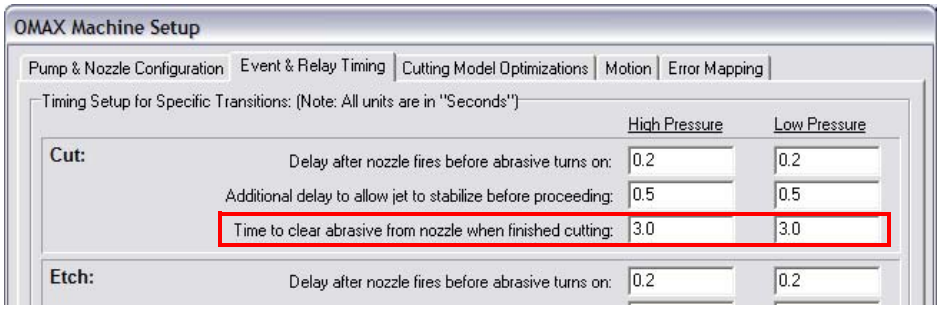


Figure 9

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 tilt 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.***

To view the existing values assigned for **A-Jet rotary axis steps per revolution** and **A-Jet Tilt Axis steps to max**, click **Setup/Advanced/Advanced Administrator setup**, enter your password, and then click the **A-Jet** tab:

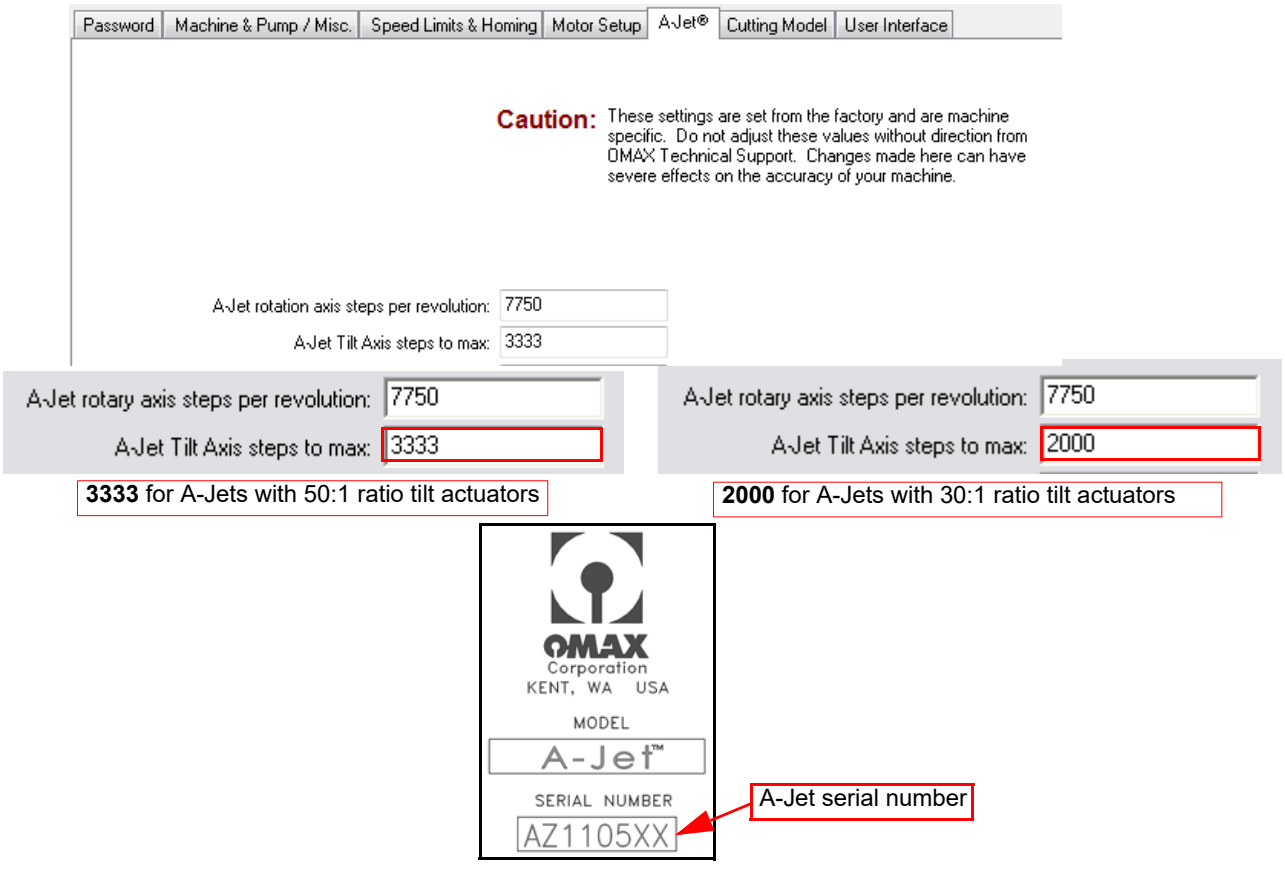
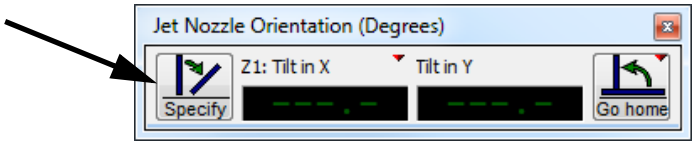


Figure 10

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

1. Close the **Advanced/Administrator Technical Setup** window.
2. Position the **A-Jet** at a **table** location where it can rotate freely and its rotation position is easily observed.
3. Click the **Specify** button in the **A-Jet** control window.



4. In the **Specify Absolute Angles of the Jet** window, click **Specify jet Tilt and Direction Angle**, enter “42” for the **Tilt Angle** and “0” for the **Direction Angle**.

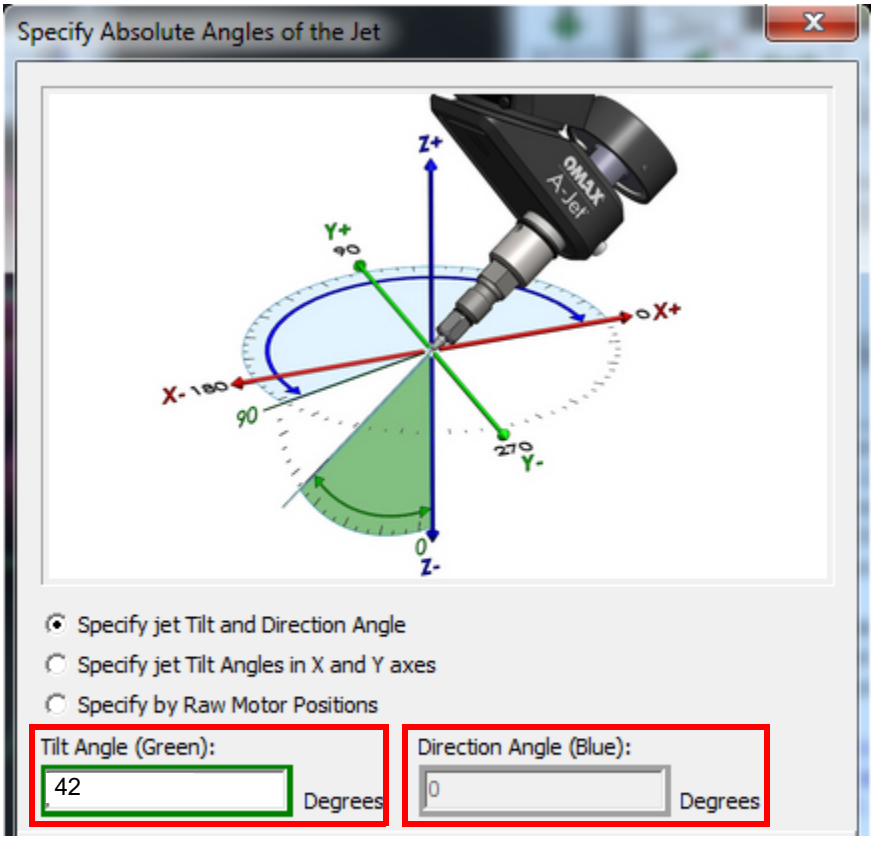


Figure 11

5. After entering the correct angles, click **Go**.
6. Once the **A-Jet** moves to 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 approximately parallel to the **bottom edge**. See Figure 12.

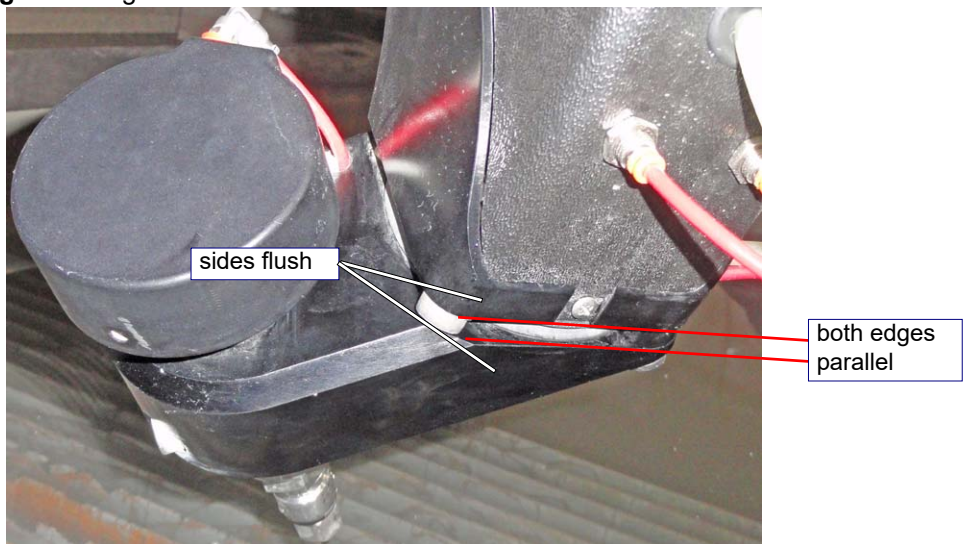


Figure 12

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 Figure 13.

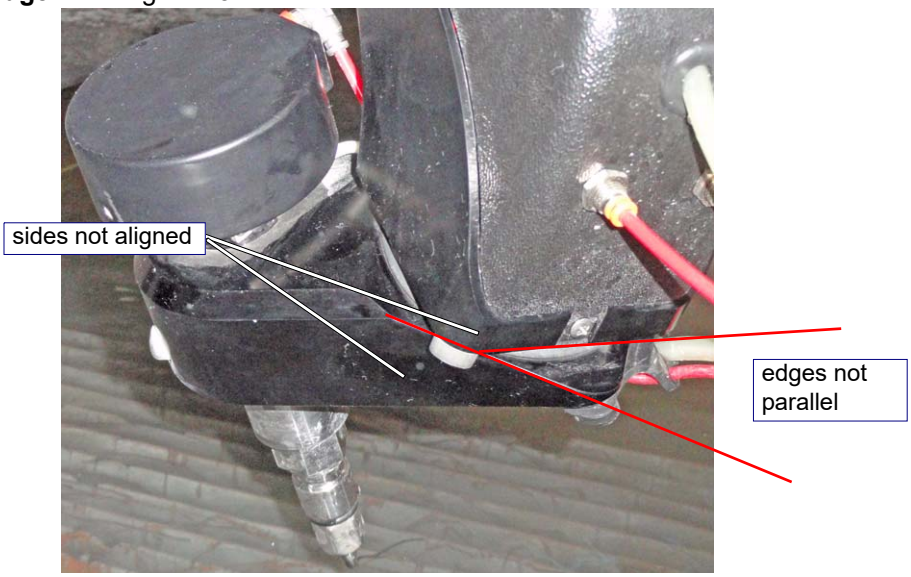


Figure 13

7. If your **A-Jet** matches the alignment illustrated in Figure 12, the correct **tilt axis step** value has been entered and this test is complete.
8. If your **A-Jet** matches the alignment illustrated in Figure 13, 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 Calibrate Tilt option, Figure 18, page 9.

Changing the Rotation Axis Motor Step Value

The default motor step value for all OMAX machines is **15100**.

To determine your current motor step value:

1. In **Make**, from the **Setup** menu, select **Advanced/Tilt Axes Calibrations/Calibrate Alignment Wizard** (see 400610, **A-Jet User's Guide** for calibration alignment details).

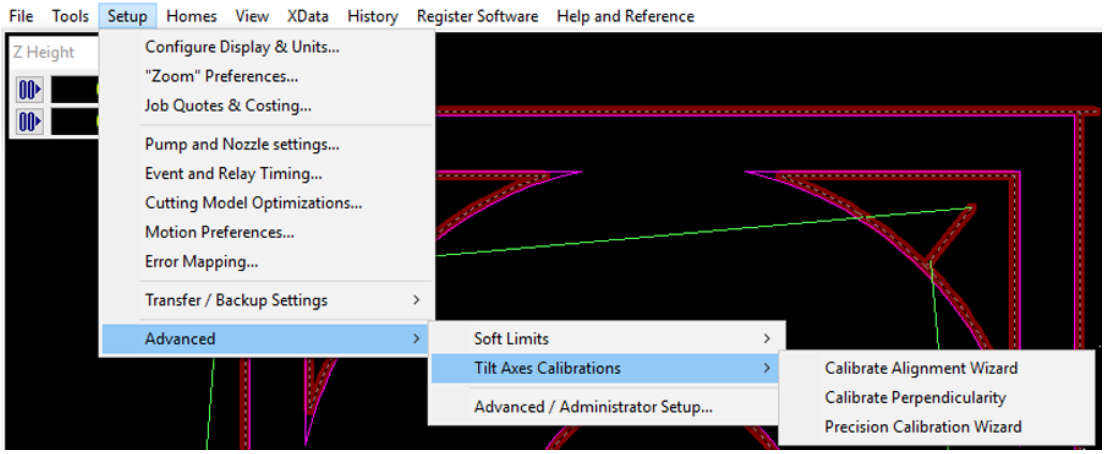


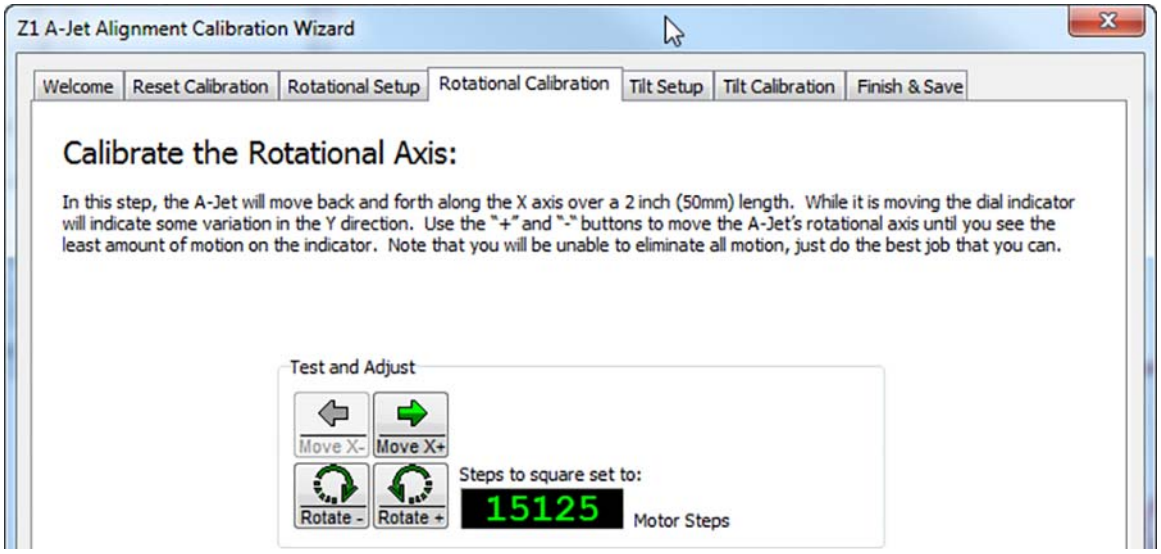
Figure 14

Note: *The option, "Calibrate Perpendicularity", is visible only in debug mode or when Z-axis alignment calibration values have been assigned.*

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

Figure 15

3. From the **A-Jet Alignment Calibration Wizard** pop-up window, select the **Rotational Calibration** tab to view your currently set **Motor Steps** value:



4. Select the **Rotational Calibration** tab.

Figure 16

Resetting the Motor Step Value

The default motor step value of **1915** 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**. Use the following procedure to verify/quickly set this value.

To quickly set your Motor Steps value to 3205:

1. Press **Shift** + **~** (tilde) to access the "**Testing & Diagnosis**" menu.
2. Enter your OMAX **password** to access **administrator setup functions** and click **OK**.

Figure 17

3. Point to **Tilt-A-Jet/A-Jet**, and then click **Calibrate Tilt/A-Jet Parallel Factory Settings.**

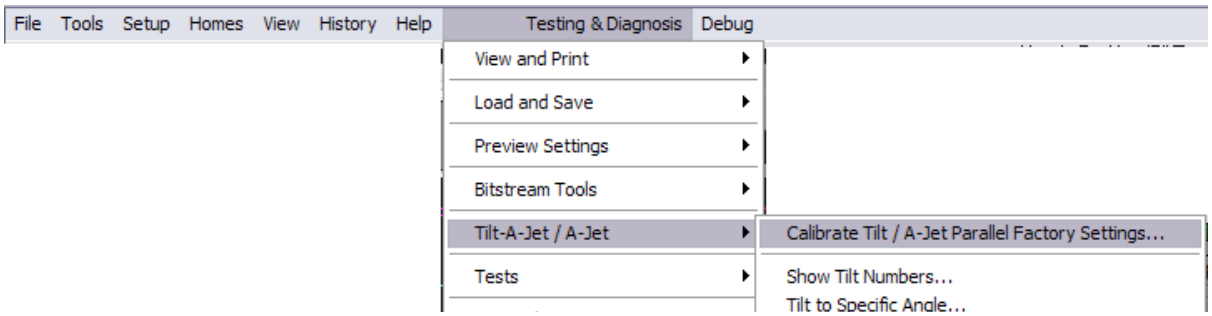


Figure 18

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

Figure 19

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

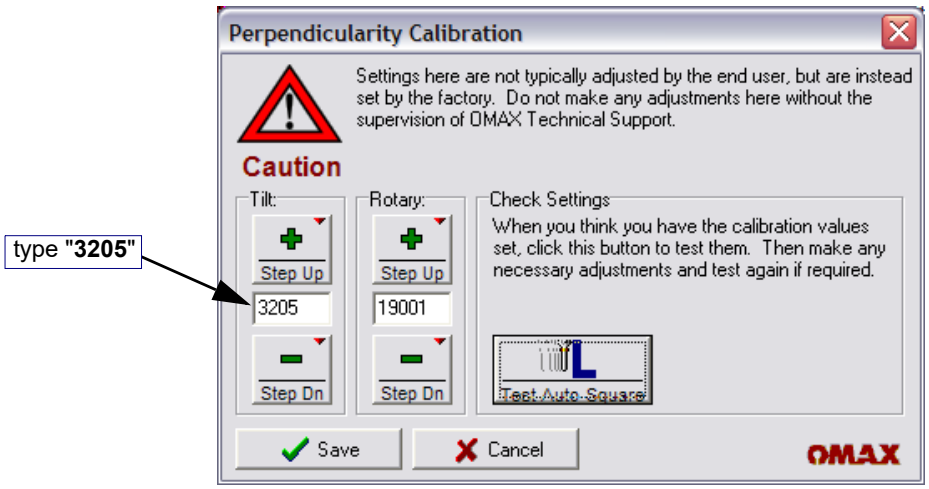


Figure 20

6. Perform the A-Jet Alignment calibration to fine-tune the alignment.

A-Jet Maintenance

Tools Required

	Tool	On/Off Valve Rebuild	Nipple Replacement	Swivel Rebuild	Abrasive feed Tube Replacement
	Component drawings	P/N 400645		P/N 400646	
	1/2 in.				
	5/8 in.				
	13/16 in.				
	1 in.				
	1-1/8 in.				
	1-1/8 in.				
	Torque wrench	(to set 25 in-lb; 225 in-lb)		(to set 25 ft-lb)	
	Blue Goop®				
	Lubriplate®				
	Loctite® #2760 (provided)				
	2.5mm				
	3mm				
	5mm				
	6mm				
	3/8 in.				
	3/8 in. Allen hex socket				
	Large flat-tipped				
	#2 Phillips				
	Soft-jawed vise				
	Diagonal cutters				
	A-Jet Tooling Kit *				
	Seal pack ejector tool (provided)				
	Seal pack push tool (provided)				
	Spanner wrench				P/N 304512
	Tie wraps				
	Electrical tape				
	Measuring tape (to 8 ft)				

General Maintenance Procedures

Follow these steps any time you perform any maintenance on the A-Jet assembly.

Caution: ***All components removed from the A-Jet assembly should be cleaned prior to/during maintenance, and all maintenance should be performed in a clean environment. Any introduction of dirt or contaminants will negatively impact the functionality of the A-Jet.***

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

1. Clear the work area of all materials to allow sufficient room for **A-Jet** disassembly.
2. Position the **A-Jet** at a location on the **table** that allows easy maintenance access for the applicable maintenance procedure.

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

3. Ensure the main power, air, and water for the **OMAX pump** are **OFF**.

WARNING! ***WARNING! Never do maintenance on the equipment with the main AC disconnect ON or unlocked. Always follow standard lockout/tagout procedures.***

4. Bleed off the residual air pressure from the system by allowing the on/off valve on the **nozzle** to open, and ensure there is no pressurized water in the **high-pressure lines**.
5. Verify all parts, drawings, and tools required for the applicable maintenance task are available. Refer to the **A-Jet Maintenance**, **Tools Required** section on page 11 for tools and drawings.
6. Place a tray under the **A-Jet** to prevent dropped items from falling into the **catcher tank**.
7. Remove all dirt, abrasive, water, and any other contamination from the **A-Jet** and its components.
8. Pull the **abrasive feed tube** from the **nozzle assembly**.

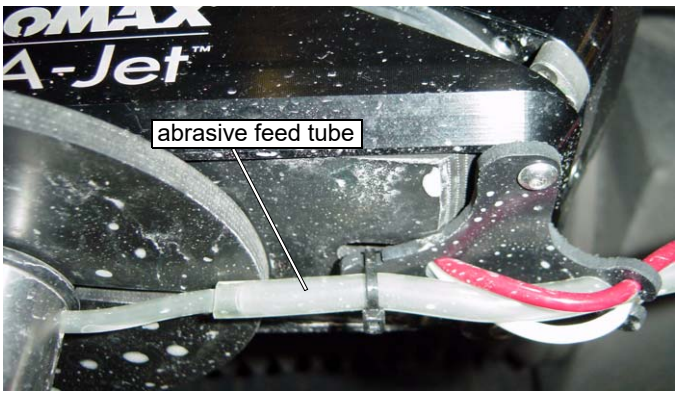


Figure 21

9. If not already done, remove the **nozzle assembly** from the **A-Jet assembly** per OMAX-specified nozzle removal procedures.

10. Remove the A-Jet **splash guard**.

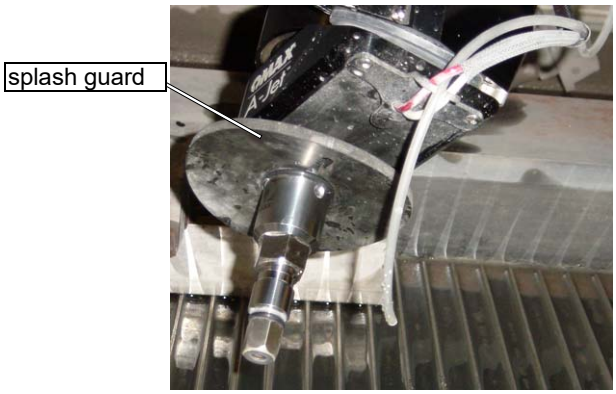


Figure 22

11. Remove the **last chance screen** and **ring seal assembly** from the **nozzle inlet body**.


last chance screen

ring seal assembly

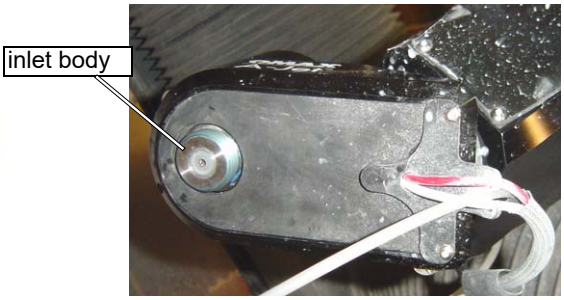


Figure 23

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.*

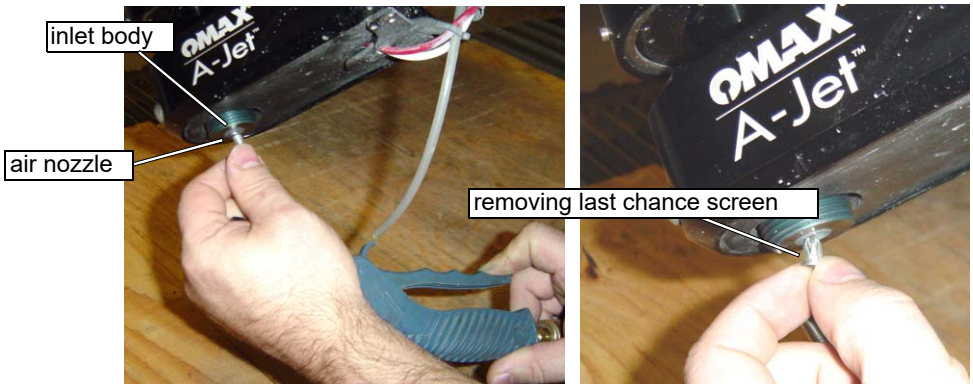


Figure 24

12. Perform maintenance and re-assemble the **A-Jet assembly**.

Note: *Do not attach the nozzle assembly at this time!*

13. Flush the **machine** after maintenance as follows:
    a. Turn **ON** air, power, and water.
    b. Turn the **pump** and **charge pump ON**.
    c. Turn the **table controller ON**.

d. Rotate the **A-Jet** to its vertical position.

e. Position the **A-Jet assembly** about 4-5 in. above the table slats.

Note: *To minimize splashing, you could position it over Jet-Brick™ or place a piece of cardboard or rags over the slats beneath the A-Jet.*

f. Open **Make**.

g. In the main menu, select **File**/**Open**.

h. Right-click in the white space to open your permanent bookmarks.

i. Click **OMAX Sample Files (for all users)**.

j. Select **Machine_Diagnostic_Files**.

k. Scroll down the list, select **CycleTest_NoAbrasive_100_Cycles.ord**, and click **OK**.

l. Click **Begin Machining** then click **Start**.

m. Inspect the system for leaks and repair any found.

n. If no leaks are found, clean and insert the **final filter screen** components.

14. Install the **nozzle assembly** components per OMAX specified procedures.

Note: *When installed in the nozzle body, the ring seal and filter screen should be flush with each other.*

15. In **Make**, click the **Test** button.

16. From the **Test Pump and Nozzle** dialog box, select **Pump Only (Jet is off, Main Pump is active)**, and for **Pump Pressure**, select **Low**:

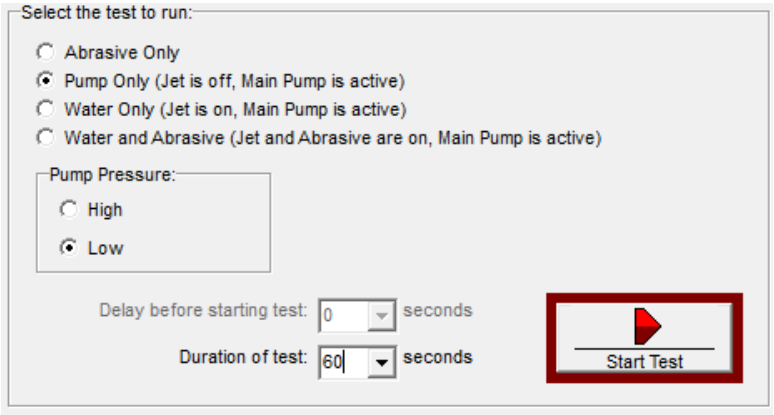


Figure 25

17. Click the **Start Test** button and inspect the system for water leaks. Let the test run for the full minute.

18. From the **Test Pump and Nozzle** dialog box, select **Pump Only (Jet is off, Main Pump is active)**, and for **Pump Pressure**, select **High**:

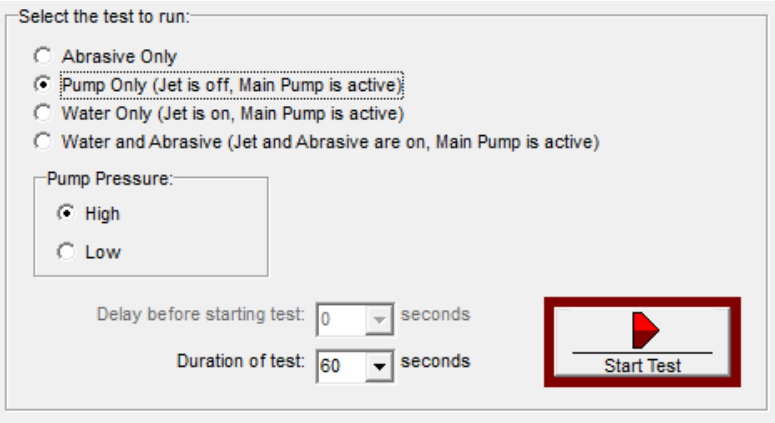


Figure 26

19. Click the **Start Test** button and inspect the system for water leaks. Let the test run for the full minute.
20. If leaks are observed, perform realignment of applicable components, or repair as needed.
21. Repeat steps 3-20 until the system is performing without any leaks.
22. Once the system tests and repairs are complete, attach the **splash guard** and **abrasive feed tube**.

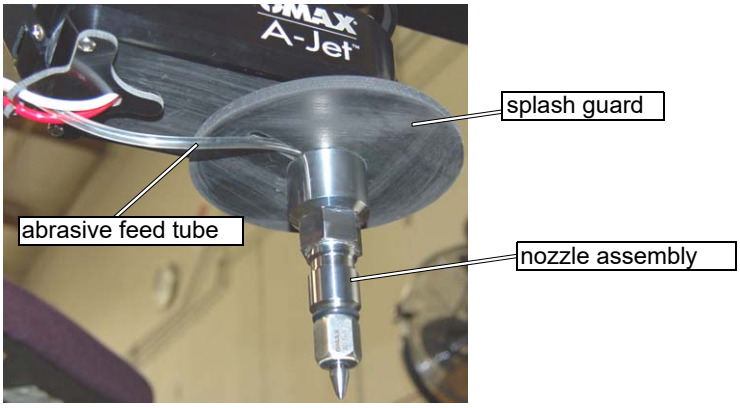


Figure 27

23. Recalibrate the **A-Jet** using the **A-Jet Squareness Calibration Wizard**.

Note: *You will also need to perform the A-Jet Precision Calibration to re-establish the A-Jet error map if precision calibration had been performed previously.*

A-Jet Hardware and Component Alignment

As a general practice, but especially with A-Jet components, alignment and proper assembly of tubing, fittings, and all components is highly critical. The following best practices are designed to prevent leaks when assembling A-Jet and attached components.

- All plumbing should be installed so there is no tension, twisting, or binding, when the components are assembled. To prevent these issues:
  - o Use the appropriate lubricants called out in assembly/rebuild instructions.
  - o Make sure the components are aligned correctly before tightening, and that they are ‘relaxed’ (not bound, twisted, pulled, pushed, or tensioned to get them to fit). This should hold true

through the whole assembly. One part out of alignment or ‘bound’ at one point will affect other component functionality downstream.

The plates in some areas are adjustable to assist with alignment (Figure 31).

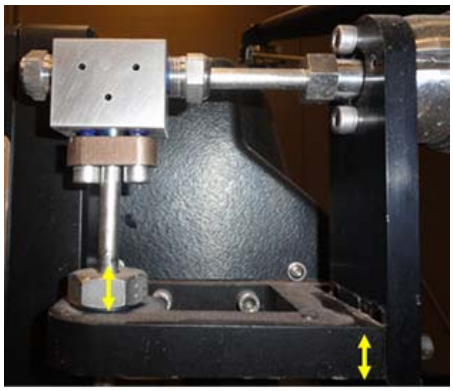


Figure 28

- Keep all components loose until you know they are aligned properly. Hand-tighten components first, then alternate back and forth between the end components when tightening to the specified values.
- Keep gaps even when tightening bar or collar clamps by alternating back and forth between the screws when tightening.

- Replace any high-pressure components that are damaged.

Shear-Screw Replacement

In the event of a hard nozzle crash, the three A-Jet shear screws are designed to break away and reduce damage to other critical components inside the assembly.

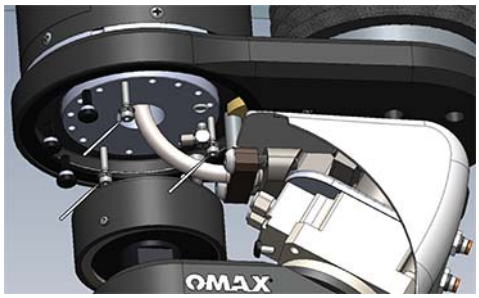


Figure 29

These shear screws need to be replaced whenever damaged or the machine faults due to a head crash.

To replace these screws, refer to the OMAX document, **400716**, **A-Jet Shear-Screw Replacement Procedure** for instructions.

A-Jet Inlet Body and Pull to Open Valve Rebuild

This section details the repair of the OMAX A-Jet Inlet Body and Pull to Open valve. These components require rebuild or replacement whenever water begins leaking from either the nozzle tip or the nozzle weep hole.

Figure 33

Rebuilding the A-Jet Pull to Open Valve

Follow these procedures to replace the stem in the A-Jet Pull to Open valve. Do not disassemble any other parts of the air actuator assembly. Disassembly of the air actuator will compromise the actuator functionality. If the assembly quits working, it cannot be repaired and must be replaced.

Note: *Ensure that all the General Maintenance Procedures, page 12, have been followed before proceeding.*

Remove the Air Actuator

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

Note: *DO NOT remove the inlet body during this portion of the rebuild. Removing it will require A-Jet recalibration.*

1. 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.

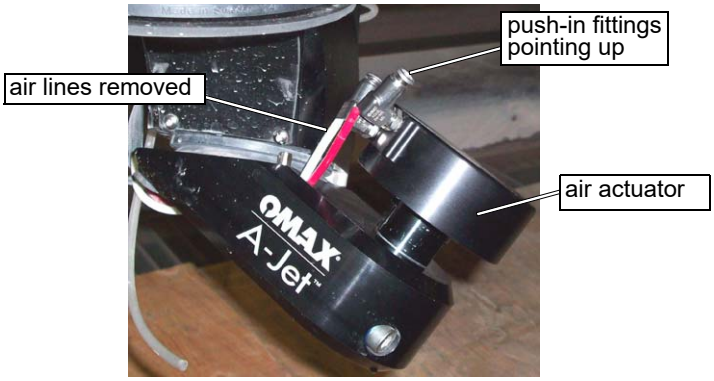


Figure 34

2. Loosen the **air actuator** from the **inlet body**. 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.***

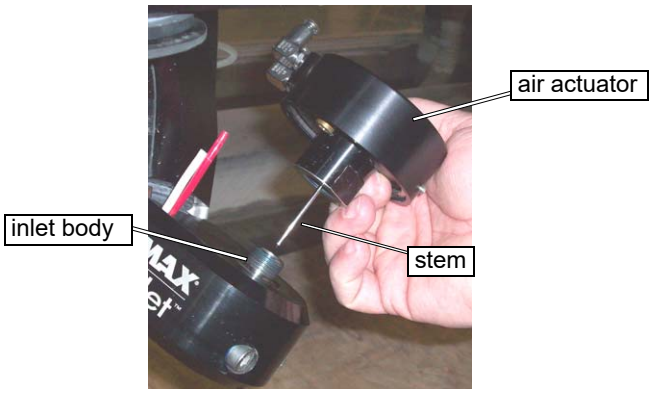


Figure 35

3. Move the **air actuator** to a clean work area for rebuilding.

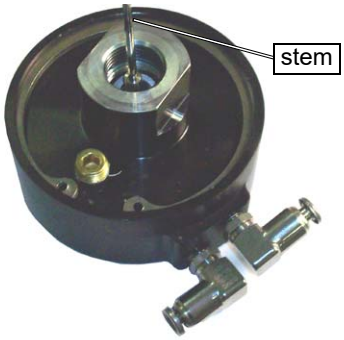


Figure 36

Rebuilding the Air Actuator Assembly

Follow these steps to replace the stem in the air actuator assembly

1. Loosen but do not remove the **Air Actuator** set screw.

Figure 37

2. Remove the small **snap ring** that holds the **stem assembly** in place.

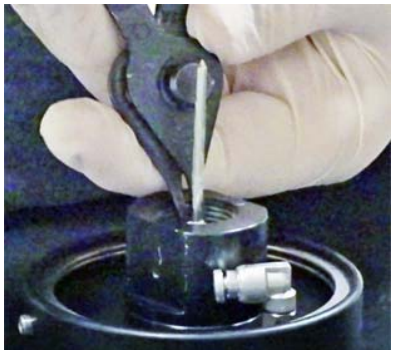



Figure 38

3. Remove and discard the **stem** from the **air actuator**.
4. Place a new **stem** into the **air actuator**.

Figure 39

5. Replace the small **snap ring** that secures the **stem** to the **air actuator**.


Figure 40

Note: *Following insertion of the snap ring, always tug out on the stem to ensure it is held firmly.*

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** (see Figure 42) 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.

Figure 41

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 **seat** from the **inlet valve body**.

Figure 42

Rebuilding the Inlet Body

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

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

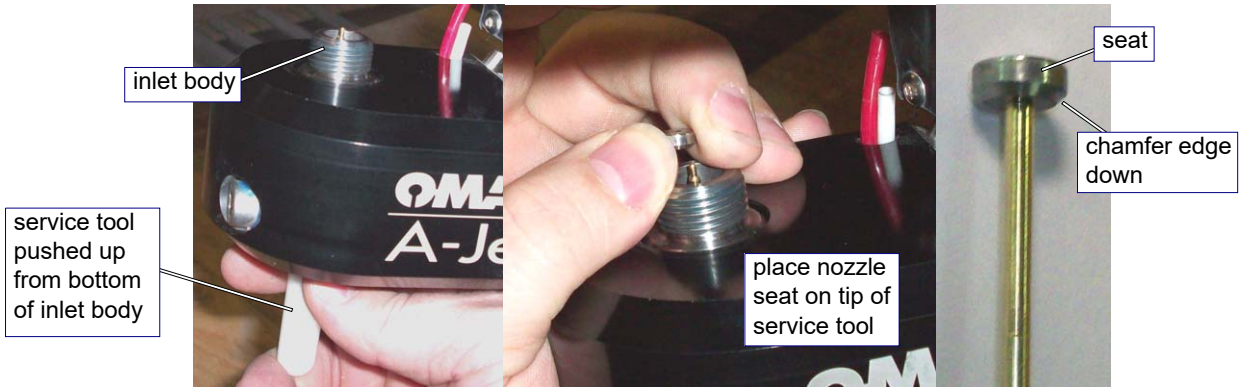


Figure 43

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

Note: *To assure the seat remains oriented correctly, use a small Allen wrench to hold the seat against the tool as the service tool is pulled out. Also, you should do a visual inspection using a flashlight to ensure the seat has not flipped over.*

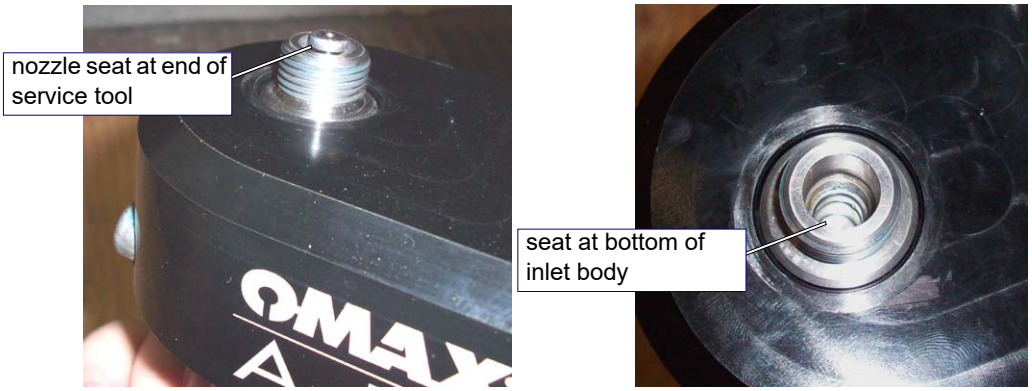


Figure 44

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

Figure 45

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):

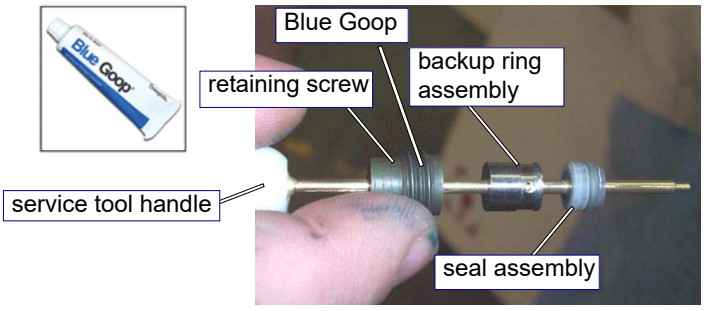


Figure 46

6. Lubricate the **seal assembly** components using Lubriplate

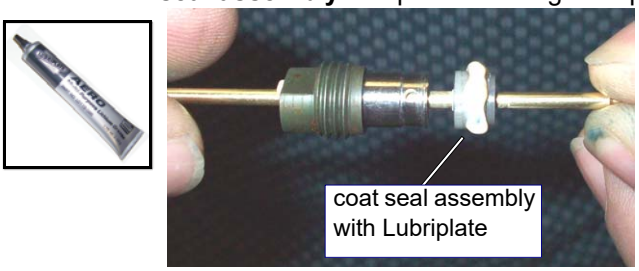


Figure 47

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**.

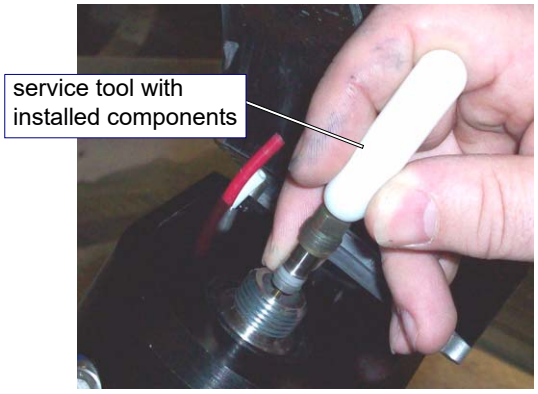


Figure 48

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** (Figure 50):

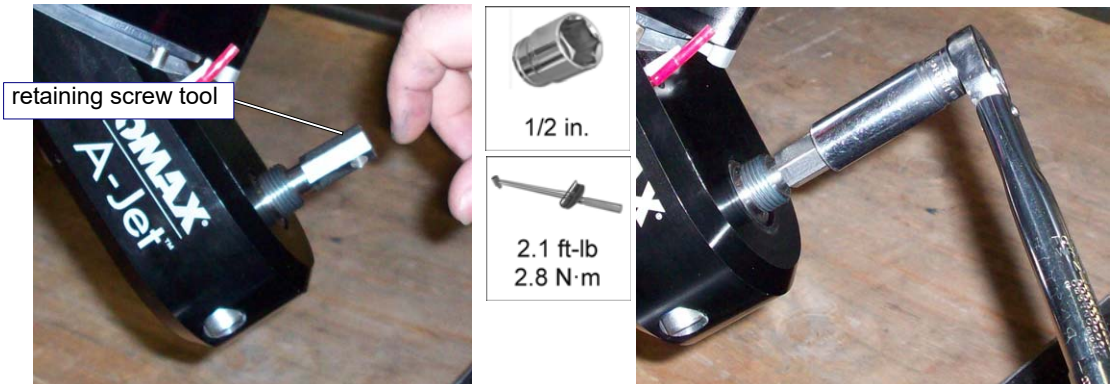


Figure 49

Attaching the Air Actuator

Follow these steps to attach 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**.

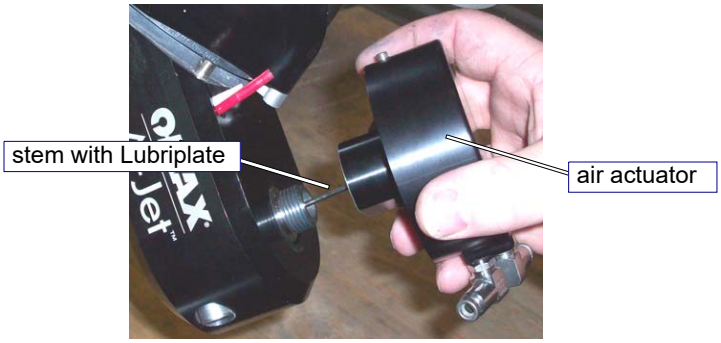


Figure 50

3. Torque the **air actuator**. (Show new A-Jet wrench icon if we have one.)

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

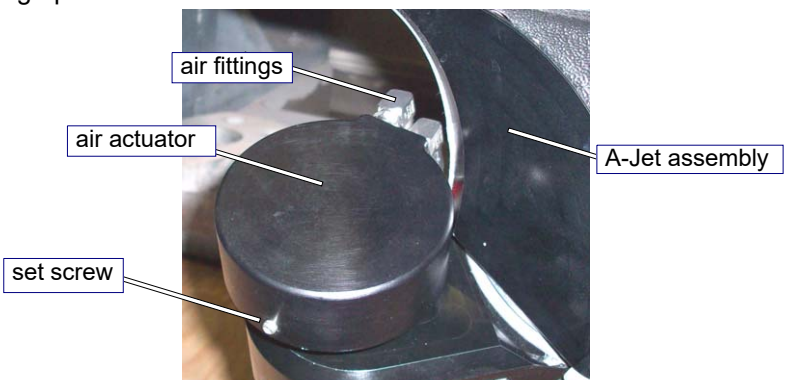


Figure 51

Note: *Tighten the air actuator set screw until snug (Figure 52). If the actuator cover has rotated causing the air fittings to make contact, loosen the set screw and reposition the cover so that contact is no longer possible. Gently tighten the set screw with the cover pulled all the way up.*

5. Attach the **air hoses** to the air actuator's **air fittings**.

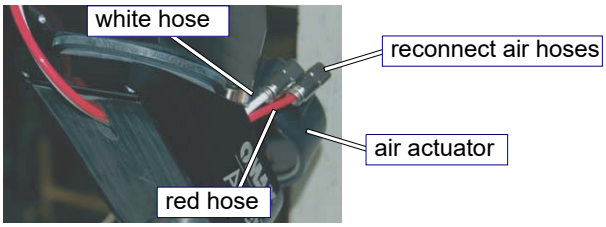


Figure 52

6. Flush the system and perform leak tests per instructions provided on page 13, step 13, **Flush the machine after maintenance**.

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

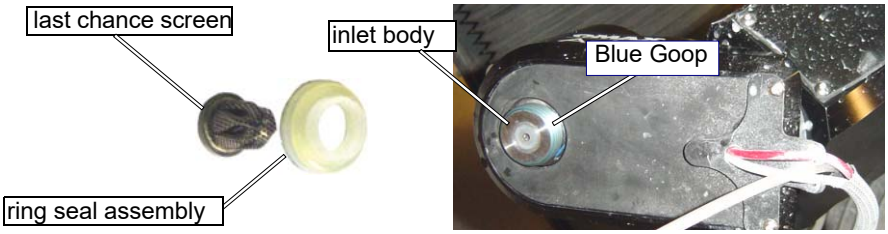


Figure 53

Note: *When installed in the nozzle body, the ring seal and filter screen should be flush with each other.*

8. Apply a thin coat of **Blue Goop** onto the **threads** on both the **inlet body** and **nozzle assembly**.

9. Re-install the **large O-ring** (if removed) onto the **nozzle body**.
10. Slide the **splash guard** over the **nozzle assembly**, aligning the **abrasive inlet hole** to the **slot** in the **splash guard**.

11. Thread the **nozzle assembly** onto the **inlet body** and tighten per MAXJET 5i installation procedures.

12. Insert the **abrasive feed tube** through the **splash guard** and into its **nozzle opening**.

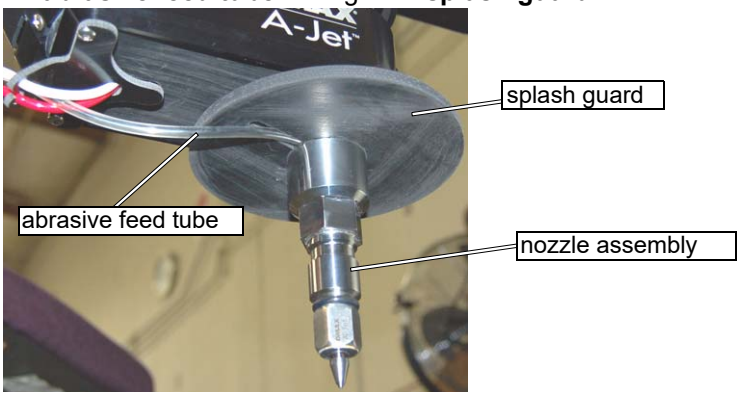


Figure 54

13. Recalibrate the **A-Jet** using the **The A-Jet Squareness Calibration Wizard** and precision calibrate if applicable.

Troubleshooting

Pull to Open 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.

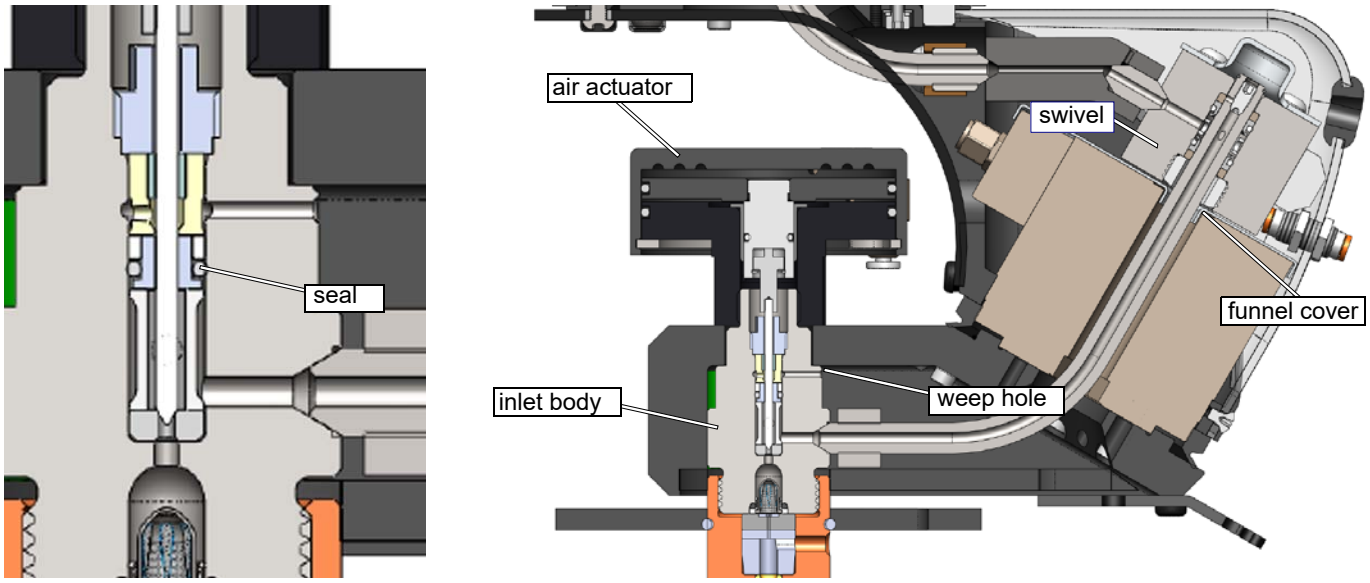


Figure 55

A-Jet Tilt Nipple Replacement and Swivel Rebuild

This section details the rebuild of the high-pressure collared swivel, and replacement of the A-Jet tilt nipple. The collared swivel requires seal replacement whenever water leaks from the swivel seals are detected. The A-Jet tilt nipple (P/N 307841) requires inspection/replacement whenever large quantities of water leak from the A-Jet collared swivel.

Figure 57

Verifying Causes of Leaks

Caution: ***Water leaks can appear to be coming from the A-Jet swivel, when, in fact, they are caused by loose high-pressure fittings, joints, or plugs. 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.***

- Retighten, realign, 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 nipple set screw plug is seated correctly and tightened securely (see Figure 58 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 58). If the nipple has a broken piece in the swivel assembly, that piece could fly out with extreme force.***

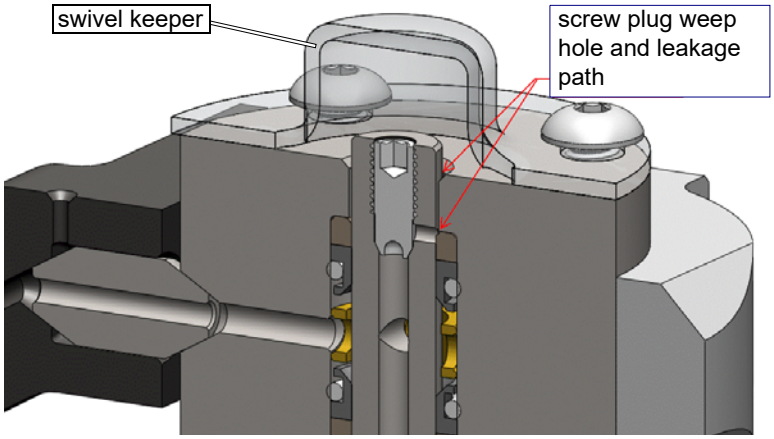


Figure 58

Note: *Water from a leaking screw plug will not exit through the threads but through the weep hole identified in Figure* 58.

- If water exits through the set screw plug weep hole, remove and reinstall the set 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.

Rebuilding the A-Jet Collared Swivel

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

Note: *Ensure that all the General Maintenance Procedures, page 12, have been followed before proceeding.*

Removing the Swivel from the A-Jet Assembly

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

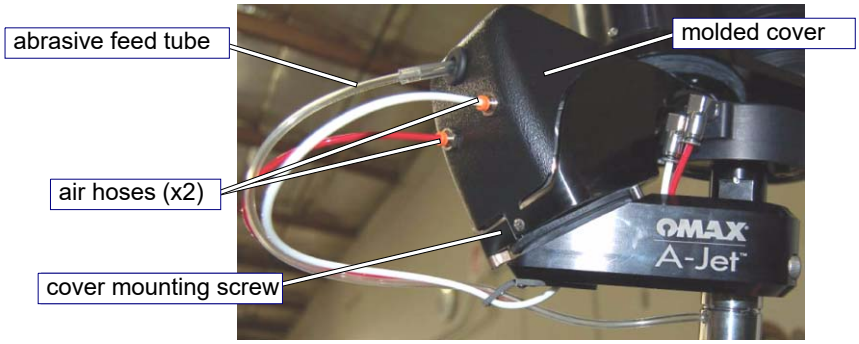


Figure 59

2. Remove the single cover **mounting screw** and carefully pull back (do not lift up) the **molded cover** exposing the **swivel** and **internal hoses**.

Figure 60

3. Disconnect the **internal hoses** from the **hose fittings** inside the **molded cover**.
4. Remove the **molded cover**.

5. Remove the two **M8 screws** holding the **swivel collar**.

Caution: ***Use the wrench to stabilize the clamp and prevent twisting the A-Jet as you loosen the screws.***

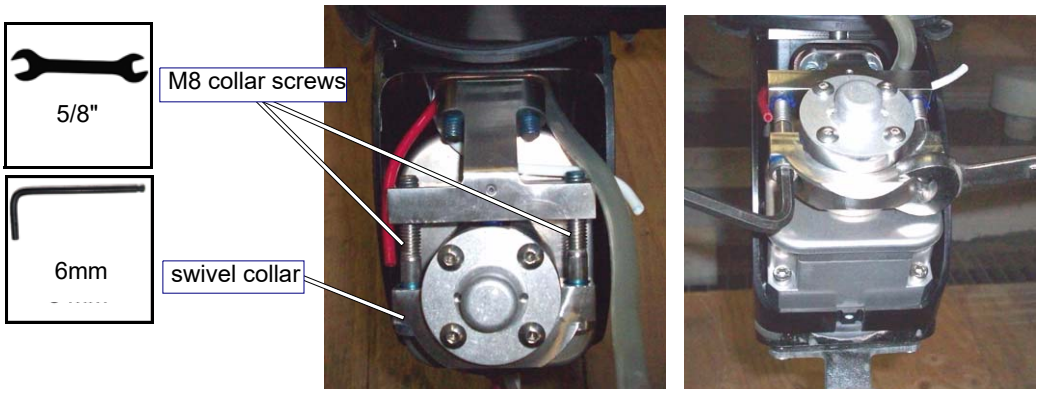


Figure 61

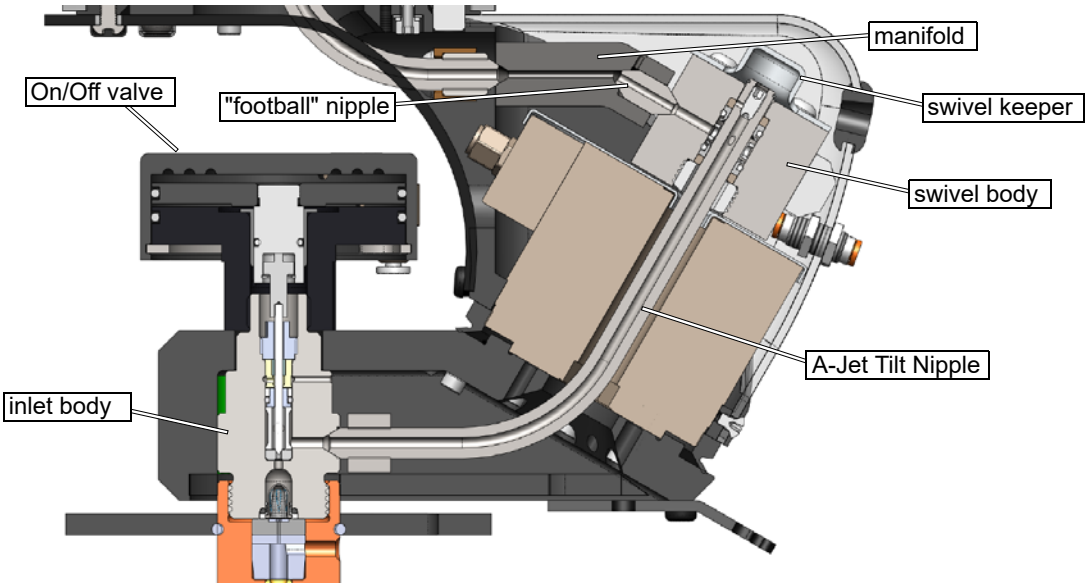


Figure 62

6. Push back the **manifold** from the **swivel body** to expose the **'football' nipple** (Figure 62) connecting the **manifold** with the **swivel body**. Use care to avoid the **electrical cables**. If the **cable sheath** is cut, water can leak into the **actuator**.

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

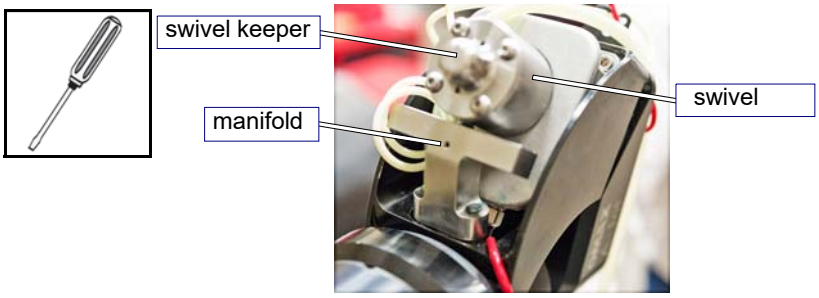


Figure 63

7. When the **football nipple** no longer makes contact with the **swivel**, pull the **swivel** up, removing it from the **tilt nipple**.

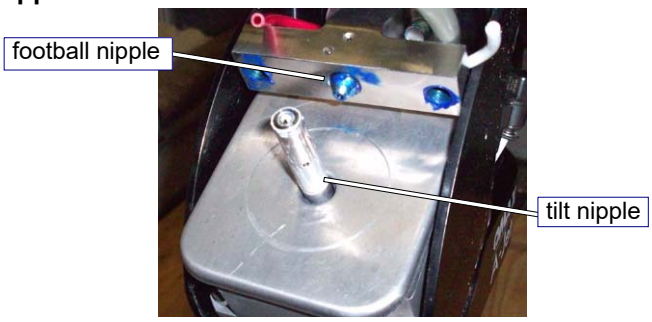


Figure 64

8. Remove the **football nipple**, clean, inspect and set it aside to ensure it does not get lost. If damaged, replace it. A blast of air may be used to aid nipple removal.

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

9. Move the **swivel body** to a clean work area for disassembly and rebuild.

Rebuilding the A-Jet Swivel

1. Remove the four **screws** holding the **swivel keeper** to the **swivel body**.

Figure 65

2. Place the **swivel body** in a vise (not soft jaws) with the flat side of the **swivel** against the flat jaw of the vise and tighten it securely to allow removal of the **hollow set screw**.

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!***

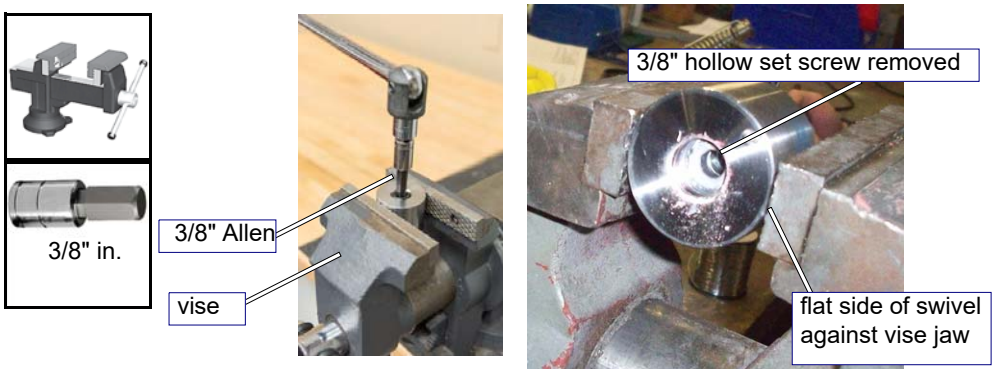


Figure 66

Note: *If the vise jaws are unable to hold the swivel tight enough, the vise 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 **swivel cage**.

Figure 67

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

Reassembling the A-Jet Swivel

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

Figure 68

Caution: ***Do not drop the backup ring. If the sharp edge (flat end) is damaged, discard and replace with a new backup ring.***

2. Apply Lubriplate to the two **O-rings** and then mount each onto a **seal** as illustrated in Figure 69.

Figure 69

3. Install each **seal kit component** in the **swivel body** exactly as follows:

Note: *Component will be inserted into the swivel body one at a time using the push tool. This prevents the seals from being pulled out as the push tool is removed.*

a. Place the **slider** onto the push tool as shown in Figure 70. Slide the first **backup ring** onto the push tool next to the **slider** with the **chamfer side facing away** from the **slider**.

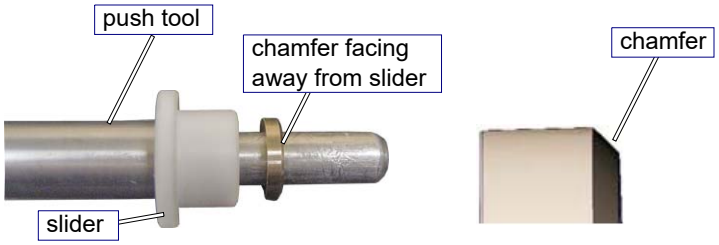


Figure 70

b. Place the **swivel body** on the workbench with the threaded side facing up.

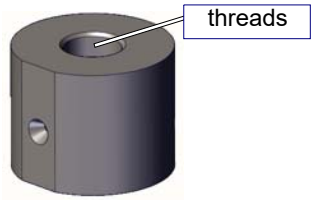


Figure 71

c. Hold the **backup ring** and slider (Figure 72) in place on the push tool with your finger. Then insert the slider and **backup ring** into the **swivel body** until the top of the slider is flush with the **swivel body**.

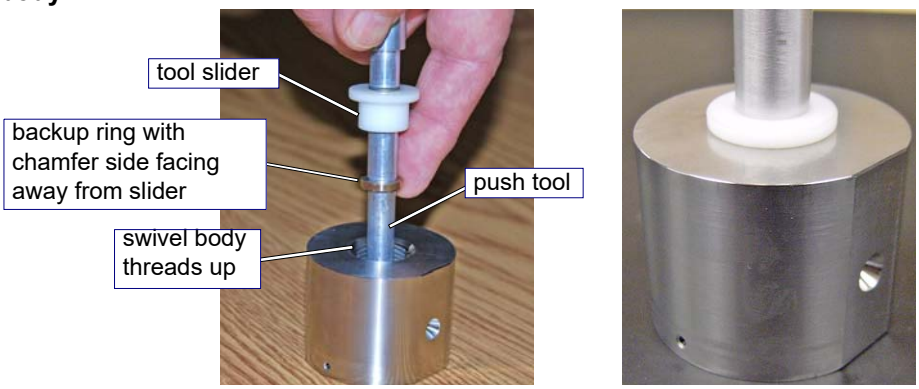


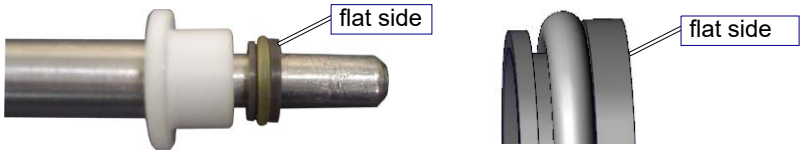
Figure 72

Caution: ***Use care to not damage the backup ring's flat face and sharp edge!***

d. Hold the push tool slider next to the **swivel body** while pulling the tool out of both the **swivel body** and slider. Then, remove the slider, leaving the **backup ring** in place:

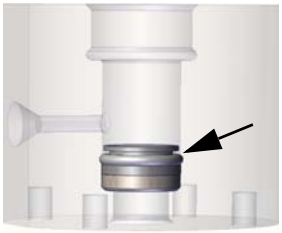
Figure 73

e. Again, place the slider onto the push tool and slide an **O-ring seal assembly** onto the push tool next to the slider with the flat side of the **seal** facing away from the slider.



f. Insert the push tool slider and the **O-ring seal assembly** into the **swivel body** until the top of the slider is flush with the **swivel body** (Figure 73).

g. Hold the slider next to the **swivel body** while pulling the tool from both the **swivel body** and slider. Then, remove the slider, leaving the **O-ring seal assembly** in place:

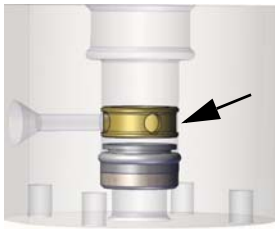


h. Place the slider back onto the push tool and slide the **cage** onto the push tool next to the slider.

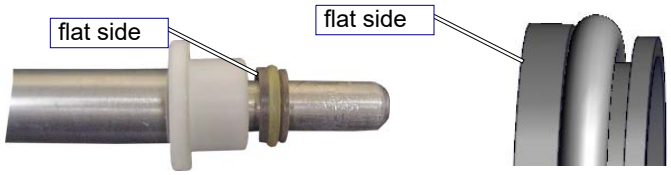
i. Insert the slider and the **cage** into the **swivel body** until the top of the slider is flush with the **swivel body** (Figure 73).

Note: *The cage is bidirectional.*

j. Hold the slider next to the **swivel body** while pulling the tool from both the **swivel body** and slider. Remove the slider, leaving the **cage** in place:

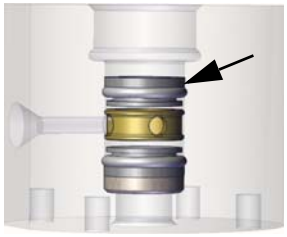


k. Place the slider onto the push tool again and slide an **O-ring seal assembly** onto the push tool next to the slider with the flat side of the **seal** facing toward the slider.



l. Hold the **O-ring seal assembly** and slider in place on the push tool and insert the push tool slider and **O-ring seal assembly** into the **swivel body** until the top of the slider is flush with the **swivel body**.

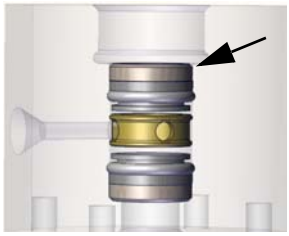
m. Hold the slider next to the **swivel body** while pulling the tool from both the **swivel body** and slider. Remove the slider, leaving the **O-ring seal assembly** in place:



n. Place the slider back onto the push tool and slide the remaining **backup ring** onto the push tool with the chamfer side facing toward the slider.

o. Hold the **backup ring** and slider in place on the push tool and insert the push tool slider and **backup ring** into the **swivel body** until the top of the slider is flush with the **swivel body**.

p. Hold the slider next to the **swivel body** while pulling the push tool from both the **swivel body** and slider, leaving the **backup ring** in place:



4. Remove the slider.
5. Remove any excess Lubriplate from the threaded area of the **swivel body**.
6. Coat the threads of the **hollow set screw** with Loctite 2760, Figure 74.

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

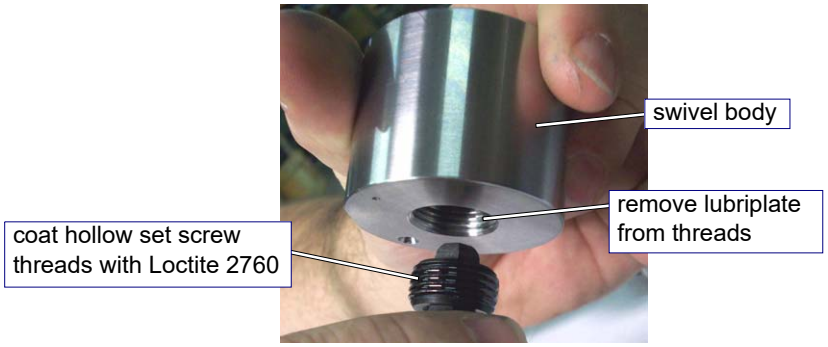


Figure 74

7. Screw the **hollow set screw** into the **swivel body** hand tight.
8. Place the **swivel body** into the vise and tighten.

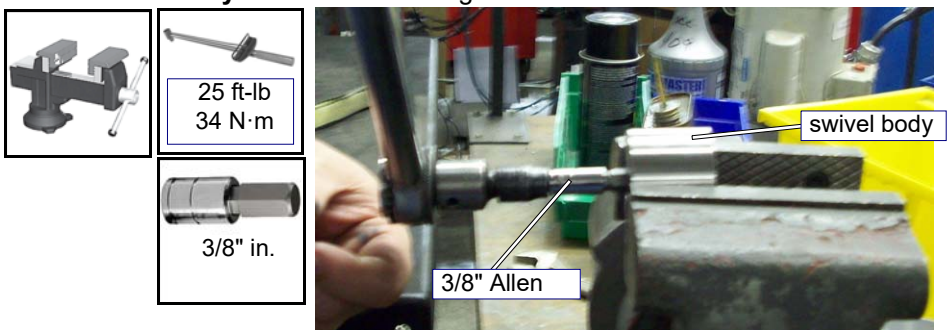


Figure 75

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

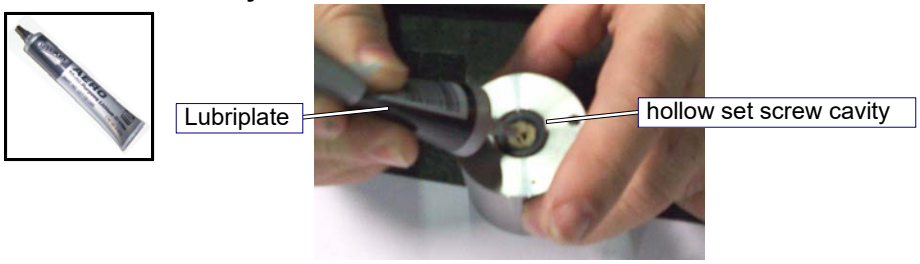


Figure 76

Replacing the A-Jet Tilt Nipple

If removing or replacing the A-Jet tilt nipple, continue from here.

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

Note: *Verify the tightness of the pull to open valve to ensure the inlet body remains in place during nipple replacement.*

1. Remove the two **M8 screws** holding the **tie bar** in place.

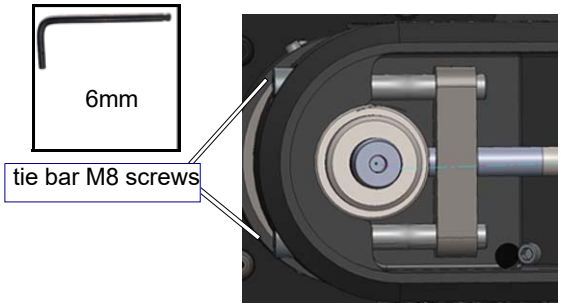


Figure 77

2. Push up on the **tilt nipple** in the **swivel body**, then pull the **tilt 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**.

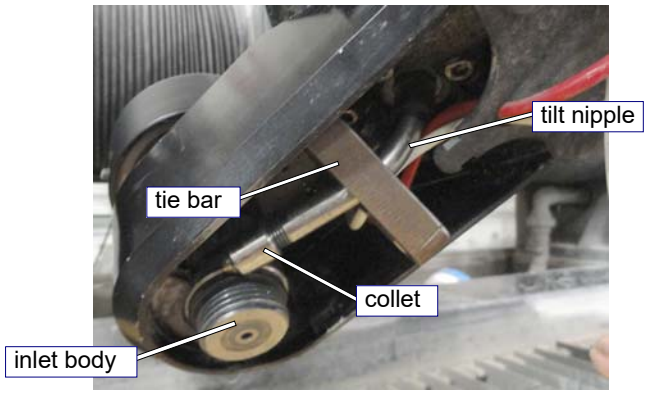


Figure 78

3. Remove the **tie bar** and **collet** from the removed **tilt nipple**.

Figure 79

4. Discard the **tilt nipple** being replaced.
5. Apply Blue Goop to the **threads** of the new **tilt nipple**.

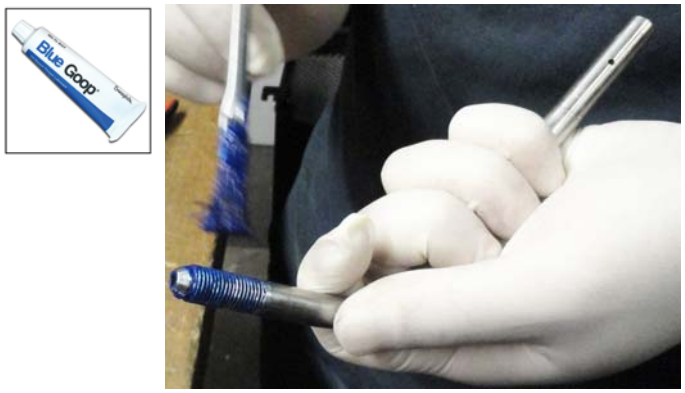


Figure 80

6. Slide the **tie bar** on and thread the **collar** onto the new **tilt nipple** assembly. Ensure the beveled side of the **tie bar** screw holes face toward the **inlet body**. Leave at least one **thread** between the **collar** and the **inlet body**.

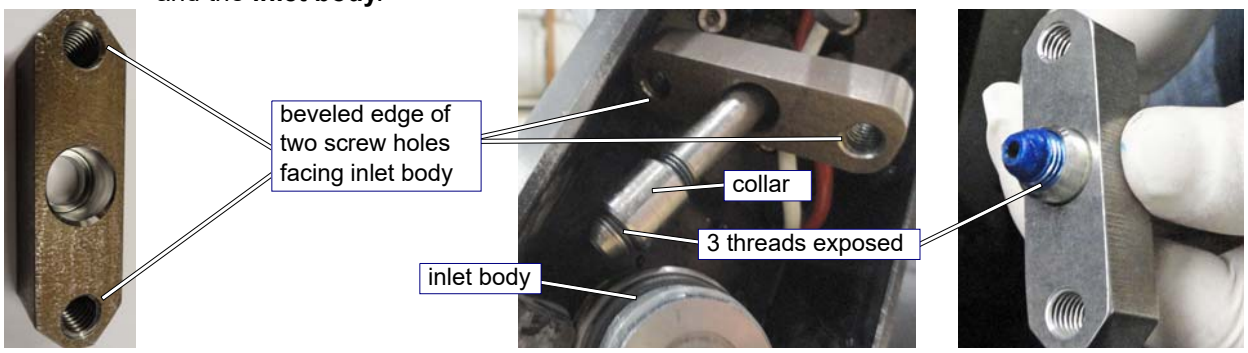


Figure 81

7. Prepare a 2.0 in. length of **tubing** used for protection and alignment of the **tilt nipple** during installation as follows:
   a. Cut out a notch from one end of the **tubing** (Figure 82).
   b. From the middle of that notch, cut a slit in the **tubing** from one end to the other.

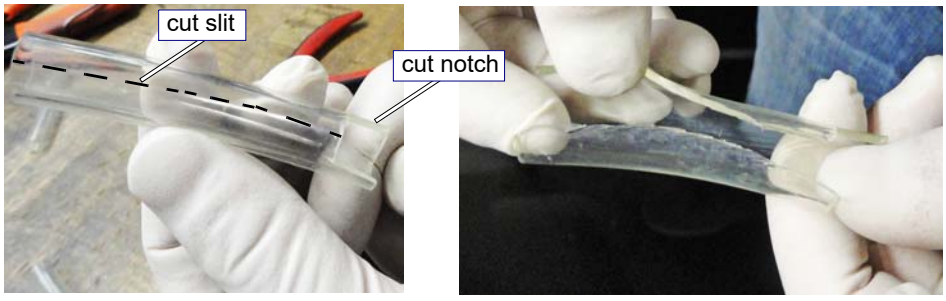


Figure 82

8. Apply a thin coating of Lubriplate to the **tilt nipple** end that will insert into the swivel body.

Figure 83

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

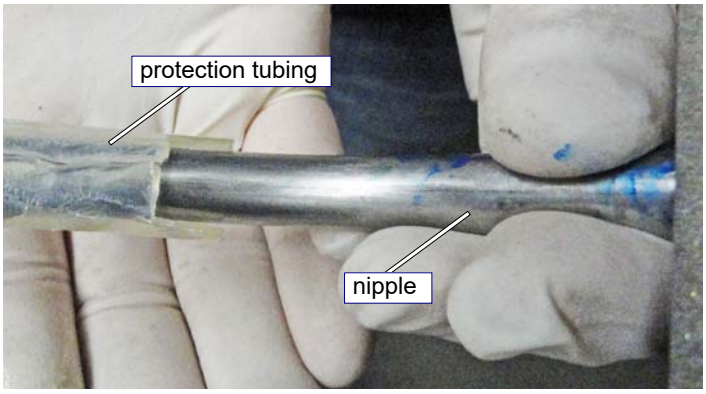


Figure 84

10. If present, remove any old protection **tubing** from the **A-Jet assembly** and discard it.

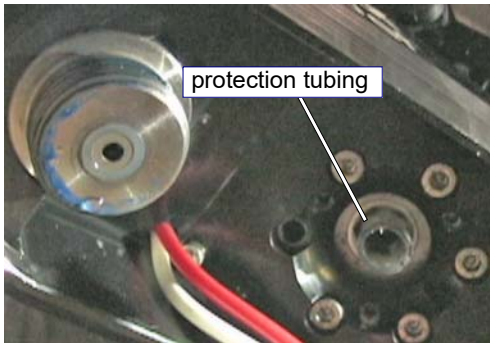


Figure 85

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

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

11. 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**.

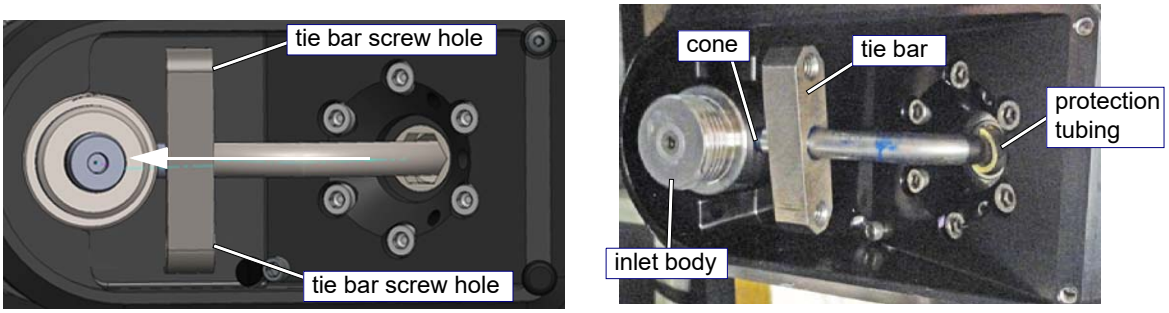


Figure 86

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

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

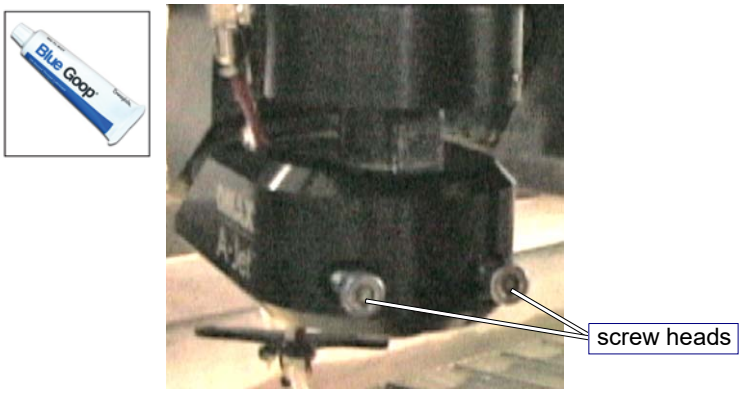


Figure 87

13. Verify that the **nipple** and **inlet body cone** remain in proper alignment while the two **screws** are being tightened.
14. Slowly begin tightening the two **tie bar screws** evenly by rotating between **screws**, being careful to keep the space between the **tie bar** and the **inlet body** even on both sides.

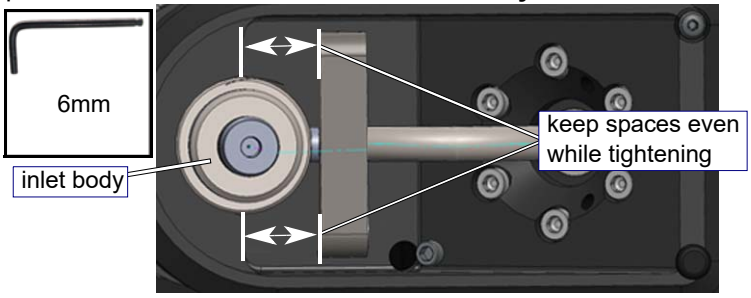


Figure 88

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.***

15. Ensure that the **inlet body** has not rotated during tightening and the **tilt nipple** and **inlet body cone** remain correctly aligned.
16. Once the **tie bar screws** are hand tight, rotate the **tilt motor** back and forth. Observe the exposed end of the **nipple** (swivel end) and verify the **nipple** does not move left or right. If it does, readjust the **tie bar** so there is no or minimal side-to-side movement of the **nipple** as the **tilt motor** is rotated.

Note: *Some front to back movement may be observed. This is because the bend of the nipple may not be exact. If excessive front to back movement is observed, contact OMAX Technical Support*

17. Remove the **protective tubing** from the **nipple assembly**.
18. Apply a thin coat of Blue Goop to the conical surfaces of the **football nipple** and re-insert it into the **manifold**.

19. Apply Lubriplate to the tip of the **tilt nipple**.

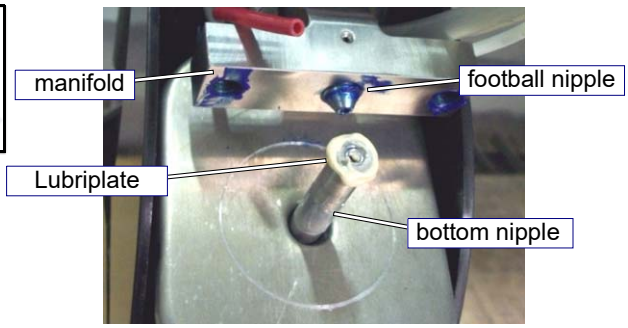
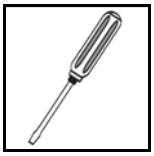


Figure 89

20. 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 32 for an example).



21. Rotate the **swivel body** until its flat side becomes parallel to the face of the **manifold**.

Caution: ***Ensure that the bottom nipple protrudes slightly above the surface of the swivel body. Refer to Figure 58, page 29, for an illustration of the correct amount of insertion.***

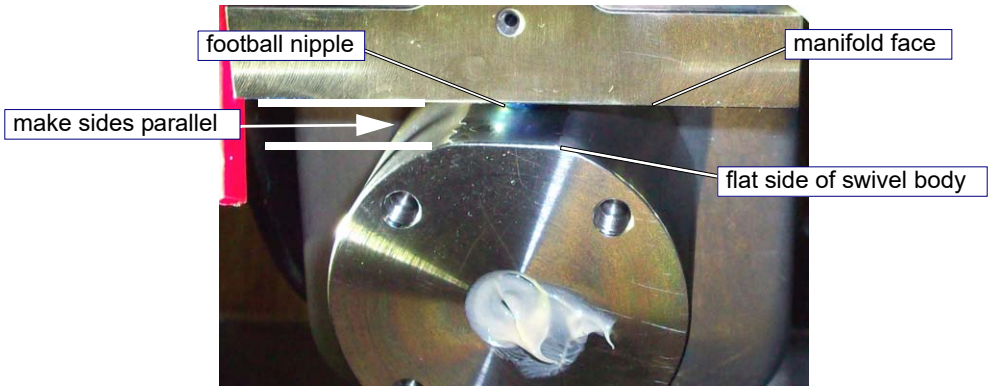


Figure 90

22. 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.

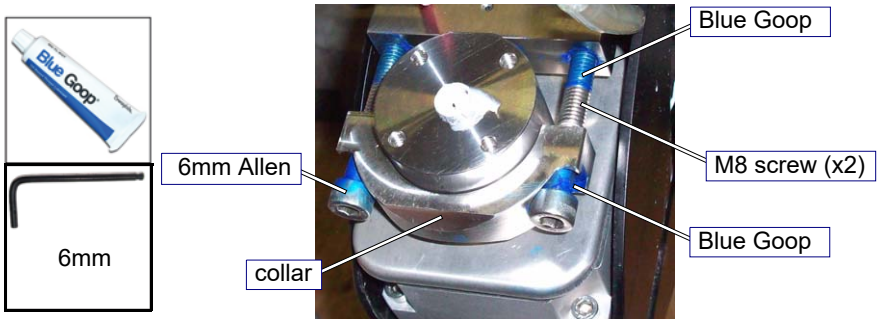


Figure 91

23. Begin tightening the two **M8 screws** 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**. If **threads** and **heads** are clean and lubricated with Blue Goop, tighten until you reach 140 in-lb (15.8 N·m). If the **threads** are not clean and lubricated, you may need to tighten the screws more (up to between 180 - 190 in-lb (20.3 - 21.5 N·m) maximum.

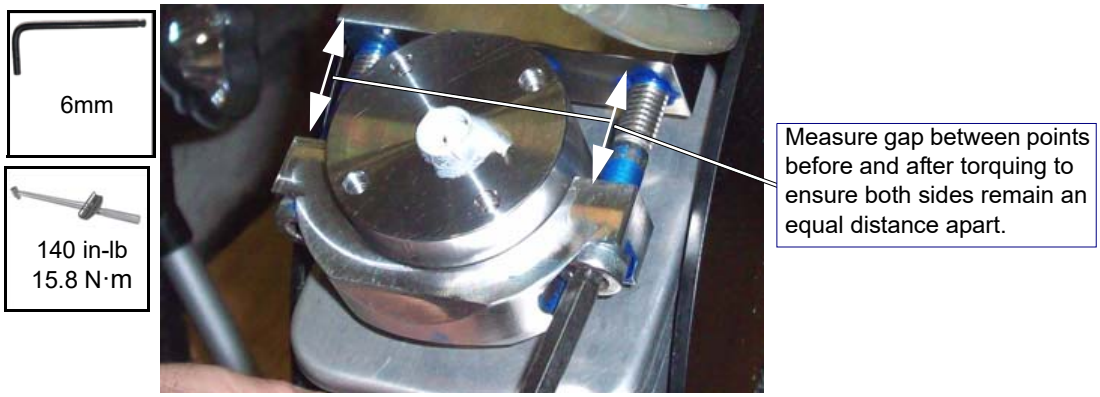


Figure 92

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

Caution: ***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.***

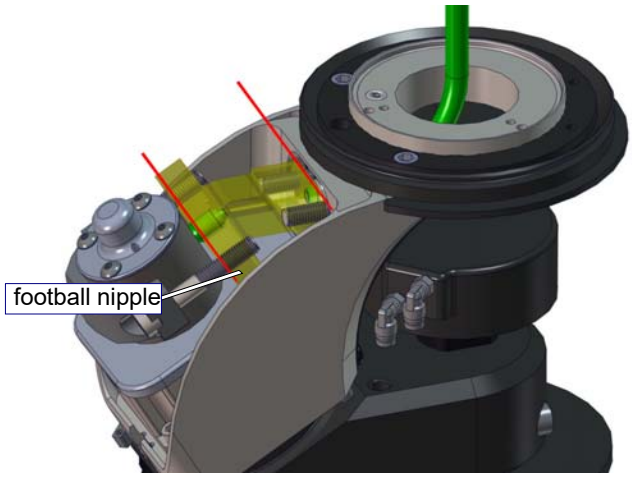


Figure 93

24. Mount the **swivel keeper** onto the top of the **swivel body** using the four **M4 screws**.

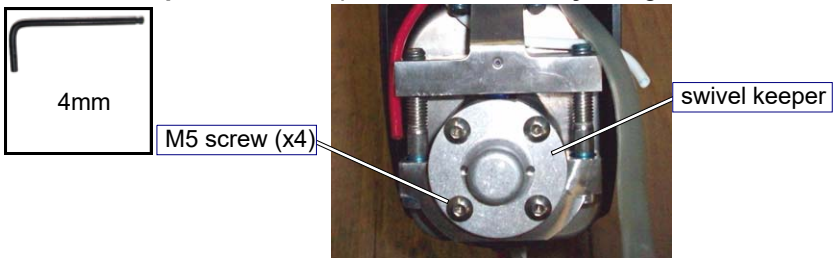


Figure 94

25. 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.***

26. 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 the procedure provided on page 13, step 13, to ensure that the nipple was successfully replaced and works without leaks.

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**.

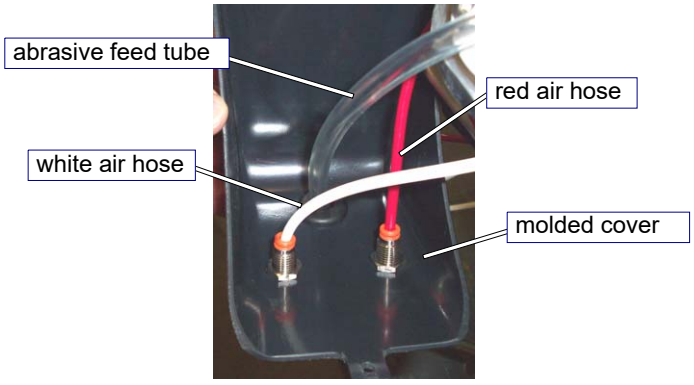


Figure 95

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

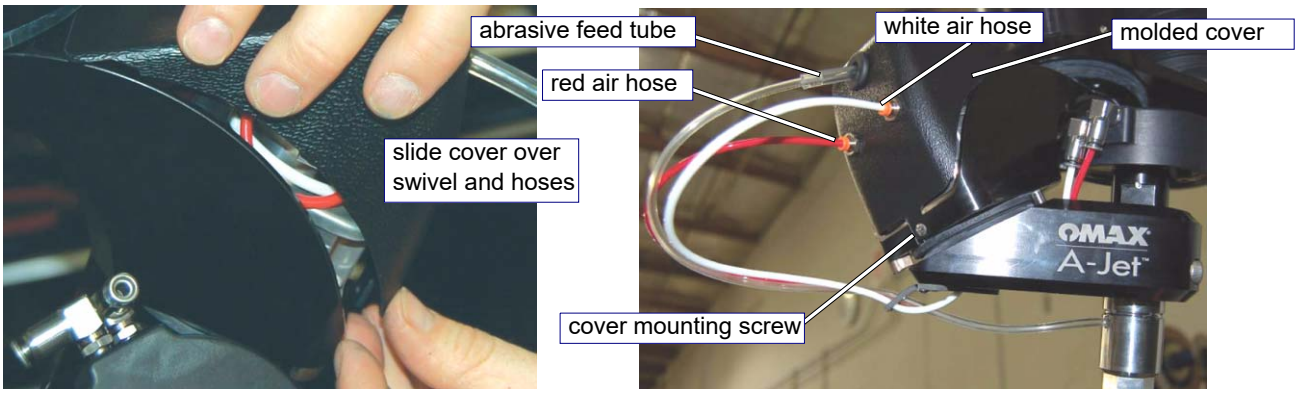


Figure 96

3. Push the **abrasive feed tube** 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**.

A-Jet Abrasive Feed Tube Replacement

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

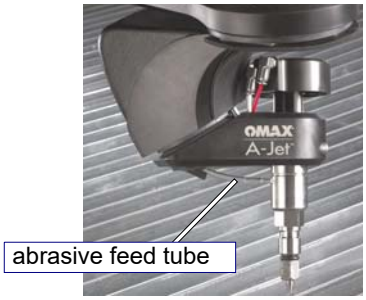


Figure 97

Replacement Parts Required

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

Tools Required

Refer to *Tools Required*, page 11, and verify that all tools required for replacing the A-Jet abrasive feed tube are available.

Getting Started

Completely read these procedures prior to replacing your A-Jet abrasive feed tube 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 feed tube** components.
3. Position the **A-Jet head** at its **center position** by squaring it to its **hard stops**.

Note: *This unwraps the abrasive feed tube 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. Bleed off the residual air pressure from the system by allowing the **on/off valve** on the **nozzle** to open and ensure there is no stored energy (pressurized water) in the **high-pressure lines**.
6. Verify that you have all the parts and tools required to replace the A-Jet **abrasive feed tube**.

Replacing the A-Jet Abrasive Feed Tube

Note: *Ensure that all the General Maintenance Procedures, page 12, have been followed before proceeding.*

1. Tilt the **A-Jet** to a position making the **splash guard** accessible.
2. Remove the **splash guard clamp bar** by unscrewing the two **M4 screws** and cutting the **tie wrap**.

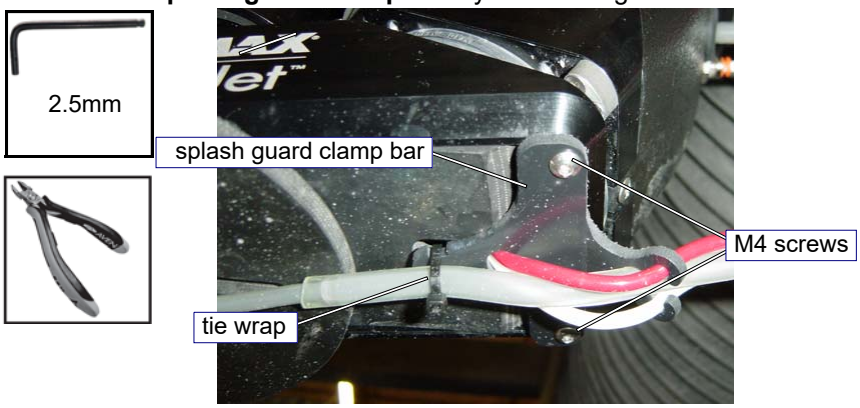
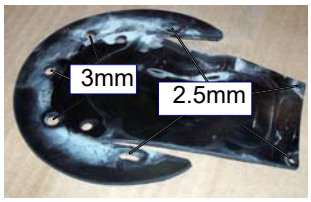


Figure 98

3. Remove the **splash guard** by unscrewing the **2.5mm 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.***



splash guard

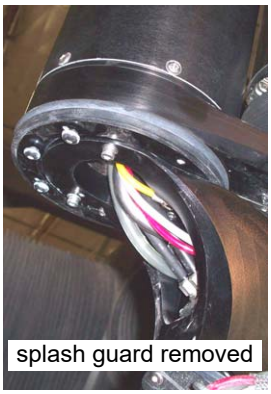


Figure 99

4. Remove the **mounting screw** that holds the **molded cover** in place. Disconnect the 2 **air hoses** from inside the **cover**. Disconnect the **abrasive feed tube** from the **nozzle**. Cut the **tie wrap** securing the **abrasive feed tube**. Pull the **abrasive feed tube** from the **nozzle assembly** and through the molded **cover**, then pull it through the **articulated arm**.

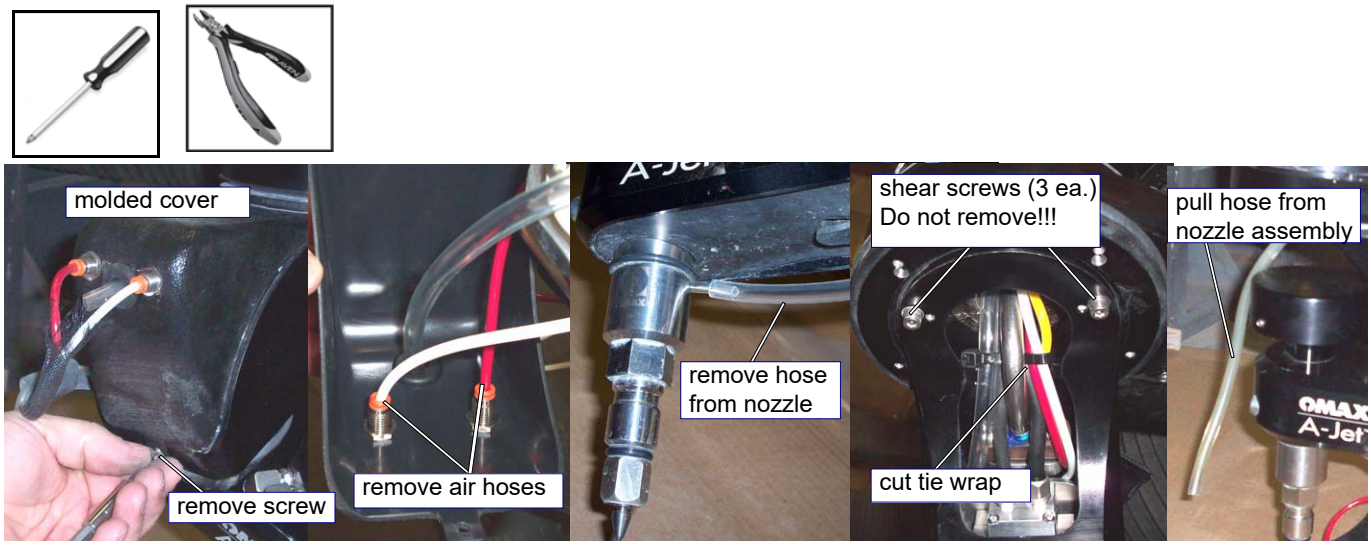


Figure 100

5. At the top of the **A-Jet assembly**, remove the two **screws** holding the **clamp bar** at the top of the **swivel assembly**.

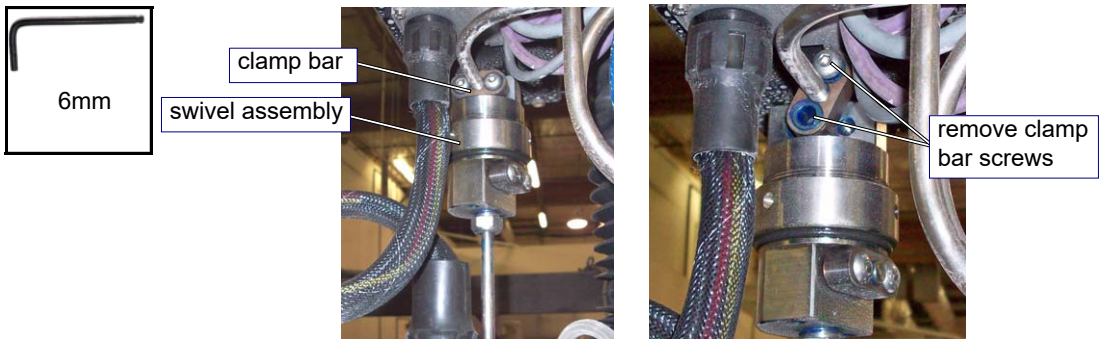


Figure 101

6. Remove the **swivel assembly** by unscrewing the bottom **gland nut** on the **high-pressure plumbing**.

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

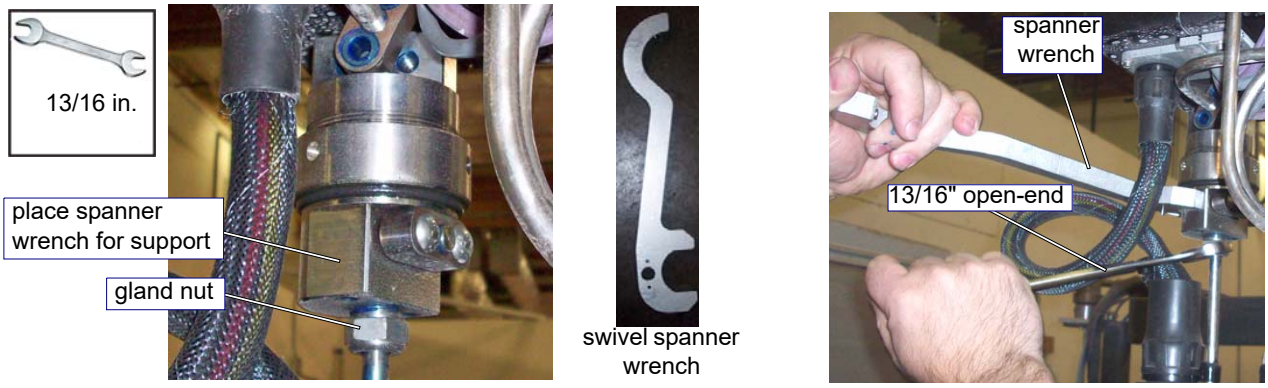


Figure 102

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

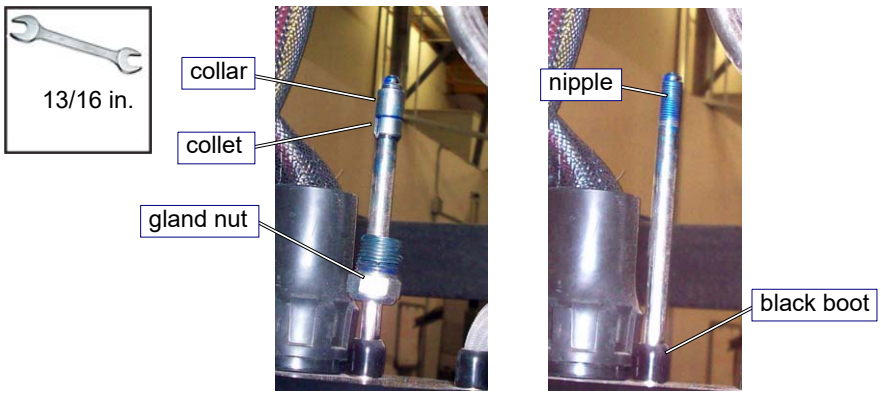


Figure 103

8. Remove the six top **screws** securing the **cap** to the A-Jet **cylindrical cover**.

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

9. Remove the six bottom **screws** securing the **base** of the A-Jet to the **cover**.

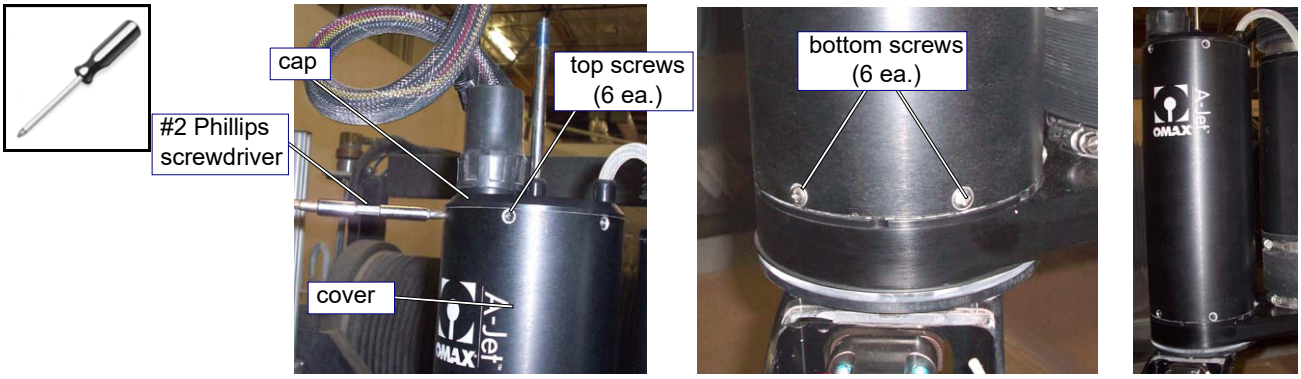


Figure 104

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

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

Figure 105

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

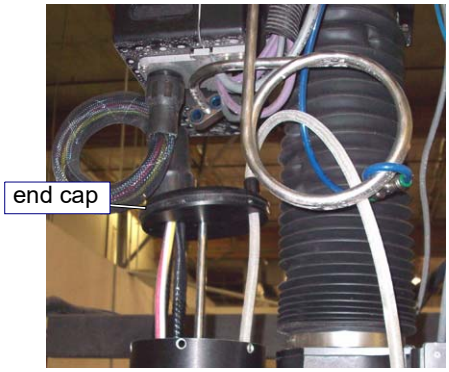


Figure 106

12. Pull the old **abrasive feed tube** out the top of the A-Jet **cap** until it is completely removed.

Figure 107

13. Disconnect the **abrasive feed tube** from the **hopper** and pull it out of the bottom slot of the **Y-carriage**.

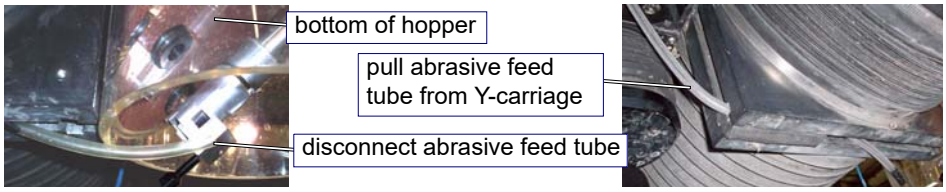


Figure 108

14. Replace the **abrasive feed tube** and **sleeve** with your new one.
15. Feed the end of the **abrasive feed tube** with the 26 in. of uncovered tubing exposed through the molded cover's **grommet** from the inside.

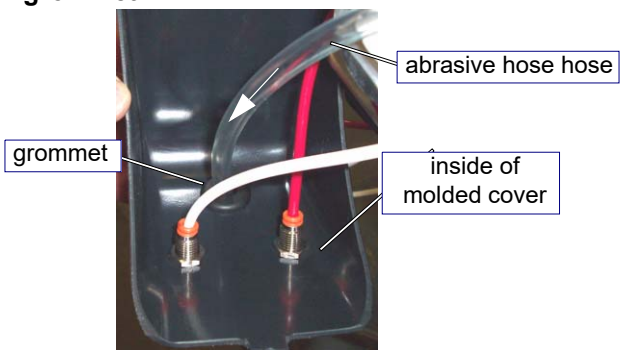


Figure 109

16. Secure the **splash guard clamp bar** using the two M4 **screws** (Figure 110).
17. 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 feed tube** then insert it into the **nozzle body**.
18. Position the **clamp bar** and adjust the length of the **abrasive feed tube** to the **nozzle body**.
19. 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 feed tube in position, but not so tight that it restricts the abrasive flow.***

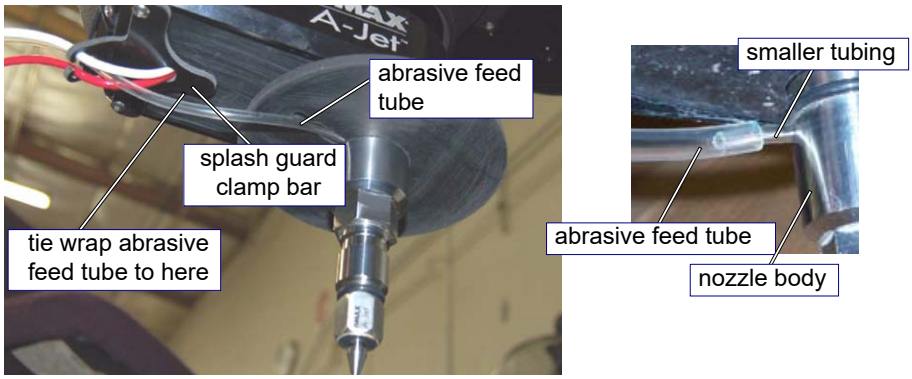


Figure 110

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

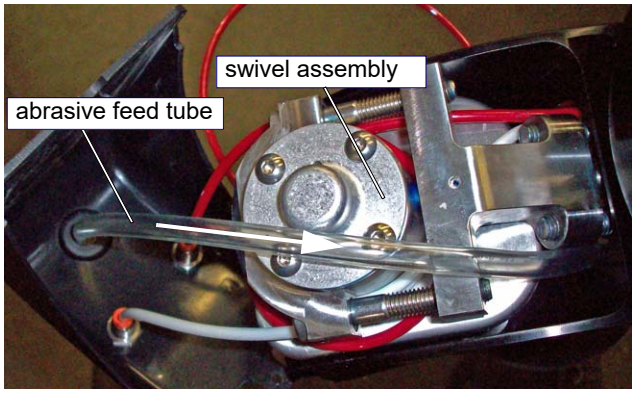


Figure 111

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

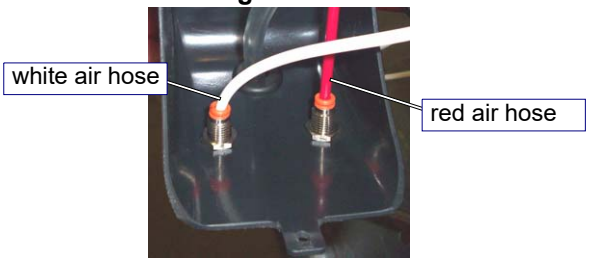


Figure 112

22. 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.***

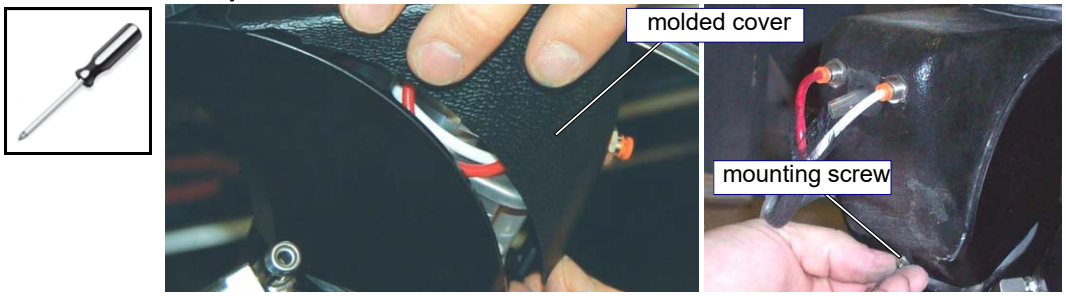


Figure 113

23. 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.

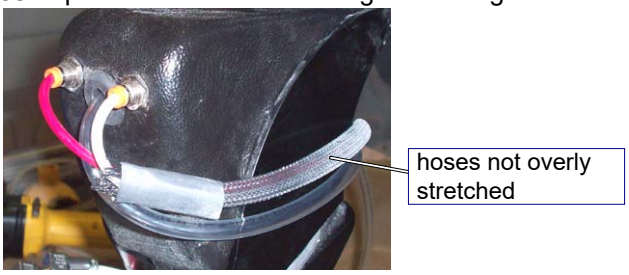


Figure 114

24. Continue to run the **abrasive feed tube** up into the **rotary motor assembly**.

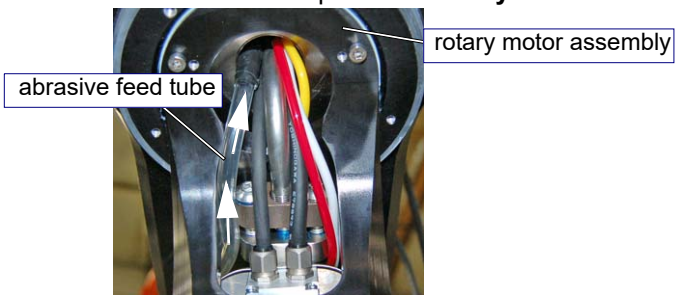


Figure 115

Note: Secure the **air hoses**, and **abrasive feed tube** by tucking a tie wrap underneath and then back around the **high-pressure line**. Do not include the **high-pressure line** or the **yellow hose** in the tie wrap. Then feed the tie wrap back up and around all **cables** and **hoses** before connecting the tie wrap. Slide the tie wrap to where the **high-pressure line** bends.

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

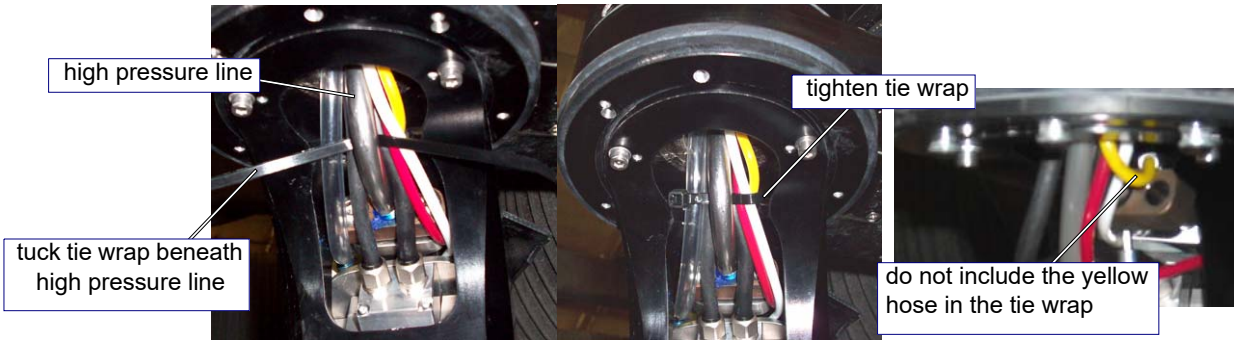


Figure 116

25. Tighten the tie wrap. Do not over tighten and compress the **abrasive feed tube**, etc.
26. Install the **splash guard** onto the **A-Jet axial assembly**.

27. Attach the bottom of the A-Jet **body cover** to the **mounting frame** using the six Phillip head **screws** and **washers** removed in step 9.

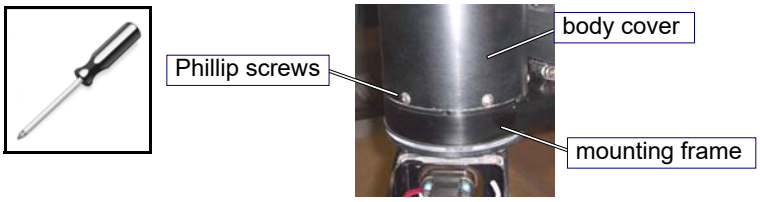


Figure 117

28. Insert the **abrasive feed tube** up the A-Jet **cylinder body** and through the **body cap**.

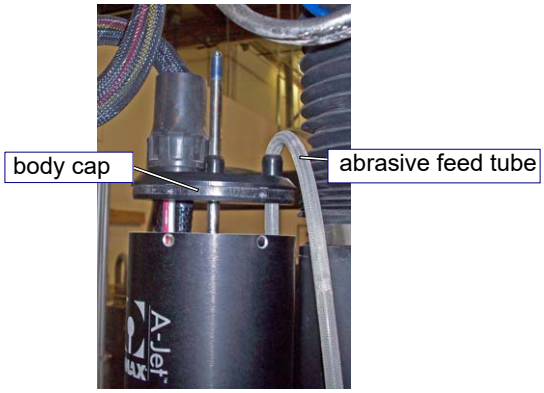


Figure 118

29. 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 tube** from the top as it wraps around the **high-pressure tubing** inside the **cylinder cover**. Assist the **abrasive feed tube** as it's drawn into the **cylinder**.

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

Caution: ***Allow sufficient abrasive feed tube 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.***

30. 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.

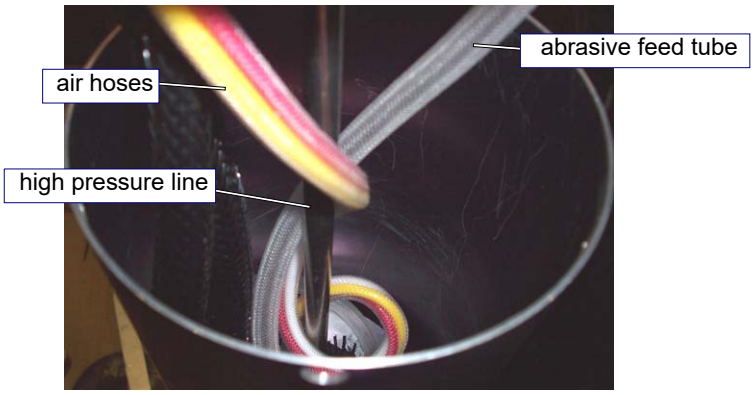


Figure 119

31. Install the A-Jet **top cap** to the body cover using the Phillip head screws removed in step 8.

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

Figure 120

32. Install a **tie wrap** through the **sleeving** and around only the **braided rotary cable** at about 1.0 in. above the **cord grip** and then feed it down as illustrated:

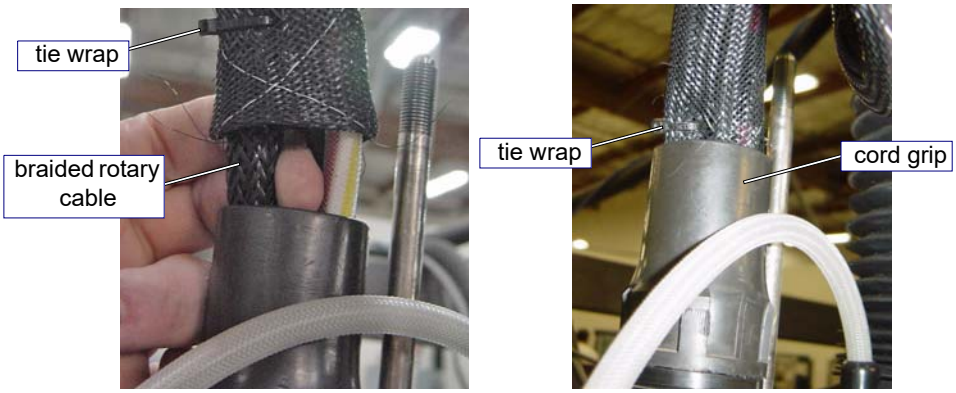


Figure 121

33. Continue running the **abrasive feed tube** up and through the **coiled nipple loop**.

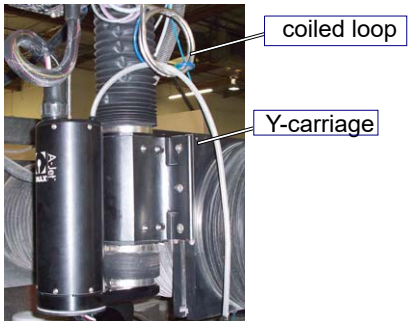


Figure 122

34. Run the **abrasive feed tube** down to the bottom of the **Y-carriage** and place it inside the bottom slot on the **Y-carriage**.

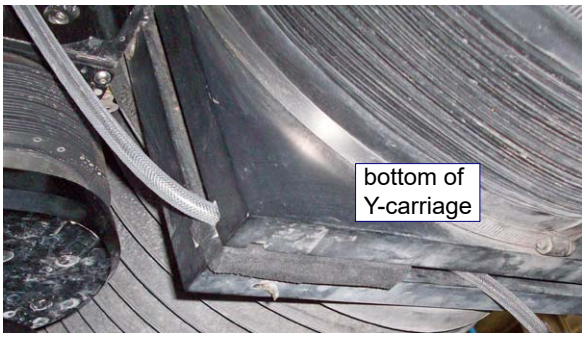


Figure 123

35. Insert the end of the **hose** into the **abrasive valve** at the bottom of the **hopper**.

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

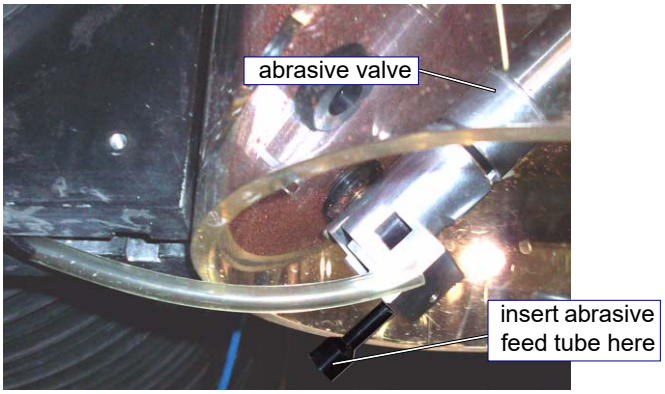


Figure 124

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

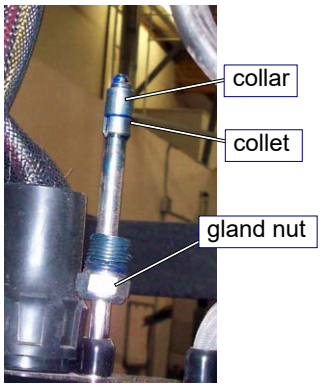


Figure 125

37. Place the **swivel assembly** onto the **rotary nipple** and thread the **gland nut** in place. Using the spanner wrench and open-end wrench, tighten the **swivel assembly** in place.

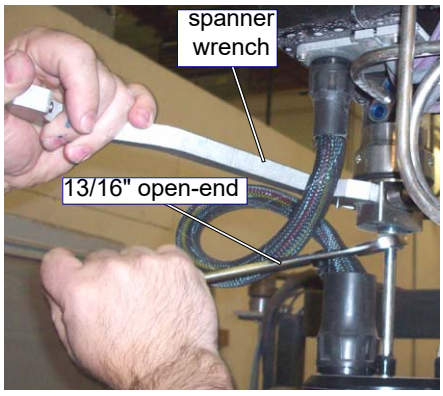


Figure 126

38. 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.***

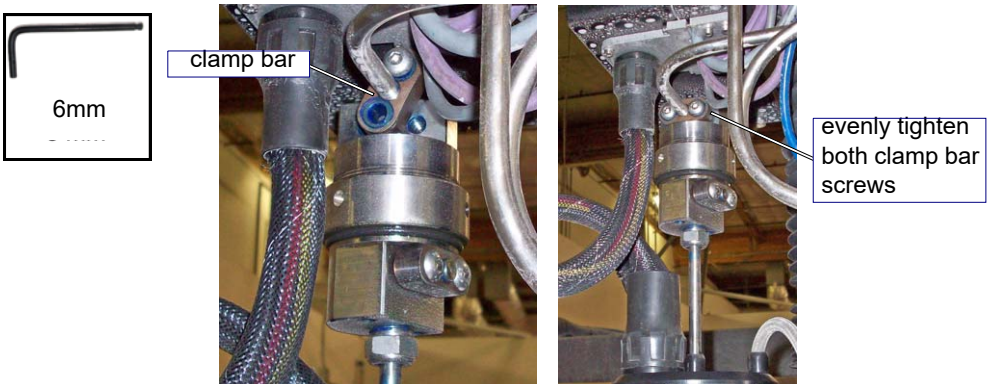


Figure 127

Testing the A-Jet Swivel and Abrasive Feed Tube

Follow these steps to ensure that the abrasive feed tube 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 feed tube**.
4. Recalibrate the **A-Jet** using the **The A-Jet Squareness Calibration Wizard**.
5. Run various test cuts to verify success of the **abrasive feed tube** replacement.

A-Jet Service

Customer Support

Refer to the OMAX.com website for detailed Customer Service information.