OMAX
Tilt-A-Jet®
Installation Instructions

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

Information: 253.872.2300
Fax: 253.872.6190
Technical Support: 800.298.4036
Web: http: //www.omax.com
E-mail: omax@omax.com

OMAX Corporation believes the information described in this manual is accurate and reliable. From time to time, design improvements will be made to the JetMachining Center and any accessories. Photographs, text, and sketches within the body of this manual may not exactly represent your equipment. In general, this manual contains the most up-to-date information available. However, OMAX Corporation cannot accept any responsibility, financial or otherwise, for any consequences arising out of the use of this material. The information contained herein is subject to change, and revisions may be issued to advise of such changes or additions.

OMAX strives to continually improve their user documentation. If you have any questions or concerns about the content of this operator's guide, we want to hear from you. Please email us at tech_writing@omax.com or contact us by mail at:

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

OMAX Corporation constantly seeks to enrich operation of their OMAX JetMachining® System and bring you the best in abrasivejet machining technology. For that reason, your OMAX JetMachining System 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 email us at **techsupport@omax.com**.

Technical support is also available on-line at: **http://www.omax.com/support** (user name and password required for access)

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.

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Contents

Installing the Tilt-A-Jet

Installing the Tilt-A-Jet will involve replacing your current Z-axis. The Tilt-A-Jet wiring will then be connected to the controller.

Note: *The Tilt-A-Jet is typically installed by an experienced OMAX technician. Customers will not need to install the Tilt-A-Jet. This information is provided for reference, and for distributors in foreign countries to refer to when installing the Tilt-A-Jet for customers.*

Safety Warnings

The following safety instructions must be followed when installing, operating and servicing OMAX equipment. If ignored, physical injury or death may follow, or damage may occur to the equipment. Always observe applicable safety precautions when working with this equipment.

Electrical Safety

WARNING! ***Electrical Hazard***
Indicates the presence of life-threatening voltages. Never access areas labeled as such without first taking appropriate safety precautions: locking out power, verifying no voltage present on circuits prior to maintenance activities, etc.

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

MANDATORY ACTION! ***Read the user's guides***
Refer to your OMAX JetMachining Center User's Guide, P/N 400433, MAXIEM Waterjets User's Guide, P/N 400588, or the EnduroMAX Direct Drive Pump User's Guide, P/N 400654, for additional safety requirements.

In addition to the usual precautions normally observed when operating the OMAX JetMachining Center, these warnings are specific to Tilt-A-Jet operation.

WARNING! ***Never put your hands near the cutting nozzle tip. The tilting head can quickly move in unexpected directions during operation.***

WARNING! ***Be careful to avoid being pinched in the Tilt-A-Jet mechanism. The servos driving the Tilt-A-Jet are strong enough to crush bones and cause serious injuries. When the Tilt-A-Jet is in operation, keep your hands away!***

WARNING! ***When piercing or cutting with higher tilt angles, there will be additional splashing. Make sure no electrical devices are affected by the splashing and always wear certified eye protection.***

Packing List

Please refer to the packing list provided with your Tilt-A-Jet and verify that you received all the parts listed.

Before You Begin

1. Position the Y-axis near the middle/left of the catcher tank and move the Y-carriage to the front of the Y-axis to allow easy access when replacing the Z-axis.
2. Place a sheet of cardboard or similar object on top of the slats immediately below the Z-axis to prevent parts or tools from falling into the catcher tank.
3. Power down the PC Controller. Switch OFF the main power to the PC Controller and Pump. Lock out power at the Breaker and place an “Out of Service” tag on the OMAX. Turn OFF the compressed air supply at its power source.

Installation Overview

Hardware

1. Install the Tilt-A-Jet onto the Y-carriage (page 6).
2. Install the Differential Receiver Boards (page 7)
3. Power Up and Test (page 9)

Software

1. Install the Latest OMAX Software (page 11).
2. Configure Tilt-A-Jet software (page 11).
3. Square the OMAX Nozzle (page 12).

Install the Tilt-A-Jet onto the Y-carriage

Tools Required

- Small Flat Head Screw Driver
- Allen Head Wrench set
- 13/16" Open End Wrench
- 5/16" (8 mm) socket
- 1¼" Open End Wrench
- Medium Phillips Head Screwdriver
- SST Software (OMAX Technicians only)
- Controller Schematic (included)
- Fault Relay drawing and Schematic (included)
- Drawings of USB Controller to Tilt-A-Jet Interface and Cabling (included)

Installation Procedure

1. Remove the White Air Line at the Dual On/off Air Cylinder. Remove the Blue Air Line at the Abrasive Bimba Cylinder. Remove the Abrasive Hopper.
2. Disconnect the Swivel at the top of the Z-axis from the hard plumbing. Allow the hard plumbing to move out of the way.
3. With one person holding the Z-axis and another person loosening the hardware, remove the Z-axis.

WARNING! ***The Z-axis can weight as much as 45 pounds. Use caution when loosening the attaching hardware to prevent personal injury. This procedure requires two people to remove the Z-axis and install the Tilt-A-Jet body.***

4. Adjust the three T-bolts on the Tilt-A-Jet body.
5. Remove the Dual On/off Air Cylinder from the Nozzle Dual On/off Body using the 1¼" open end wrench.
6. Slide the T-bolts into the Tee Slot on the Y-axis Block. Align the top of the Tilt-A-Jet body with the top of the Y-axis Block. Tighten the T-bolts.

Note: *This requires two people: one to hold the Tilt-A-Jet and another to tighten the hardware,*

7. Replace the Dual On/off Air Cylinder on the Nozzle Dual On/off Body using the 1¼" open end wrench.

Caution: ***Very little torque is necessary to tighten the air cylinder. Do not over tighten!***

8. Install the Swivel at the top of the Z-axis.
9. Install the Abrasive Hopper.
10. Install the Blue Air Line into the Abrasive Bimba Cylinder.
11. Install the White Air Line into the Dual On/off Air Cylinder on the Nozzle Dual On/off Valve.

Install the Differential Receiver Boards

Owners of an OMAX JetMachining Center that was delivered prior to November 2003 with the connector box bolted to the back door of the controller cabinet will need to add a Differential Receiver Board to both the X- and Y-servo motors. These circuit cards are provided as part of a separate upgrade kit with the included instructions. The procedure will vary depending on the OMAX model.

Tilt-A-Jet Electrical Hook-up

Note: *Follow the instructions in the kit to install the Differential Receiver Board:*

1. Open the back door of the PC Controller.
2. Remove the safety cover from the back door of the PC Controller.
3. If your OMAX has a Motorized Z-Axis:
   a. Remove the black, 24-pin cable connector from the side of the USB Controller.
   b. Disconnect the 10-pin input cable from the Z-axis Stepper Motor Controller.
   c. Disconnect the 5-pin output cable from the Z-axis Stepper Motor Controller and hide it in the cable tray.
   d. Trace the white and black wires from the Z-axis Stepper Motor Controller back to their connections to terminals “N” and “1” and remove those wires.
   e. Remove the Z-axis Stepper Motor Controller.
4. Remove the 2.5" (6.4 cm) diameter snap-in plug from the bottom of the Controller cabinet.
5. Route the new servo and power cable assembly through the hole in the bottom of the Controller cabinet and through the cable tray to the USB Controller.
6. Plug the circuit board with its connector into the USB Controller.

7. Install wires on the power supply.
   The cable set contains a power wire for the Tilt-A-Jet with two wires terminated by crimped ring terminals. These wires will be connected to the terminals of the blue capacitor of the Teknic power supply mounted on the back panel of the controller. The existing screws are replaced with two longer screws, OMAX part number 201741.
   a. Remove and discard the screw on the negative terminal of the capacitor.
      This terminal can be readily identified because it has some green with yellow striped wires attached to it.
   b. Add the wire, either labeled “ground” or with the number “2” to the ground terminal using the 201741 screw.

Note: *This wire may be green with a yellow stripe.*

   c. Remove and discard the screw on the positive terminal.
   d. Add the wire, either labeled “+” or with the number “1” to the positive terminal using the remaining 201741 screw.

Note: *If the ground wire (step “b” above) was green with a yellow strip, then this wire (step “d”) will be black and may be unlabeled.*

8. Remove the 10-pin Molex connector from the top of the USB Controller.
   a. Install the new 10-pin connector.
   b. Cut the blue wire off of the old connector, crimp the female terminal from the new connector assembly onto the end of the wire and connect it to the mating terminal.
9. Refer to sheet 3 of the 302532 schematic and drawing 303777. Both of these drawings are provided at the back of this manual. The Reset switch, pin 2, has a total of 4 wires connected to it. Two of the wires shown are part of the USB power cable, 303777. The end of the wire with the Tilt-A-Jet Enable label should be close to the hinge of the back door of the controller cabinet. If you can't locate this label, you will need to install the 303777 cable included in the installation kit.
   a. The four position white connector plugs into a connector of the cable that comes out of the back of the computer. Disconnect the cable you are replacing. If the cable has only two wires, contact OMAX customer service for more information.
   b. If the cable has three wires, one of the wires is routed through a cable track along the inside of the controller to the front panel Reset switch. Trace and remove the wire.
   c. The other two wires are routed through the cable track on the back door of the controller enclosure to the black USB Controller box on the back door. Trace and remove the wires from the cable track and unplug the connector from the bottom of the USB Controller box.
   d. Plug the four position white connector of the 303777 cable into the mating connector of the cable coming out of the back of the computer.
   e. Route the fork terminal to the Reset switch and secure it to the switch. There should be a total of 4 wires connected to this terminal. The wire with the Tilt-A-Jet Enable label should be close to the hinge after the fork terminal is routed and the cable track cover is replaced.
   f. Route the two pin power portion of the 303777 cable to the USB Controller box and plug the connector into the bottom of the box. You should feel a 'click' as the connector engages. If you don't feel a 'click', look closely to confirm that the connection has been made.
10. The Tilt-A-Jet interface cabling will have a long wire with a label marked with the number “20”. The wire will have a Male/Female disconnect pair and a fork terminal at the end of the wire. Remove the wire with the fork terminal at the disconnect pair and plug it into the terminal of the wire with the Tilt-A-Jet Enable label.
11. For the following steps, refer to drawing and schematic 303497.

a. Install the TX, TY, Z Relay Set onto the middle of the DIN rail, just below the Y Fault Relay.

Note: *Some wires will need to be temporarily disconnected to accommodate the new relays.*

b. Connect the ground from terminal #5 of the Y Relay to the Z Relay.

c. Connect the ground wire from terminal #5 of the TY Relay to the terminal strip.

d. Connect the TX, TY and Z blue wires from the Tilt-A-Jet cable assembly to the appropriate terminal #1 on TX, TY and Z Relays.

Note: *When all connections to the relays have been made, the connections should be in agreement with the 303497 schematic.*

12. Connect the blue wire from the Tilt-A-Jet cable assembly labeled “3” to the DIN rail terminal labeled “3”.
13. Run the loose end of the Tilt-A-Jet cable to the Tilt-A-Jet. Plug the RJ45 connectors into the OMAX-Teknic Differential Receiver Board Assy, TILT-A-JET, OMAX part number 303560, which are plugged into the individual Teknic Servo cards. Make sure the receiver boards are firmly connected to the Teknic Servo cards.

Note: *The cables for the Z- and TX-axis need to be routed between the servo cards to prevent the possibility of pinching the cables when the box cover is attached. The cable to the TY-axis needs to be routed in front of the servo card. These boards function as follows: the board farthest inside toward the right drives the Z-axis motor, the middle board drives the TX-axis motor; and the outboard card, furthest to the left, drives the TY-axis motor.*

14. Insert the power cable into the Tilt-A-Jet.

    The power cable has a 2-pin Molex connector, and is keyed so it may only be installed one way. The plug is in the top center of the Tilt-A-Jet. The Negative wire (marked wire 2) goes to the back pin. The positive wire (marked wire 1) goes to the forward pin. The negative wire may be green/yellow with no wire number.
15. 15.Connect the other end of the power cable to the Teknic Servo boards.

    There are two power connectors on each of the Teknic Servo boards. This distributes power to the three boards in a “daisy chain” fashion. The furthest left board, the TY board, has an empty connector for the incoming power cable.

    There is a short jumper cable from the other power connector to one of the connectors on the TX board. Likewise, there is a short jumper cable from the second power connector on the TX board to one of the connectors on the Z board.

Power Up and Test

Caution: ***Do not power up the Tilt-A-Jet until all grounds are installed and the High Pressure Tube is connected at the top plate of the Z-axis. Failure to properly ground the Tilt-A-Jet can result in erratic movements.***

1. Disconnect one of the connectors of the power jumper that goes from the TY board to the TX board.

   This ensures that if a wiring error has been done in the power circuit, only the fuse on the TY board or in the Teknic power supply will blow.
2. Turn ON the power to the controller while watching the lights on the TY board. If the power wiring is correct, the green LED immediately lights with a solid green color.

3. Immediately turn power OFF to the controller, wait 30 seconds and then plug in the power jumper between the TY board and the TX board.
4. Turn ON power to the controller.

   The green LEDs on all three of the Tilt-A-Jet servo cards should be a solid green and should stay that way until the USB Controller board has received its operating instructions from the computer. This happens towards the end of the computer's boot process when the blue progress bar is about ¾ complete.
   At this time, the USB Controller board enables the servo drives and the green LEDs should blink rapidly.
5. Measure the DC voltage at the blue capacitor. It must read between 73 and 81VDC.
6. Activate the Reset Switch on the front of the Controller, and the LEDs should stop flashing. Release the switch and the LEDs should flash again.
7. Start up the laptop with the SST software and plug in the Teknic Cable to the Tilt-A-Jet Z-Axis Service board so that you can monitor the steps of this axis. Double-click “Current Position/Velocity” on the SST Quickset Window to zero the position count.

Caution: ***Do not run the Teknic SST software from the OMAX computer. The SST software competes for the same RAM used to run Make. As a result, installing the SST software can interfere with the proper running of Make and can cause steps to be dropped by the USB controller.***

8. Start the OMAX Tester program and select the Cycle Test tab. Check the box for “Step Z1” and click Send. After 10 cycles, the current position shown in the SST software should return to zero. If motion does not occur, it is likely that a jumper setting inside of the USB Controller has to be changed. Contact OMAX Customer Service department for instructions. Repeat for “Step Tx” and “Step Ty”.

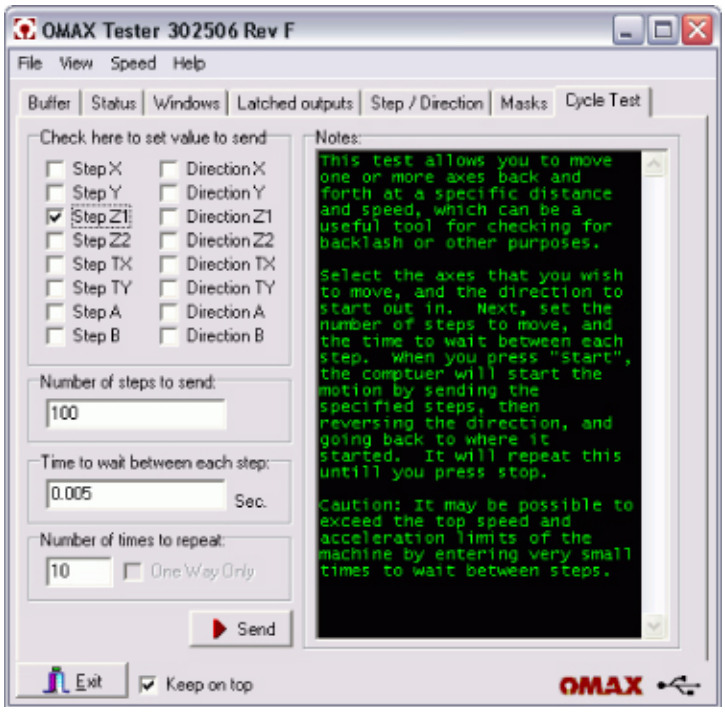

Figure 1: Check “Step Z1” and then click ***Send***

9. The system is ready to run.

Install Tilt-A-Jet Software

Two software tasks must be completed prior to using the Tilt-A-Jet system:

- Install the latest version of OMAX Layout and Make for Windows.
- Configure the software to recognize the Tilt-A-Jet and use its specific calibration settings.

Install the Latest OMAX Software

Install the latest version of OMAX Layout and Make for Windows using the included CD or DVD disc.

When new versions of Layout and Make are installed, all existing settings and machine history are preserved. The only things changed are the programs—preferences don't need to be reset, and settings don't need to be changed.

1. Make sure all other Windows programs are closed.
2. Insert the CD (or DVD) labeled “OMAX Software CD” into the CD drive.
3. Wait about 20 to 30 seconds for the setup menu to appear.

   If the setup menu does not appear after 30 seconds, then double-click the **My Computer** icon. Double-click the CD drive to open the folder. Finally, double-click the **OMAXSetup** icon to launch the setup program.

Figure 2: Double-click this icon if the setup menu doesn’t automatically appear

4. Click the **Install Software** screen button and use the on-screen menus to install the software, using all the default settings.

Configure Tilt-A-Jet software

At this point, it is necessary to tell the OMAX software that a Tilt-A-Jet is attached and provide the specific hardware settings for the Tilt-A-Jet.

This information is entered by running a special Tilt-A-Jet configuration CD which will prompt you to enter some numbers as well as copies of a configuration file that is unique to the exact serial number of your Tilt-A-Jet.

1. Make sure all other Windows programs are closed.
2. Make sure that you have your Tilt-A-Jet documentation handy (you will need the paper that contains some of the Tilt-A-Jet settings unique to your Tilt-A-Jet hardware).
3. Insert the CD which has a number on it that is the same as your Tilt-A-Jet serial number.

Caution: ***It is very important that the number on the CD matches the serial number of your Tilt-A-Jet.***

4. Wait about 20 to 30 seconds for the setup menu to appear. If the setup menu does not appear after 30 seconds, double-click the My Computer icon. Double click the CD drive to open the folder. Finally, double-click the “OMAX_TAJ.exe” icon to launch the setup program:

Figure 3: The OMAX_TAJ.exe Icon

5. Follow the on-screen instructions.

Note: *You will need to enter information from a printed sheet of paper that was supplied with your Tilt-A-Jet. This information you will enter in "by hand" as part of the setup process.*

6. When completely finished and there are no setup screens or dialogs remaining, remove the CD and store it in a safe place for future reference if should you ever need to re-install the software. Remember, this CD is unique to your Tilt-A-Jet. **Do not lose it!**

Square the OMAX Nozzle

Although the Tilt-A-Jet nozzle is in line with the Z-axis, the Z-axis itself may be at a slight angle to the OMAX machining table. To ensure accuracy you must always square the Tilt-A-Jet to the table when the Tilt-A-Jet is first installed. In this procedure, you take several measurements from a flat piece of material (Surface Plate). These measurements are entered into Make, which then knows how to move the Tilt-A-Jet nozzle perfectly perpendicular to the machining surface. Refer to the Tilt-A-Jet User's Guide, P/N 400568 for detailed procedures for squaring the OMAX nozzle.

Customer Support

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.

USA

OMAX Technical Support
OMAX Corporation
21409 72nd Avenue South
Kent, WA 98032 USA
Phone: (253) 872-2300 x3, (800) 298-4036, or (800) 838-0343 x3
Fax: (253) 872-7446
techsupport@omax.com
parts@omax.com
http://www.omax.com

International

International.parts@omax.com
Phone: 001-253-872-2300
Fax: 001-253-872-7446

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