FlexJet Head Assembly

T47541107
Rev. H
07-00dh,dra,djh

This document supports assembly
47541107 Rev. D
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</table>
This Document Supports Assembly 47541107 Rev.D

Detail A

Detail B

(Ref) 47749501, Clearflo Tubing 7 x 4in
Notes

1. Adjust belt tension until .050 inch (0.127 cm/1.27 mm) of deflection is achieved with 2 oz. of force.

2. Adjust belt tension until .200 inch (0.508 cm/5.08 mm) of deflection is achieved with 2 oz. of force.

3. Set brake gap to .015 inch (0.038 cm/0.38 mm).

Lubricants and Adhesives

Loctite 222
# FlexJet Head Assembly

**T47541107 Rev. H**

<table>
<thead>
<tr>
<th>DET NO.</th>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>U/M</th>
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<td>4</td>
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<td>5</td>
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<td>7</td>
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**USED BUT NOT SHOWN ITEMS**

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**Functional Description**

The FlexJet Head Assembly is a high-speed 7-spindle flexible placement head. This head is capable of gang picking components up to 12mm square, inspecting components on the fly using on-board vision cameras, correcting the theta angle with rotation, and placing components in sequential order.

**Maintenance Concept**

The following Maintenance Concept table summarizes maintenance and operational procedures for this assembly.

<table>
<thead>
<tr>
<th>Maintenance Procedures</th>
<th>Recommended Frequency</th>
<th>Minimum Skill Required</th>
<th>Spares Kit Required</th>
<th>Tool Kit Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexJet Head Installation</td>
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<td>Maintenance Technician</td>
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<tr>
<td>FlexJet Head Removal</td>
<td>As Required</td>
<td>Maintenance Technician</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Head/Changer Nozzle Setup</td>
<td>As Required</td>
<td>Maintenance Technician</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Coupler Body Assembly Replacement/Alignment</td>
<td>As Required</td>
<td>Maintenance Technician</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Vacuum Level Verification</td>
<td>160 Hours</td>
<td>Maintenance Technician</td>
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<td>Yes</td>
</tr>
<tr>
<td>Verify Air Kiss</td>
<td>160 Hours</td>
<td>Maintenance Technician</td>
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<td>No</td>
</tr>
<tr>
<td>Inspect Theta and Z-Motor Belts</td>
<td>500 Hours</td>
<td>Maintenance Technician</td>
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</tr>
<tr>
<td>Theta Encoder Zero Setup</td>
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<td>Maintenance Technician</td>
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<tr>
<td>Z-Home Sensor Setup</td>
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<td>Maintenance Technician</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Z-Safe Sensor Setup</td>
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<td>Maintenance Technician</td>
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<tr>
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<td>Verify Touch-Down Sensors</td>
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<tr>
<td>Up/Down Clutch-Bar Drive-Belt Tension Adjustment</td>
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<td>Z-Safe Stop Bracket Belt Tension</td>
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<tr>
<td>Comprehensive Head Maintenance</td>
<td>Head is Removed or at 1000 Hours</td>
<td>Maintenance Technician</td>
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<td>FlexJet Spindle Assembly Replacement</td>
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<td>UIC Field Service Engineer</td>
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<tr>
<td>Z Stop Brake Assembly Replacement</td>
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<td>UIC Field Service Engineer</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Up/Down Stop Brake Air Gap Setup</td>
<td>As Required</td>
<td>UIC Field Service Engineer</td>
<td>No</td>
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Note: The Maintenance Concept is continued on the next page.
FlexJet Head Assembly

<table>
<thead>
<tr>
<th>Maintenance Procedures</th>
<th>Recommended Frequency</th>
<th>Minimum Skill Required</th>
<th>Spares Kit Required</th>
<th>Tool Kit Required</th>
</tr>
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<tbody>
<tr>
<td>Spindle Touch-Down Sensor Replacement</td>
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<td>UIC Field Service Engineer</td>
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<tr>
<td>Clutch Replacement</td>
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<td>UIC Field Service Engineer</td>
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<td>Manifold Assembly Replacement</td>
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<td>UIC Field Service Engineer</td>
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<td>No</td>
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<tr>
<td>Fiber Optic Cable Replacement</td>
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<td>UIC Field Service Engineer</td>
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<td>No</td>
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<td>Z-Axis Spindle Drive Belt Replacement</td>
<td>As Required</td>
<td>UIC Field Service Engineer</td>
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</tbody>
</table>

**Related Information**

The following table defines documents that may be required while performing the procedures in this document.

<table>
<thead>
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<th>Procedure or Section</th>
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</thead>
<tbody>
<tr>
<td>Machine Configuration</td>
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<tr>
<td>Operation Features</td>
<td>Various</td>
</tr>
<tr>
<td>Nozzle Tip Assembly</td>
<td>Installation/Removal of Nozzles</td>
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<tr>
<td>FlexJet Operation Module</td>
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<tr>
<td>Z-Axis Index Housing Assembly</td>
<td>Various</td>
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<tr>
<td>Platform Assembly</td>
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<tr>
<td>Camera Asm., 2.6 OTH</td>
<td>Various</td>
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<tr>
<td>FlexJet Spindle Asm</td>
<td>Various</td>
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<tr>
<td>Calibration, CPE and Measurement</td>
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</tbody>
</table>

**Prerequisite Information**

- See the Prerequisite Information/Introduction document for Adhesive and Lubricant icon information and definitions.

**CAUTION**

Use Electro-Static Discharge (ESD) precautionary measures when maintaining, adjusting, or repairing the FlexJet Head.
Procedures and Adjustments

The following subsections contain the maintenance procedures that are required for proper FlexJet Head Assembly operation.

**CAUTION**

Use Electro-Static Discharge (ESD) precautionary measures, such as a ground strap, when working on the FlexJet Head.

FlexJet Head Installation

Install a FlexJet Head using the following procedure.

1. Move the beam(s) to a maintenance position using **Manual Control**.

2. Place the machine in the powered down mode. Then execute your site's Lockout/Tagout procedure.

**WARNING**

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

**CAUTION**

Use a properly connected ground strap for provide ESD protection when handling the FlexJet Head.

3. Use ESD precautionary measures and configure the Head Control Asm PC BD according to the Maintenance Support Document, **PC Jumper Config., SMT** document.

4. Carefully place the FlexJet Head on the head mounting plate so the mounting plate dowel pins align with and enter the alignment holes of the head. Verify that the FlexJet Head is flush against the head mounting plate.

5. Apply Loctite 222 and torque the 2 set screws in the head mounting bracket, on the left side of the FlexJet Head, to 2.5 in-pounds (0.282 Nm) and tighten the nuts on set screws.

6. Apply Loctite 222 and torque the main head retaining bolts on both the right and left side of the FlexJet Head to 84 in-pounds (9.49 Nm).

7. Connect pneumatic line 9 to the FlexJet Head input pneumatic connector.
It is important to connect the HD INTF2 Cable Assembly first to protect the circuitry from ESD.

8. Connect the HD INTF2 (Power) Cable Assembly to the head first.

9. Connect the HD INTF1 Cable Assembly and CAM INTF Cable Assembly.

10. Disconnect the 3 video connectors on the IGUS Cable from PEC Box. Connect the 3 video connectors on CAM INTF Cable Assembly to the appropriate video connectors on IGUS Cable. Refer to the following illustration and table.

```
<table>
<thead>
<tr>
<th>CAM INTF Cable Assembly</th>
<th>IGUS Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTF.V-OUT</td>
<td>PEC1.V-OUT</td>
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<tr>
<td>Pec1.V-DRIVE</td>
<td>Pec1.V-DRIVE</td>
</tr>
<tr>
<td>Pec1.H-DRIVE</td>
<td>Pec1.H-DRIVE</td>
</tr>
</tbody>
</table>
```

11. Connect the 3 video connectors on CAM INTF Cable Assembly to the appropriate video connectors on the PEC box. Refer to the following table.

```
<table>
<thead>
<tr>
<th>CAM INTF Cable Assembly</th>
<th>PEC box</th>
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<tbody>
<tr>
<td>Pec1.V-OUT</td>
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<td>Pec1.V-DRIVE</td>
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<tr>
<td>Pec1.H-DRIVE</td>
<td>HD-GEN-LOCK</td>
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</tbody>
</table>
```
12. If necessary, remove the 2 screws securing the handle to the Z-Axis Index Housing Assembly. Then remove the handle. Refer to the illustration to the left.

**NOTE**

Removing the handle from the Z-Axis Index Housing is only required for pre L-block machines.

13. Install the FlexJet Head Cover.

**NOTE**

The FlexJet Head requires calibration prior to production operation and therefore must be calibrated at this time.


15. Verify that any covers previously removed are installed, such as the safety cover below the hinged cover.

---

**FlexJet Head Removal**

Remove a FlexJet Head using the following procedure.

**CAUTION**

Use Electro-Static Discharge (ESD) precautionary measures, such as a wrist strap, when working on the FlexJet Head.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Then execute your site's Lockout/Tagout procedure.

**WARNING**

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Open the hinged machine cover to access the FlexJet Head. Then remove the safety cover below the hinged cover.

4. Remove the FlexJet Head cover.

5. Remove the nozzles from Coupler Body Assemblies. Make sure to record the nozzle configuration.
6. Disconnect the HD INTF1 Cable Assembly and CAM INTF Cable Assembly.

**CAUTION**

It is important to disconnect the HD INTF2 Cable Assembly last to protect the circuitry from ESD.

7. Disconnect the HD INTF2 Cable Assembly last.

8. Disconnect the input pneumatic line from the FlexJet Head.

9. Disconnect the 3 video connectors from the PEC box.

10. Disconnect the 3 video connectors on CAM INTF Cable Assembly from IGUS Cable.

11. Connect the 3 video connectors on the IGUS Cable to the PEC Box.

12. Install the 2 screws and the handle to the Z-Axis Index Housing Assembly. Refer to the illustration to the left.

13. Loosen the 2 set screws and nuts in the mounting bracket on the left side of the FlexJet Head.

14. Remove the mounting bolts (from both the right and left side of the head) that secure the head to the mounting plate.

15. While firmly supporting the FlexJet Head, pull the head straight back from the mounting plate. If possible, use an ESD-dissipative foam pad between the head and the work surface.

**NOTE**

Removing the Plate and Baffle from the bottom of the head is recommended when working on a head apart from the machine. Otherwise, the weight of the head on an installed Baffle will probably break the Baffle.

---

**Head/Changer Nozzle Setup**

The Head/Changer Nozzle Setup allows moving the head to a specific location where FlexJet Spindle Assemblies are lowered and there is access to the nozzles. Refer to the Head/Changer Nozzle Setup procedure located in the Machine Configuration document.
**Coupler Body Assembly Replacement/Alignment**

Replace or align a Coupler Body Assembly using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Then execute your site's Lockout/Tagout procedure.

### WARNING

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Open the hinged machine cover to access the FlexJet Head. Then remove the safety cover below the hinged cover.

4. Remove the FlexJet Head cover.

5. Remove the FlexJet Head. Refer to the *FlexJet Head Removal* procedure located in this document.

### CAUTION

Use ESD precautionary measures when handling the Camera Assembly. Also, use extreme caution when removing the Camera assembly from the FlexJet head. Jarring, bumping or mishandling may damage the Camera Assembly.

6. Remove the Camera assembly from the FlexJet Head. Refer to the *OTH Camera Assembly Removal* procedure located in the *Camera Asm, 2.6 OTH* document.

7. Remove the nozzles from Coupler Body Assembly by using the *Installation/Removal of Nozzle* procedure located in the *FlexJet Spindle Assembly* document.
8. Remove the damaged Coupler Body Assembly from the Bearing Cap by removing the 2 mounting screws and disconnecting the 2 Tubings. Refer to the following illustration.

9. Install the new Coupler Body Assembly, but do not tighten the 2 mounting screws.

10. Manually position the Theta Alignment Tool from the FlexJet Tool Kit under the FlexJet head. Align and insert the tool into Coupler Body Assemblies. Refer to the following illustration.
11. Tighten the 2 mounting screws for the new Coupler Body Assembly to the specified torque with the tool installed.

12. Remove the Theta Alignment Tool.

13. Connect the 2 Tubings to the Coupler Body Assembly.

---

**CAUTION**

The tool must be removed from the Coupler Body Assemblies before head use to prevent head damage.

---

14. Install the Camera assembly. Refer to the *OTH Camera Assembly Installation* procedure located in the *Camera Asm, 2.6 OTH* document.

15. Install the FlexJet Head. Refer to the *FlexJet Head Installation* procedure located in this document.

16. Install the nozzles that were removed. Then verify that the nozzle configuration is correct in Universal Platform Software.

17. Verify FlexJet Head vacuum levels. Refer to *Vacuum Level Verification* section located in this document.

18. Install the FlexJet cover.


20. Record on the appropriate copied sheet from the *Maintenance Log* document that this procedure was performed and include the date.

---

**Vacuum Level Verification**

Verify the FlexJet Head Assembly vacuum level using the following procedures.

- Zero the machine. Refer to the *Machine Operation* document for more information.

---

**Verify Main Vacuum Pressure**

Verify the Pneumatic Panel assembly main pressure using the following procedure. This panel is located behind the rear, center fan panel.

1. Remove the Center Rear Cover Assembly of the machine by pulling on the handle.

2. Remove the 2 top screws from the rear panel containing the cooling fans.
Do not force the Pneumatic Panel Assembly out of the machine. This may cause damage to the electrical or pneumatic connections of the assembly.

3. Release the panel locking lever from the Pneumatic Panel Assembly and slide the assembly out from inside the machine.

4. Observe the pressure on the Regulator/Filter Gauge. If the pressure is 85 psi (5.86 bar), continue with the Lower Spindles section.

5. If the pressure is not 85 psi (5.86 bar), turn the Filter/Regulator locking knob counter-clockwise. This action allows the pressure adjustment knob to rotate.

6. Turn the pressure adjustment knob and intermittently press the rubber bleed valve on the bottom of the coalescing filter until the pressure on the Filter/Regulator Gauge is 85 psi (5.86 bar). Pressing the rubber valve allows the system to compensate for the pressure change.

7. Turn the locking knob clockwise until the pressure adjustment knob locks. Verify that the pressure is still 85 psi (5.86 bar). If the pressure is not 85 psi (5.86 bar), repeat from step 6.

8. Carefully push the Pneumatic Panel Assembly into the machine and engage the panel locking lever.
Do not force the Pneumatic Panel Assembly into the machine. This may cause damage to the electrical or pneumatic connections of the assembly.

9. Check for damaged or crimped wires and pneumatic lines. Make any changes to the orientation of the wires or pneumatic lines to maintain proper operation of the Pneumatic Panel Assembly.

10. Attach the rear (cooling fan) panel with the two screws that were removed earlier.

11. Install the Center Rear Cover Assembly on the machine. Continue with the next section to prepare the machine for vacuum verification.

**Prepare Machine**

Prepare the machine for vacuum verification using the following procedure.

1. Remove all nozzles from the spindles using the **Head/Changer Nozzle Setup** window. Refer to the Installation/Removal of Nozzles section in the Nozzle Tip Assembly module.

2. Remove the safety cover below the hinged cover.

3. Open the hinged cover to access the FlexJet Head.

4. Continue with the Install Vacuum Gauge section.

**Install Vacuum Gauge**

Use the following procedure to install the vacuum gauge.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
</table>

The machine cover must remain open during this procedure to place the Interlock circuit in the violated state, disabling machine servo axes. Failure to comply could result in serious personal injury.

1. If the vacuum gauge has an adapter designed to fit inside the Coupler Body, push the adapter into the bottom of the selected spindle.

2. If the vacuum gauge does not have an adapter designed to fit inside the Coupler Body, install a 10MPF nozzle in the spindle. Then install the gauge on the 10MPF nozzle.

3. Continue with the Verify Vacuum section.
Verify Vacuum

1. Select **Machine Status > Diagnostics > Discrete I/O > Head**

   The Discrete I/O - Head Subsystem I/O dialog box displays.

2. Select the correct **Head # (number)** option button.

3. Perform the following procedure to turn vacuum on for all 7 spindles. It is recommended to measure each spindle vacuum level with vacuum on all spindles simultaneously.
   a. Select **Tool > 1**.
   b. Select **VACUUM** and **MAIN_VACUUM_CONTROL** in the **Select Outputs** field.
   c. Select the **Set Outputs** button.
   d. Repeat steps 3a to 3c for the next tool. When vacuum is turned on for all 7 spindles, proceed to the next step.

4. Observe the vacuum gauge reading while manually rotating the Theta pulley 360 degrees. If the vacuum level is at least 20 inches Hg for a complete revolution, proceed to step 6. If the vacuum level is not at least 20 inches Hg for a complete revolution, proceed to the next step.

5. Perform the following procedure if the vacuum for a spindle is low.

**NOTE**

It is important to check the vacuum reading while rotating the Theta pulley 360 degrees because it is possible for vacuum to vary depending on the Theta angle.
a. Visually inspect the vacuum hose that routes from the Manifold to the top of the Spindle. Check for a kink, loose fitting, or physical damage. If physical damage is evident, replace the vacuum hose. If a fitting is loose, properly seat the fitting. See the illustration to the left.

b. Visually inspect the vacuum hoses on the Coupler Body Assembly for loose fittings or damage. Then properly seat the hose or replace if necessary. See the illustration below.

c. Check the upper section of the Manifold for the selected spindle. If the upper LED is on at the Manifold, but there is no vacuum, then manually push the button in front of the manifold. If vacuum appears when the button is pushed, the Manifold must be replaced. Refer to the illustration below.

6. Disconnect the vacuum gauge from the nozzle, then attach the gauge (and 10MPF nozzle if needed) to the next spindle and repeat this procedure from step 3 until all 7 spindles are verified.

7. Use the following procedure to turn off vacuum for all 7 spindles.

   a. Select Tool > 1.

   b. Verify that VACUUM and MAIN_VACUUM_CONTROL are highlighted in the Select Outputs field.
c. Select **Reset Outputs**.

d. Repeat steps 7a to 7c for the next Tool number. When vacuum is turned off for all 7 spindles, verify that none of the 7 upper manifold LEDs are on. If any of the LEDs are on, repeat from step 7a until all 7 LEDs are extinguished.

8. Select **Exit**

9. Install the FlexJet Head cover.

10. Install the nozzles previously removed using the **Head/Changer Nozzle Setup** window. Refer to the *Installation/Removal of Nozzles* section in the *Nozzle Tip Assembly* module.

11. Select **System Status > Machine > Configuration** and select the head icon to verify the nozzle configuration.

12. Palm down to raise the spindles.

13. Install the safety cover below the hinged cover.

14. Record on the appropriate copied sheet from the *Maintenance Log* document that this procedure was performed and include the date.

---

**Verify Air Kiss**

Verify the FlexJet Head Assembly air kiss using the following procedure.


2. Verify the Pneumatic Panel assembly main pressure. Refer to the *Verify Main Vacuum Pressure* section in the *Vacuum Level Verification* section of this module and adjust the pressure if necessary.

3. Perform the following steps to lower the spindles for removing the nozzles.
   
a. Select the **System Setup** icon.

   b. Select **Machine > Setup > Head/Changer Nozzle Setup**

   c. Select **Manually Mount Head Nozzles** in the **Task** field.

   d. Select the appropriate **Head Choice**.

   e. Select **Activate**. A message displays in the **Status** field indicating that the Procedure Activated.
f. Push [Start] to enable the axes. The beam(s) move to a location for mounting or removal of nozzles from the selected head or changer.

g. If necessary, use **Manual Control** to move the beam(s) to a more accessible location. For more information, refer to the **Manual Control** section of **Machine Configuration**.

h. Select **Alignment Done**. The head lowers the spindles to access to the nozzles.

i. Open the hinged cover to access the FlexJet Head.

---

**WARNING**

The machine cover must remain open during this procedure to place the Interlock circuit in the violated state, disabling machine servo axes. Failure to comply could result in serious personal injury.

---

j. Remove all 7 nozzles from the spindles.

k. Select **Exit**.

---

**CAUTION**

All nozzles must be removed before verifying air kiss.

---

4. Select **Machine Status > Diagnostics > Discrete I/O > Head**

The Discrete I/O - Head Subsystem I/O dialog box displays.

5. Select the correct **Head #** (number) option button.

6. Perform the following steps to enable air kiss on the spindles.
a. Select the Tool #. Begin with tool number 1.

b. Highlight AIR_KISS and MAIN_VACUUM_CONTROL in the Select Outputs field.

c. Select Set Outputs.

d. Repeat steps 6a to 6c until air kiss is on for all 7 spindles.

7. Verify that all 7 spindles are emitting air from the bottom of the Coupler Bodies. If a spindle is not emitting air, check the hoses on the Coupler Body Assemblies and the Manifold to verify that the hoses are properly seated. Reseat any hoses that are loose and replace any hoses that are damaged. If air kiss is still not present, contact a Universal Instruments Technical Specialist.

If air kiss is present for all 7 spindles, continue with the next step.

8. Perform the following steps to turn off air kiss for all spindles.

a. Select the Tool #. Begin with tool number 1.

b. Verify that AIR_KISS and MAIN_VACUUM_CONTROL are highlighted in the Select Outputs field.

c. Select Reset Outputs.

d. Repeat steps 8a to 8c until air kiss is turned off for all 7 spindles.

e. Select Exit.

9. Select System Setup > Machine > Setup > Head/Changer Nozzle Setup to install the nozzles removed earlier. It is recommended to inspect the nozzles before installation.

10. Verify that the head nozzle configuration is correct by selecting Machine > Configuration. Then select the head icon to access the configuration window.

11. Close the hinged cover.

12. Palm down to automatically raise the spindles. The spindles move up in stages to prevent sudden impact.

13. Install the safety cover below the hinged cover if it was removed earlier in the procedure.

14. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.
**Inspect Theta and Z-Motor Belts**

Use the following procedure to inspect the FlexJet Theta and Z-Motor Belts for missing teeth or other obvious damage.

1. Use **Manual Control** to move the beam(s) to a convenient maintenance location. For more information, refer to the *Manual Control* section of *Machine Configuration*.

2. Palm down the platform machine.

3. Open the hinged cover to access the FlexJet Head.

4. If necessary, remove the safety cover below the hinged cover.

5. Remove the FlexJet Head cover.

6. Manually rotate the Theta Motor pulley and inspect all Theta Motor Belt teeth for damage. If the belt is damaged, replace the Theta Motor Belt. Refer to the *Theta Motor Timing Belt Replacement* section of the *Platform Assembly* module. Also refer to the illustration below.

![Theta Motor Belt](image)

**CAUTION**

The upper Z-Motor belt is larger than the lower belt. So, verify that a replacement belt is the correct size for the Z-Motor pulleys before installing the belt for either the upper or lower Z-Motor pulleys.

7. Manually rotate either Z-Motor pulley and inspect both Z-Motor Belts for damage. If a belt is damaged, replace the Z-Motor Belt. Refer to the *Z-Axis Timing Belt Replacement* section of the *Z-Axis Index Housing Assembly* module.

8. After all 3 belts are inspected, install the FlexJet Head cover.

9. For a dual-beam machine, repeat steps 5 through 8, then proceed to the next step.
10. After the head on a GSM1™ machine or both heads on a GSM2™ machine are inspected, install the safety cover below the hinged cover, if the cover was removed earlier.

11. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

**Theta Encoder Zero Setup**

Zero the Theta Encoder after encoder replacement using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Power down and Lockout/Tagout the platform machine.

3. Remove the FlexJet Head cover.

4. Remove the nozzles from Coupler Body Assembly. Refer to the Installation/Removal of Nozzles procedure located in the FlexJet Spindle Assembly document.

5. Manually position the Theta Alignment Tool under the FlexJet head. Align and insert the tool into Coupler Body assemblies. Refer to the following illustration.

![Coupler Body Assy](image_url)

![Theta Alignment Tool](image_url)
Use ESD precautionary measures when handling the Head Control Asm PC BD.

Do not connect or disconnect electrical cabling with machine power on. The machine must be powered down to prevent possible damage to the Head Control ASM PC BD.

6. Remove HD INTF1 Cable Assembly from P1 of the Head Control Asm PC BD. Refer to the following illustration.

7. Connect the Encoder Adapter Cable to P1 of the Head Control Asm PC BD.

8. Power up the platform machine.

9. Loosen the 3 screws securing the encoder clamps so the encoder is movable. Then turn the encoder until the home pulse light on the meter illuminates.

10. Secure the encoder in position by tightening the 3 screws in the encoder clamps while ensuring the home pulse light remains illuminated.

**NOTE**

Only one pulse is generated per complete revolution.

11. Disconnect the Encoder Adapter Cable from P1 of the Head Control Asm PC BD.

12. Connect HD INTF1 Cable Assembly to P1 of the Head Control Asm PC BD.

13. Remove the Theta Alignment Tool.

14. Install the FlexJet Head cover.
15. Power cycle the machine by turning off the AC Input Switch and waiting 6 seconds before restoring power.

**Z-Home Sensor Setup**

This section describes how to adjust and verify the adjustment of the Z-Home Sensor following sensor replacement. It is recommended that 2 individuals perform the Z-Home Sensor Setup procedure for a Dual Beam machine.

All reference to the head are from the Head Interface PC BD vantage point and all reference to the Z Drive Pulley are from the Z Drive Pulley side vantage point.

---

**NOTE**

Refer to the Z-Safe Stop Bracket Belt Tension section of the Platform Assembly document before continuing with Z-Home Sensor Setup procedure.

---

**Prerequisite:**

- The Stop Bar must not be misaligned.

**Adjustment**

Adjust the Z-Home Sensor using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position that allows access to the Z-Home sensor located on the right side of the FlexJet head. Refer to the following illustration.
2. Select **Machine Status > Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

3. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select head number 1. If the FlexJet head is on the rear of the beam, select head number 2.

4. Highlight **STOP_BRAKE** located in the Select Outputs field. Then select the **Reset Outputs** button. If a message box displays asking to place the machine in Diagnostic Mode, select **Yes**.

5. Deselect **STOP_BRAKE** located in the Select Outputs field and highlight **STOP_CLUTCH**. Then select the **Set Outputs** button.

6. Open the machine cover and remove the FlexJet Head cover.
7. Rotate the Z-Motor Drive pulleys clockwise until the Stop Bar comes in contact with the Head Base Casting. Refer to the following illustration.

**NOTE**
If the Stop Brake is still engaged, the Z-Motor Drive pulleys will not rotate.

8. While holding the Z-Motor Drive pulleys in position, highlight STOP_BRAKE located in the Select Outputs field. Then select the Set Outputs button.

9. Loosen the mounting screws that secure the Sensor Mount to the head casting and move the Z Home Sensor Assembly up then down until the LED on the sensor just illuminates.

10. Tighten the mounting screw to secure the Sensor Mount to the head casting.

11. In the Discrete I/O window, highlight STOP_CLUTCH and STOP_BRAKE located in the Select Outputs field. Select the Reset Outputs button.

12. Select Exit.
13. Record on the appropriate copied sheet from the *Maintenance Log* document that this procedure was performed and include the date.

**Adjustment Verification**

Verify the Z-Home Sensor adjustment using the following procedure.

1. Move the FlexJet Head Assembly to a maintenance position that allows access to the Z-Home sensor located on the right side of the FlexJet head. Refer to the following illustration.

2. Select *Machine Status > Diagnostics > Discrete I/O > Heads*

The Discrete I/O dialog box displays.

3. From the Select Head # group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

4. Highlight STOP_BRAKE located in the Select Outputs field. Select the Reset Outputs button. If a message box displays asking to place machine in Diagnostic Mode, select Yes.
5. Deselect **STOP BRAKE** located in the Select Outputs field and highlight **STOP_CLUTCH**. Select the **Set Outputs** button.

6. Rotate the Z-Motor Drive pulleys clockwise until the Stop Bar comes in contact with the Head Base Casting. Refer to the following illustration.

**NOTE**

If the Stop Brake is still engaged, the Z-Motor Drive pulleys will not rotate.

7. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Reset Outputs** button.

8. Select **Exit**.

9. From the Machine Status window, select:

   **Diagnostics > Global Memory > Alter memory**

10. From the Alter Global Data window, select:

    **OS_READONLY >OS_READONLY [A-M] > ID_OS_READONLY_AXIS_LOC_AREA**
The ALTER ID_OS2_READONLY_AXIS_LOC_AREA window displays.

11. In the **AXIS** field, enter the appropriate axis value for Z Axis on the head that is being adjusted. Refer to the following table.

<table>
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<tr>
<th>Head</th>
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<td>Front Head Beam 1</td>
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</tr>
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<td>14</td>
</tr>
<tr>
<td>Rear Head Beam 2</td>
<td>16</td>
</tr>
</tbody>
</table>

12. Select the **READ VALUES** button. Verify that the micron value is zero ± 25. If the micron value does not display, rotate the Z Drive pulleys while clicking the **READ VALUES** button until the proper value displays.

13. Select **ESCAPE**. Then select **EXIT**.
14. Select **Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

![Discrete I/O Dialog Box]

15. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

16. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Set Outputs** button.

17. Select **Exit**.

18. From the Machine Status window, select:

   **Diagnostics > Global Memory > Alter memory**

19. From the Alter Global Data window, select:

   **OS_READONLY > OS_READONLY [A-M] > ID_OS_READONLY_AXIS_LOC_AREA**
The ALTER ID_OS2_READONLY_AXIS_LOC_AREA window displays.

20. In the AXIS field, enter the appropriate axis value for Z Axis on the head that is being adjusted. Refer to the following table.

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</tr>
<tr>
<td>Rear Head Beam 2</td>
<td>16</td>
</tr>
</tbody>
</table>

21. Select the READ VALUES button. Verify that the micron value is zero ± 25.

22. Verify the LED on the Z Home Sensor Assembly is illuminated. While observing the Z Home Sensor Assembly, rotate the Z Drive pulleys counterclockwise until LED on the Z Home Sensor Assembly goes out.

23. Select the READ VALUES button. Verify that the micron value is less than 350. If the micron value is greater than 350, perform the Z Home Sensor Setup procedure located this document.

24. Select ESCAPE. Select EXIT.
25. Select **Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

```
26. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

27. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Reset Outputs** button.

28. Select **EXIT**.

**Z-Safe Sensor Setup**

The Z-Safe values define the distance from the top surface of the board to the bottom tip of each nozzle. This value must be large enough so that the nozzles will not hit any obstructions on the board when moving over the board.

---

**NOTE**

The Z Safe Optics should not be moved unless the Z Safe Optics were replaced or the alignment of the emitter and receiver changed. However, the verification procedure can be used to verify the correct setting of the Z Safe Sensor after adjusting the Z Home Sensor.

The **Z Home Sensor Setup Verification** procedure must be performed before continuing with the **Z-Safe Sensor Setup** procedure.
Adjustment

Adjust the Z-Safe Sensor using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position that allows access to the Z Touch-Down Sensor assembly located on the right side of the FlexJet head. Refer to the following illustration.

2. Select:

   Machine Status > Diagnostics > Discrete I/O > Heads

The Discrete I/O dialog box displays.

3. From the Select Head # group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.
4. Highlight **STOP_BRAKE** located in the Select Outputs field. Select the **Reset Outputs** button. If a message box displays asking to place machine in Diagnostic Mode, select **Yes**.

5. Deselect **STOP_BRAKE** located in the Select Outputs field and highlight **STOP_CLUTCH**. Select the **Set Outputs** button.

6. Open machine cover and remove the FlexJet Head cover.

7. Rotate the Z-Motor Drive pulleys clockwise until the Stop Bar comes in contact with the Head Base Casting. Refer to the following illustration.

**NOTE**

If the Stop Brake is still engaged, the Z-Motor Drive pulleys will not rotate.

8. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Reset Outputs** button.

9. Select **Exit**.

10. From the Machine Status window, select:

    **Diagnostics > Global Memory > Alter memory**
11. From the Alter Global Data window, select:

```
OS_READONLY > OS_READONLY [A-M] >
ID_OS_READONLY_AXIS_LOC_AREA
```

The ALTER ID_OS2_READONLY_AXIS_LOC_AREA window displays.

12. In the **AXIS** field, enter the appropriate axis value for Z Axis on the head that is being adjusted. Refer to the following table.

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<td>16</td>
</tr>
</tbody>
</table>

13. Select the **READ VALUES** button. Verify that the micron value is zero ± 25. If the micron value does not display, rotate the Z Drive pulleys while clicking the **READ VALUES** button until the proper value displays.

14. Select **ESCAPE**. Select **EXIT**.

15. From the menu heading, select:

```
Diagnostics > Discrete I/O > Heads
```
The Discrete I/O dialog box displays.

16. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

17. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Set Outputs** button.

18. Go back to **OS/2 READONLY, ID OS/2 AXIS_Loc_Area**. Rotate the Z Drive pulleys counterclockwise while clicking the **READ VALUES** button until the micron value is 750 ± 50.

19. While holding the Z Drive pulleys in this position, select **ESCAPE** and **EXIT**.

20. From the menu heading, select:

   **Diagnostics > Discrete I/O > Heads**
The Discrete I/O dialog box displays.

21. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

22. Highlight **STOP_BRAKE** and **STOP_CLUTCH** located in the Select Outputs field. Select the **Set Outputs** button. Go back to **OS/2 READONLY, ID OS/2 AXIS_Loc_Area**. With the head axis entered, select **READ VALUES**. The Z stop bar should be locked at approximately 750 microns (0.03 inches/0.75 mm) from the hard stop.

23. Remove the sensor cover from the Z-Safe Sensor Assembly. Refer to the following illustration.

24. Perform the following procedure only if all Incident Level Indicators are not illuminated.

   a. On the Z-Safe Sensor Assembly, set the **Mode Selector** switch to the **TEACH** position.
b. Push the **Set Button** until the green Incident Level Indicators illuminate. Refer to the following illustration.

### Position 8

![Position 8 Diagram]

25. Set the **Mode Selector** switch to the **RUN** position. The far right red arrow, **Current Setting** must be illuminated. If the far right red arrow, **Current Setting** is not illuminated, repeat steps 18 through 19.

26. Adjust the Z Safe Optics only if one of the following conditions exist.
   - Damage to the fiber optic cable(s)
   - Replacement of the Z Safe Optics
   - In step 24, all of the green indicator lights do not illuminate

   If one of the above conditions exists, perform the following procedure.

   a. Loosen the screws that secure the Z Safe Optics and adjust the Z Safe Optics to obtain full green Incident Level Indicators.

   b. Tighten the screws to secure the Z Safe Optics.

27. Install the sensor cover to the Z-Safe Sensor Assembly.

28. Select **ESCAPE**. Select **EXIT**.
29. Select **Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

![Discrete I/O Dialog Box](image)

30. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

31. In the Discrete I/O window, select **Tool # 1**. Then highlight **STOP_BRAKE** and **STOP_CLUTCH** located in the **Select Outputs** field and select the **Reset Outputs** button.

32. Select **Exit**.

33. Record on the appropriate copied sheet from the **Maintenance Log** document that this procedure was performed and include the date.

**Adjustment Verification**

Verify the Z-Safe Sensor adjustment using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position that allows access to the Z Touch-Down Sensor assembly located on the right side of the FlexJet head.
2. Select **Machine Status > Diagnostics > Discrete I/O > Heads**

   The Discrete I/O dialog box displays.

3. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

4. Highlight **STOP_BRAKE** located in the Select Outputs field. Select the **Reset Outputs** button. If a message box displays asking to place machine in Diagnostic Mode, select **Yes**.

5. Select **Tool # 1**. Then deselect **STOP_BRAKE** located in the Select Outputs field and highlight **STOP_CLUTCH** and select the **Set Outputs** button.

6. Remove the FlexJet Head cover.
7. Rotate the Z-Motor Drive pulleys clockwise until the Stop Bar comes in contact with the Head Base Casting. Refer to the following illustration.

**NOTE**
If the Stop Brake is still engaged, the Z-Motor Drive pulleys will not rotate.

8. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Reset Outputs** button.

9. Select **Exit**.

10. From the Machine Status window, select:

   `Diagnostics > Global Memory > Alter memory`

11. From the Alter Global window, select:

   `OS_READONLY > OS_READONLY [A-M] > ID_OS_READONLY_AXIS_LOC_AREA`
12. In the **AXIS** field, enter the appropriate axis value for Z Axis on the head that is being adjusted. Refer to the following table.

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<td>16</td>
</tr>
</tbody>
</table>

13. Select the **READ VALUES** button. Verify that the micron value is zero ± 25. If the READ VALUES does not display, rotate the Z Drive pulleys while clicking the **READ VALUES** button until the proper value displays.

14. Select **ESCAPE**. Select **EXIT**.
15. Select **Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

![Discrete I/O Dialog Box](image)

16. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

17. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Set Outputs** button.

18. Select **Exit**.

19. From the Machine Status window, select:

**Diagnostics > Global Memory > Alter memory**

20. From the Alter Global Data window, select:

**OS_READONLY > OS_READONLY [A-M] > ID_OS_READONLY_AXIS_LOC_AREA**
The ALTER ID_OS2_READONLY_AXIS_LOC_AREA window displays.

21. In the **AXIS** field, enter the appropriate axis value for Z Axis on the head that is being adjusted. Refer to the following table.

<table>
<thead>
<tr>
<th>Head</th>
<th>Axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Head Beam 1</td>
<td>12</td>
</tr>
<tr>
<td>Rear Head Beam 1</td>
<td>14</td>
</tr>
<tr>
<td>Rear Head Beam 2</td>
<td>16</td>
</tr>
</tbody>
</table>

22. Select the **READ VALUES** button. Verify that the micron value is zero ± 25.

23. While clicking the **READ VALUES** button, rotate the Z Drive pulleys until all of the Incident Level Indicators on the Z-Safe Sensor Assembly illuminate.

24. Verify that the micron value is 750 ± 50 when the Incident Level Indicators illuminate. If the micron value is not 750 ± 50, perform the **Z-Safe Sensor Setup** procedure located this document.

25. Select **ESCAPE**. Select **EXIT**.
26. Select **Diagnostics > Discrete I/O > Heads**

The Discrete I/O dialog box displays.

27. From the **Select Head #** group box, select the number of the head: If the FlexJet head is on the front of the beam, select number 1. If the FlexJet head is on the rear of the beam, select number 2.

28. Highlight **STOP_CLUTCH** located in the Select Outputs field. Select the **Reset Outputs** button.

29. Select **EXIT**.

30. Install the FlexJet Head cover.

**Spindle Drive Belt Tension Adjustment**

This section describes how to adjust drive belt tension following belt replacement. Adjust the drive belt tension using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Power down the machine. Execute your site’s Lockout/Tagout procedure.

---

**WARNING**

The machine must be powered down and your site’s Lockout/Tagout procedure executed during this procedure to ensure personal safety.
3. Open the machine front cover.

4. Remove the FlexJet Head cover.

5. Remove the FlexJet Head. Refer to the FlexJet Head Removal procedure located in this document.

6. Place the FlexJet Head assembly camera side down in order to access the Z-Axis Spindle Drive Belt.

**CAUTION**

Be careful not to damage the head and camera assembly.

7. Install the Spindle drive-belt tension fixture to the Platform Assembly.

8. Place the 2 ounce (0.556 newtons) weight on the tension rod for the selected Spindle as seen in the illustration below. The upper line (mark) of the weight support should appear just above the bracket on the fixture.

9. If the adjustment does not meet the criteria in the last step, adjust the selected Spindle drive belt tension using the following steps.
   
   a. Loosen the set screw at the bottom of the Platform Assembly corresponding to the selected spindle as seen in the illustration above.
   
   b. Adjust the screw at the bottom of the casting so that the mark noted in step 8 drops below the top of the fixture bracket.
c. Adjust the bottom screw so that tension increases and the 2 ounce (0.556 newtons) weight support moves up to align with the fixture bracket as described in step 8. It is recommended to carefully tap the weight while adjusting to make sure that the tension rod is not settling into the belt. When this settling occurs, the weight suddenly pops up during adjustment instead of steadily changing.

d. Tighten the set screw loosened in step 9a.

10. Move the weight to the next spindle until all 7 Spindle belt tensions are verified and/or adjusted.

11. Install the Plate and Baffle if removed earlier.

12. Install the FlexJet Head. Refer to the FlexJet Head Installation procedure located in this document.

13. Install the FlexJet Head cover.


15. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

**Verify Touch-Down Sensors**

Verify the touch-down sensor setup for all 7 spindles using the following procedure. Make sure the Pin Mirrors are clean before verifying the sensors. Refer to the Clean Pin Mirrors section in this document.

1. Select Production Control > Manual Control.

2. Select the correct Operator: option button.

3. Select the correct beam in the Device: pull-down box.

4. Select Increment > 1.0”.

5. Move the head to a location between the board-handling rails by selecting the directional buttons. Or use a maintenance location that is between the rails.

6. Verify that the space below the spindles is clear of PC boards or other objects.
7. Select **Device > Z**.

8. Select **Axis Locations > Display Absolute Locations**.

9. Select **Absolute Locations > Units > Inches** to view the spindle depth.

10. Select **Tool > All**.

11. Select **Increment > 1.0”**.

12. Move the spindle down 3 inches (76.2 mm) by selecting the down-arrow button 3 times.

13. Select **Increment > 0.1”**.

14. Move the spindle down 0.4 inches (10.16 mm) by selecting the down-arrow button 4 times. The spindle is now at a depth of 3.4 inches (81.36 mm) from the home position.

15. If 2 or more LEDs are not illuminated for any of the spindles, that touch-down sensor needs adjustment. For future reference, record which of the 7 sensors are out of adjustment.

   Touch-down sensor setup for a spindle is not necessary under the following circumstances.

   - If all LEDs for a spindle are illuminated
   - If all but 1 of the LEDs for a spindle are illuminated.

16. Select **Increment > 1.0”**.

17. Move the spindle up to the home position by selecting the up-arrow button 4 times.

**CAUTION**

It is important to use Manual Control to move the spindles up to the home position before exiting the software window to prevent the spindles from slapping to the home position.

18. Select **Exit**.

19. If necessary, proceed to the **Touch-Down Sensor Setup** section in this module. It is recommended to only adjust those sensors which are out of adjustment. Therefore, it may not be necessary to adjust all 7 spindles.

20. Record on the appropriate copied sheet from the **Maintenance Log** document that this procedure was performed and include the date.
Clean the Pin Mirrors

Use the following procedure to clean the Pin Mirrors in the Spindle Housings to help ensure proper touch-down sensor operation.

**Prerequisites**

- Several long cotton swabs
- Isopropyl alcohol
- A lighting tool is recommended.

**Position the FlexJet Head**

Move the head to a convenient location.

- For a GSM1™ platform, move the head to a maintenance location so that the front of the head is accessible.
- For a GSM2™ platform, it may be necessary to select a maintenance location and use Discrete I/O to move the heads as seen in the illustration below.

![Top View of the GSM2 Platform](image_url)

- Move this head to the left and reach around the outer beam to clean the Pin Mirrors.
- Stand on this side of the machine.
**Lower the Spindles**

Use the following steps to lower the 7 spindles to access the Pin Mirrors.

1. Select **Machine Status > Diagnostics > Discrete I/O > Heads**
   
The Discrete I/O - Head Subsystem I/O window displays.

2. Select the correct **Head #** (number).

3. Select **Tool #1**.

4. Highlight **STOP_CLUTCH** in the **Select Outputs** list box.

5. Select the **Set Outputs** push button.

6. Highlight **STOP_BRAKE** in the **Select Outputs** list box.

7. Position the cursor over the **Set Outputs** push button, but do not select the button yet.

8. Rotate a Z Motor pulley to manually move the 7 spindles down so that the spindle housings appear in the gap between the top of the 2.6 OTH Camera Assembly and the bottom of the Head Control ASM PC BD. All 7 spindles should move at the same time.

9. When the spindles are in the appropriate position, click the upper, left trackball button to activate the **STOP_BRAKE** output. The 7 spindles should remain at the chosen position when the Z Motor pulley is released.

**Clean the Reflective Surfaces of the Mirrors**

1. Moisten one of the long cotton swabs with isopropyl alcohol and roll the tip with the thumb and index fingers to compact the fibers. Refer to the illustration below.

   ![Swab](image)

   **Swab**

   **CAUTION**

   Using swabs with visible contamination can damage the Pin Mirrors. So check the swab tips frequently and discard a swab when contamination is evident.
2. Clean both Pin Mirrors in each spindle by passing the swab through the opening in the spindle housings. Check the swab tip regularly for contamination. Refer to the illustration below.

It is recommended to attempt to clean approximately half of the Pin Mirrors from each side of the head. For example, it may be preferable to clean 8 Pin Mirrors on 4 spindles from one side of the head and clean the 6 Pin Mirrors on the 3 remaining spindles from the other side of the head. Also note that a lighting tool such as a flashlight may be required to verify the location of the swab within the spindle housings.

3. Use a dry swab to clean the same Pin Mirrors before the solution dries on them.

**Raise the Spindles**

1. After all Pin Mirrors are cleaned, hold on the Z Motor pulleys and highlight **STOP_BRAKE** in the **Activated I/O Outputs** field.

2. Select the Reset Outputs push button.

**CAUTION**

Always hold one of the FlexJet Z Motor pulleys before resetting the STOP BRAKE in Discrete I/O window, or the spindles may abruptly impact the Optic Bracket, thereby resulting in damage or alteration of adjustments.

3. Use care to manually return the 7 spindles to the upper position.

**Verify the Touch-Down Sensors**

Complete the Verify Touch-Down Sensors procedure in this document to ensure that the Pin Mirrors are reflecting the light at an acceptable intensity. This system verification is important because it is difficult to visually verify the reflectivity of the Pin Mirrors.
If the results of the verification are not acceptable, repeat the sections above in sequential order, beginning with the Position the FlexJet Head section. It may be easier to use Discrete I/O to lower only those spindles with Pin Mirrors which are distorting the optical signal. When all Pin Mirrors are functioning correctly, continue with the Perform Touch-Down Sensor Setup section below.

**Perform Touch-Down Sensor Setup**

After confirming that the Pin Mirrors are clean by verifying the touch-down sensors, perform touch-down sensor setup to teach the sensors. Refer to the Touch-Down Sensor Setup section in this document.

Record on the appropriate copied sheet from the Maintenance Log document that this cleaning procedure was performed and include the date.

**Touch-Down Sensor Setup**

This section describes how to set the Touch-Down Sensor so that the illumination of the light goes out as soon as the nozzle impacts a component or board. For GSM2™ platforms, be aware that viewing the touch-down sensor LEDs may require use of a mirror. Setup the Touch-Down Sensor on all 7 nozzles using the following procedure.

**NOTE**

*Use 10 MPF nozzles for Touch-Down Sensor Setup.*

**Machine Preparation**

Perform the following procedure to prepare the machine for touch-down sensor setup.

1. Move the head to a maintenance location using **Manual Control**.
2. Palm down the machine and open the machine front hinged cover.
3. Remove the safety cover below the hinged cover.
4. Remove the feeders from the feeder bank where the head is located.
5. Remove the FlexJet Head cover.
6. Remove the 2 screws and the Plate and Baffle from the Platform Assembly. Refer to the following illustration.

![Diagram of the assembly](image)

7. Proceed to the **Sensor Setup** section.

**Sensor Setup**

Perform the following procedure to setup touch-down sensors which are not adjusted correctly.

1. On a GSM2™ platform, perform the following procedure. For a GSM1™ platform, continue with step 2.

   a. Loosen the set screw shown in the illustration below, and rotate the gauge 180 degrees in the tool housing to allow for easier viewing on the GSM2 platform. The scale setting should be set so that it can be viewed as seen in the lower, right illustration.

   ![Diagram of sensor setup](image)

   The fixture may have relief for a thumb screw.

   b. Verify that the gauge is seated against the tool housing and tighten the set screw.
2. Install the Impact Sensor Setup Tool to the bottom of the Platform Assembly, below the selected spindle. Refer to the following illustration.

![Diagram showing the installation process]

If visually aligning the Impact Sensor Setup Tool after it is installed on the FlexJet Head is uncomfortable, an alternate method is to sight on the gauge as shown in the illustration before installing it to the head. Note that a black locking collar on the gauge may be used to ensure that the gauge setting is constant during installation.

3. Rotate the gauge handle to align the gauge pin with the shelf on the fixture as seen in the illustration above.
4. Select Machine Status > Diagnostics > Discrete I/O > Heads

The Discrete I/O dialog box displays. The Head Subsystem I/O is illustrated.

5. Select the correct Head # (number).

6. Select the Tool # option button for the spindle to be adjusted.

7. Select SPINDLE_CLUTCH in the Select Outputs field.

8. Select Set Outputs to engage the clutch.

9. Select Yes when the Discrete I/O message box displays.

10. Select Tool # 1.

Tool # 1 must be selected to set the STOP BRAKE and STOP CLUTCH for any of the 7 spindles.

11. Drive down the selected spindle using the following procedure.

a. Select STOP_BRAKE and STOP_CLUTCH in the Select Outputs field.

Use extreme caution when driving the Z-Axis down until the nozzle tip is at board height. Jarring, bumping, or mishandling may cause damage to the head assembly.
b. Position the cursor over the **Set Outputs** push button, but do not select the button. This aids in selecting the button when the spindle is in the proper lower position.

c. Manually drive the spindle down by turning the Z-Axis Drive pulleys and install a 10 MPF nozzle when the Coupler Body is accessible.

d. Continue to manually drive the pulley down until the nozzle tip is +/- 0.05 inches (1.27 mm) from the shelf on the setup fixture.

e. While holding the Z-Axis pulley in position, select the **Set Outputs** push button.

12. Turn the vernier knob located on the setup fixture until it comes in contact with the nozzle tip or use a 0.001 to 0.002 inches (0.025 to 0.050 mm) feeler gauge.

13. Teach the location for the selected spindle using the following procedure.

   a. Remove the cover from Touch-Down Sensor for the selected spindle. Refer to the following illustration.

   b. On the Spindle Touch-Down Sensor Assembly, set the **Mode Selector** switch to **Teach**.
Pushing and holding the Set button for more than 2.5 seconds and then releasing will cause all Incident-Level-Indicator LEDs to turn green. If this occurs, push the Mode Selector switch to Run Mode and then push the switch back to Teach.

c. Push and release the Set Button. All Incident-Level-Indicator LEDs should turn red. Refer to the following illustration.

d. Turn the vernier knob located on the setup fixture until it compresses the nozzle tip 0.02 inches (0,50 mm).

e. Push and release the Set Button. The red Incident-Level-Indicator LEDs should extinguish. If the lights flash red, repeat steps 12 and 13, driving the vernier an additional 0.005 inches (0,127 mm) into the nozzle tip until the lights turn green. Maximum nozzle tip compression is 0.025 inches (0,635 mm).

f. Push the Mode Selector switch to Run Mode.

g. Install Spindle Touch-Down Sensor Assembly cover removed in step 13a.

14. Remove the setup fixture from the head.

15. Remove the 10 MPF nozzle from the spindle.

16. Perform the following procedure to return the selected spindle to the home position.

a. Select Tool # 1.

b. In the Select Outputs: section of the window, select the None push button.

c. Select STOP_BRAKE and STOP_CLUTCH in the in the Select Outputs field.

d. While holding the Z-Axis pulley in position, select the Reset Outputs push button.
e. Manually move the spindle up to the home position by turning a Z-Motor pulley.

f. Select the Tool # of the spindle just returned to the home position.

g. Select SPINDLE_CLUTCH in the Select Outputs field.

h. Select Reset Outputs to disengage the clutch.

17. Repeat the entire Sensor Setup section for any other spindle touch-down sensors which need adjustment. If necessary, refer to information recorded during the Verify Touch-Down Sensors section of this document. Make sure to change the Tool # to match the number of the selected spindle.

When all touch-down sensors selected for setup are properly adjusted, proceed to the Setup Verification section.

**Setup Verification**

Perform the following procedure to verify the sensors after adjustment.

```
CAUTION

The fixture must be removed from the Coupler Body Assemblies before head use to prevent head damage.
```

1. Palm up the machine.

2. Zero the machine. Refer to the Machine Operation document for more information.

3. Perform the Verify Touch Down Sensors procedure in this module. If all 7 spindles are properly adjusted, proceed to step 4. Otherwise, repeat the Sensor Setup section for any spindles that are still not adjusted correctly.

4. Use Manual Control to move the head to an accessible location.

6. Install the 2 screws and the Plate and Baffle to the Head Mount Platform using specified torque and loctite requirements.

7. Install the feeders that were removed earlier in the procedure. If necessary, verify that the software feeder configuration is correct. Refer to the Feeder Configuration document in the Product Editor Guide.

8. Install the FlexJet Head cover.

9. Install the safety cover below the hinged cover if it was removed earlier.
Spindle Height Calibration must always be performed after Touch-Down Sensor Setup on a FlexJet Head.

10. Perform Spindle Height Calibration. Refer to the Spindle Height Calibration section of the FlexJet Operation Module.

11. Record on the appropriate copied sheet from the Maintenance Log document that this setup procedure was performed and include the date.

Up/Down Clutch-Bar Drive-Belt Tension Adjustment

This section describes how to set the Up/Down Clutch Bar Drive belt tension. Set the Up/Down Clutch Bar Drive belt tension using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

The machine cover must remain open during this procedure to place the Interlock circuit in the violated state, disabling machine servo axes. Failure to comply could result in serious personal injury.

2. Palm down the machine and open the machine front cover.

3. Remove the FlexJet Head cover.

4. Adjust the pulley so the belt deflection is 0.05 inches (1.27 mm) from a force of 2 ounces (0.556 N) using the following procedure.

   a. Loosen the pulley-bracket metric socket head screw. Refer to the following illustration.
b. Rotate the idler pulley bracket so that it is almost vertical with
the pulley towards the Stop Bar drive pulley.

c. Push the bracket upwards so the mounting screw is at the bottom
of the adjustment slot and rotate the bracket clockwise until the
proper deflection is measured with 2 ounces (0.556 N) of force.

d. While maintaining the pulley position and belt tension, secure the
metric socket head screw loosened in step 4a.

5. Verify adjustment and repeat if necessary.

6. Install the FlexJet Head cover.

7. Record on the appropriate copied sheet from the Maintenance Log
document that this procedure was performed and include the date.

Z-Safe Stop Bracket Belt Tension

The Z-Safe Stop Bracket Belt requires tension adjustment following belt
replacement or to correct for normal wear and stretch. To adjust the Z-Safe
Stop Bracket Belt tension, refer to the procedure Z-Safe Stop Bracket Belt
Tension located in the Platform Assembly document.

Comprehensive Head Maintenance

Perform Comprehensive Head Maintenance if the head is removed for repair
or adjustment and as prescribed in the maintenance concept for this
assembly. Perform the procedures below to complete the maintenance.

NOTE

A Calibration Placement Enhancement (CPE) kit for FlexJet is required
to ensure specified accuracy after performing this procedure.

For a GSM2™ platform, it is recommended to perform the entire
procedure on one FlexJet Head before removing the second head.

CAUTION

Use Electro-Static Discharge (ESD) precautionary measures when
working on the FlexJet Head.
Remove the FlexJet Head

Refer to the FlexJet Head Removal section in this module to remove a head from the platform machine before performing the Comprehensive Head Maintenance procedures. After the head is removed, proceed to the Clean Pin Mirrors section. Use an ESD-dissipative foam pad for cushioning between the head and the work surface if one is available.

Clean the Pin Mirrors

Use the following procedure to clean both Pin Mirrors on each FlexJet Spindle. If the Pin Mirrors are covered with dust, oil, or other contamination, the performance of the FlexJet Head touch-down sensors may decrease.

1. Remove the Plate and Baffle from the head casting. Refer to the following illustration.

Be careful when handling the 7 CCD Camera Assembly. It is a delicate device.
2. Remove the 7 CCD Camera Assembly and the Stiffener using the following procedure. Also refer to the following illustration.

![Diagram showing Stiffener and 7 CCD Camera Assembly]

**CAUTION**

Use Electro-Static Discharge (ESD) precautionary measures when disconnecting cabling from the Head Control ASM PC BD.

- a. Disconnect the 7 CCD Camera Cable Assembly from the Head Control ASM PC BD.
- b. Remove the 6 Stiffener screws.
- c. Remove the 4 screws and the 7 CCD Camera Assembly, with the Camera Cable Assembly attached.
- d. Remove the Stiffener from the 2.6 OTH Camera. Be careful not to bump the PC board.
3. Manually move the selected spindle down so that both Pin Mirrors are accessible. Refer to the following illustration.

Do not dry wipe the Pin Mirrors or scratching may occur.

Using swabs with visible contamination can damage the Pin Mirrors. So check the swab tips frequently and discard a swab when contamination is evident.

4. Moisten a swab with Isopropyl alcohol and roll the head of the swab between the fingertips, unless the swab has a foam tip. The swab should be at least 6 inches (152,4 mm) long. Refer to the following illustration.

5. While holding the Spindle in the down position so that the opening in the Spindle housing is accessible, clean both Pin Mirrors by pushing the alcohol-moistened cotton swab through the openings in the spindle Housing. Refer to the following illustration.

Then use a dry swab to clean the same Pin Mirrors before the solution dries on them.
Do not let go of the Spindle until it is fully in the up position, or the return spring may cause the Spindle to abruptly impact the Optic Bracket.

6. Carefully return the Spindle to the up (home) position.

7. Repeat the procedure from step 3 until all 14 Pin Mirrors on the 7 Spindles are clean, then continue with the next procedure.

**Verify/Adjust the Camera Mirror Cable**

Use the following procedure to verify the camera cable adjustment. After the cable is adjusted, proceed to the next section.

1. Use feeler gauges to verify the gap shown in the illustration below. Refer to the *Cable Adjustment* procedure in the *2.6 OTH Camera Assembly* document for the proper gap specification.

2. If the gap is out of adjustment, perform the following steps. Otherwise proceed to the *Inspect Mirror Spring Shaft* procedure.
   a. Rotate the cable adjustment screw clockwise or counterclockwise to achieve the gap specified in the *Cable Adjustment* section of the *2.6 OTH Camera Assembly* document. See the illustration to the left.
b. With the rocker switch in the **ON** position, test pins 1 and 2 of the P15 connector of the FlexJet Prism Setup Fixture found in the FlexJet toolkit. If the voltage is below 13 volts, replace the batteries before continuing with the procedure. If the voltage is 13 volts or above, continue with the next step. See the illustration to the left.

![](image)

**CAUTION**

Use ESD precautionary measures when handling the Head Control ASM PC BD and associated cabling.

c. Disconnect the 15PL connector from the Head Control ASM PC BD.

d. Connect 15PL to the P15 connector on the FlexJet Prism Setup Fixture shown in the illustration above.

e. With the movable camera mirror in the upper (at rest) position, verify that the **MIRROR CLEAR** LED illuminates when the rocker switch is pushed to the **ON** position.

f. Disconnect 15PL from the test box and connect it to the Head Control ASM PC BD.

3. Continue with the next procedure.

**Inspect the Mirror Spring Shaft**

Use the following procedure to inspect the 2.6 OTH Camera Mirror Spring shaft for wear that may affect performance.

![](image)

**CAUTION**

Be careful not to release the movable mirror when it is in the upper position, or the springs will abruptly pull the mirror to its rest position.
Inspect the 2.6 OTH Camera Mirror Spring Shaft for wear. This shaft is located inside of a spring on the inner, right portion of the camera. Check the shaft with the movable mirror in both the upper and lower positions. If the shaft appears worn, contact a Universal Technical Specialist.

**Inspect the Linear Bearings**

Use the following steps to inspect the Linear Bearings to which the FlexJet Spindles are mounted for excess oil.

---

**CAUTION**

Do not use any solutions to remove excess oil from the Linear Bearings. Use only a dry lint-free cloth or swab.

---

* Inspect the bottom portions of the 7 Linear Bearings for excess oil. Refer to the following illustration. If excess oil is visible, absorb the oil with a dry, lint-free cloth, or a cotton swab.

---

**Verify/Adjust Tension of Spindle Drive Belts**

Refer to the *Z Axis Spindle Drive Belt Tension Adjustment* section in this module. After the 7 Spindle drive belts are verified or adjusted, proceed to the next section.

**Inspect Theta and Z-Motor Belts**

Refer to the *Inspect Theta and Z-Motor Belts* section of this module to check the belts for wear or missing teeth. If necessary, temporarily mark the belt to verify that the entire belt is inspected. After the belts are inspected, proceed to the next section.
General Inspection

Use the following steps to inspect the FlexJet Head for loose connections.

**CAUTION**

Use ESD precautionary measures when handling the Head Control ASM PC BD and associated cabling.

1. Inspect the connections to the Head Control ASM PC BD. Verify that all connectors are properly seated. If a connector is not seated correctly, push the connector so that it is securely in place.

2. Inspect the clear hoses connected to the Manifold Assembly for proper seating. If a hose is loose, but appears in good condition, firmly connect the hose to the fitting. If a hose is damaged, it must be replaced.

3. Inspect the Coupler Body hoses for proper seating. See the illustration to the left. If a hose is not seated correctly, push the hose onto the fitting until it is completely seated.

Clean the Camera Mirrors

Use the following procedure to clean contamination from the 2.6 OTH Camera mirrors.

**CAUTION**

Never wipe mirrors with anything that is dry because they are susceptible to scratching. Use only a lens solution and tissue designed for delicate optical surfaces to clean the camera mirrors. The mirror surfaces can be damaged by solutions and tissue not formulated for optical surfaces or lenses. Also be aware that fingerprints on the camera mirrors may reduce the performance of the head.

If the movable mirror is damaged, the entire Slide Mirror assembly must be replaced. In addition, if the stationary image-path mirror is damaged, it must be replaced. However, the side-plate mirror surfaces are for illumination only and the impact of a small scratch is negligible.

1. While holding the movable mirror in the up position, apply any commercially available quality optics/lens cleaning solution to lens tissue and clean the stationary mirror and 2 side mirrors. Then wipe the surface clean with the lens tissue.

   Do not continue to wipe the mirror surfaces after the solution is removed. If a stain or particle is still present after the first attempt, then apply more solution and repeat. However, never wipe the mirrors with a dry tissue. Also, do not wipe the mirrors with a soiled portion of a tissue.
2. Carefully clean the movable mirror in the same manner as the other mirrors and return the movable mirror to its rest position.

3. Inspect the 2 image mirrors for significant scratches. If significant scratches are visible, contact a Universal Technical Specialist.

4. Inspect the 7 CCD Camera Assembly glass plates for visible particles. If particles are present on the glass plates, use clean, compressed air to remove the particles. Make sure to perform this step at least several feet (or about 1 meter) away from the head.

CAUTION

Clean the 7 CCD Camera Assembly glass plates with lens-cleaning solution and a lint-free cloth only if oil or other liquid substances are visible on the glass plates. If such substances are not visible, use clean, compressed air only, in an area away from the head. Also, do not dry wipe the glass plates.

5. Install the 7 CCD Camera Assembly and the Stiffener using the following procedure. Also refer to the following illustration.

Stiffener Screws

a. Install the 6 screws and the Stiffener on the 2.6 OTH Camera, but do not tighten the screws.

Be careful when handling the 7 CCD Camera Assembly. It is a delicate device.

Use ESD precautionary measures when installing cabling to the Head Control ASM PC BD and do not touch exposed pins on the board.
b. Install the 4 screws and the 7 CCD Camera Assembly, with the Camera Cable Assembly attached.

c. Verify proper cable orientation and attach the Camera Cable Assembly to the Head Control ASM PC BD. Refer to the following illustration.

d. Tighten the Stiffener screws.

**Install the FlexJet Head**

Refer to the *FlexJet Head Installation* section of this module to install the FlexJet head on the platform machine in its previous location before Comprehensive Head Maintenance was performed. After the head is installed, proceed to the next section.

**Perform Required Calibrations**

Use the following steps to ensure accuracy with calibration.

1. Perform the Spindle-Height Calibration. Refer to the *Spindle Height Calibration* module in the *Calibration, CPE and Measurement* manual.


3. Calibration Placement Enhancement (CPE) is required after removing and then installing the FlexJet back to the previous position on the machine. Refer to the *Calibration, CPE and Measurement* manual and perform CPE for FlexJet to ensure specified placement accuracy. It is also recommended to dry cycle to verify head performance before running full production.

4. Record on the appropriate copied sheet from the *Maintenance Log* document that this maintenance procedure was performed and include the date.
Advanced Support Information

The following corrective maintenance procedures are intended for Universal Instruments Corporation Field Service Engineers only. Unauthorized implementation of these procedures may result in damage to the machine and may adversely affect your warranty status if performed by other than UIC personnel.

The advanced support information procedures are those identified on the maintenance concept table as requiring a minimum skill level of Universal Instruments Field Service Engineer.

FlexJet Spindle Assembly Replacement

This section describes how to replace a FlexJet Spindle Assembly due to damage or wear. Replace the FlexJet Spindle Assembly using the following procedure.

1. Verify that the machine is in the powered down mode. Execute your site's lockout/tagout procedure.

2. Remove the FlexJet Head cover.

3. Remove the FlexJet Head from the machine. Refer to FlexJet Head Removal procedure located in this document.

4. Remove the OTH Camera Assembly from the FlexJet Head. Refer to OTH Camera Assembly Removal procedure located in the Camera Asm, 2.6 OTH document.

5. Place the FlexJet Head assembly Spindle Assembly side up in order to access the FlexJet Spindle Assembly.

Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.
6. Remove all cables from the Head Control Asm PC BD. Refer to the following illustration.

7. Remove the 6 screws securing the Head Control Asm PC BD to the bracket.

8. Remove the 4 screws securing the bracket to the Platform Assembly.

9. Detach the EXT (Special) Spring from the Arm Spring and remove the 2 screws holding the Arm Spring in place. Refer to the illustration to the left.

10. Remove the 6 screws securing the Z-Axis Housing to the Linear Slide. Slowly remove the spindle downward.
11. Remove the 2 set screws securing the top spindle bearing to the Theta Drive Housing. Refer to the following illustration.

![Diagram of FlexJet Spindle Assy]

12. Remove the Bearing Assembly from Theta Housing and install on spline of removed spindle assembly.

13. Install the new spindle Bearing Assembly in Theta Drive Housing, first top, then bottom screw. Tighten screws to specified torque.
14. Assemble FlexJet Spindle Assembly to Theta Drive Housing. Align Theta Drive Housing set screws per illustration.

15. Install the FlexJet Spindle Assembly to the Linear Slide.

16. Justify the Linear Ball Spline to the right as it is installed onto the linear slide. The reference edge on the sliding portion is indicated by the middle groove along its length. Tighten screws to 46 in-ounces (0.325 Nm), while keeping the spindle justified to the right. Refer to the following illustration.

17. Install the 2 screws in the Arm Spring. Tighten screws to 3.5 in-pounds (0.395 Nm).
18. Use Loctite 222 (BLKMO7389) when installing the screw that attaches the belts to the arm spindle.

19.Attach the EXT (Special) Spring to the Arm Spring.

20. Install the 4 screws securing the bracket to the Platform Assembly. Refer to the following illustration.

21. Install the 6 screws securing the Head Control Asm PC BD to the bracket. Reconnect all cables.

22. Install the OTH Camera Assembly to the FlexJet Head. Refer to OTH Camera Assembly Installation procedure located in the Camera Asm, 2.6 OTH document.

23. Verify the Z-Axis drive belt tension. Refer to the Z-Axis Spindle Drive Belt Tension Adjustment procedure located in this document.

24. Install the FlexJet Head to the machine. Refer to FlexJet Head Installation procedure located in this document.

25. Verify the spindle alignment. Refer to the Coupler Body Assy Replacement/Alignment procedure located in this document.


27. Verify the vacuum level. Refer to the Vacuum Level Verification procedure located in this document.

28. Install the FlexJet Head cover.

30. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

### Z Stop Brake Assembly Replacement

This section describes how to replace a Z-Stop Brake Assembly due to damage or wear. Replace the Z-Stop Brake Assembly using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Execute your site's Lockout/Tagout procedure.

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**WARNING**

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

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3. Remove the FlexJet Head cover.

4. Remove the FlexJet Head from the machine. Refer to the FlexJet Head Removal procedure located in this document.

5. Place the FlexJet Head assembly vertical in order to access the brake assembly from the side.

---

**CAUTION**

Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.

---

6. Remove the cable ties securing the brake cable to the Head Control Asm PC BD.

7. Disconnect the brake cable (P11) from the Head Control Asm PC BD (11PL).
8. Remove the 4 screws securing the Brake Bracket to the Platform Assembly and remove the Brake Bracket. Refer to the following illustration.

9. Remove the 2 set screws securing the Z Stop Brake Assy to the shaft and remove from shaft.

10. Remove the 4 screws securing the Z Stop Brake Assy to the Brake Bracket and remove the Z Stop Brake Assy.

11. Slide the new Z Stop Brake Assy with 2 set screws on the shaft and align the assembly to the Brake Bracket. Secure in position with the 4 screws removed in step 10.

12. Install the Brake Bracket to the Platform Assembly and secure in position with the 4 screws removed in step 8.

13. Set brake gap to 0.015 in (0.38 mm). Refer to the Up/Down Stop Brake Air Gap Setup procedure located in this document.

14. Install the FlexJet Head on the machine. Refer to the FlexJet Head Installation procedure located in this document.

15. Install the FlexJet Head cover.


17. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.
Up/Down Stop Brake Air Gap Setup

The Up/Down Stop Brake requires air gap adjustment. To adjust the Up/Down Stop Brake Air Gap, perform the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Execute your site’s Lockout/Tagout procedure.

3. Open the machine front cover.

4. Remove the FlexJet Head cover.

5. Loosen the 2 set screws on the Z Stop Brake Assy.

6. Use 2 feeler gauges, one on each side of the disc, to adjust the Up/Down Stop Brake Air Gap on the Z Stop Brake Assy. Set the gap to 0.015 inches (0,38 mm) as shown below.

7. While maintaining the Up/Down Stop Brake Air Gap on the Z Stop Brake Assy, secure the 2 set screws loosened in step 5.

8. Replace the FlexJet Head cover.

9. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.
This section describes how to replace a Spindle Touch-Down Sensor Assembly due to damage or wear. Replace the Spindle Touch-Down Sensor Assembly using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Execute your site’s Lockout/Tagout procedure.

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Remove the FlexJet Head cover.

Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.

4. Remove the cable ties securing the faulty Spindle Touch-Down Sensor Assembly to the Head Control Asm PC BD.

5. Disconnect the Spindle Touch-Down Sensor Assembly cable from the Head Control Asm PC BD. Refer to the following illustration and wiring chart.

<table>
<thead>
<tr>
<th>From Spindle Touch-Down Sensor Assy</th>
<th>To PC BD FlexJet Ctrl Asm</th>
</tr>
</thead>
<tbody>
<tr>
<td>P18 18PL</td>
<td></td>
</tr>
<tr>
<td>P19 19PL</td>
<td></td>
</tr>
<tr>
<td>P20 20PL</td>
<td></td>
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<tr>
<td>P21 21PL</td>
<td></td>
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<tr>
<td>P22 22PL</td>
<td></td>
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<tr>
<td>P23 23PL</td>
<td></td>
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<tr>
<td>P24 24PL</td>
<td></td>
</tr>
<tr>
<td>P14 14PL</td>
<td></td>
</tr>
</tbody>
</table>
6. Remove the faulty Spindle Touch-Down Sensor Assembly.

7. Install the new Spindle Touch-Down Sensor Assembly and stack the Spindle Touch-Down Sensor Assemblies in the appropriate location. Refer to the following illustration.

8. Slide the stack of Spindle Touch-Down Sensor Assemblies into the Bracket Switch located on the Fiber Optic Block. Refer to the following illustration.
9. Connect the Spindle Touch-Down Sensor Assembly cable to the appropriate location on the Head Control Asm PC BD. Refer to the following illustration and wiring chart.

<table>
<thead>
<tr>
<th>From (Spindle Touch-Down Sensor Assy)</th>
<th>To (PC BD FlexJet Ctrl Asm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P18</td>
<td>18PL</td>
</tr>
<tr>
<td>P19</td>
<td>19PL</td>
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<td>P20</td>
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<td>P24</td>
<td>24PL</td>
</tr>
<tr>
<td>P14</td>
<td>14PL</td>
</tr>
</tbody>
</table>

10. Install the cable ties securing the Spindle Touch-Down Sensor cable to the Head Control Asm PC BD.

11. Set the Touch-Down Sensors so that the light goes off as soon as the nozzle impacts the component or board. Refer to Touch-Down Sensor Setup procedure located in this document.

12. Install the FlexJet Head cover.


14. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

Clutch Replacement

This section describes how to replace a Clutch Assembly due to damage or wear. Replace the appropriate Clutch Assembly using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.
2. Place the machine in the powered down mode. Execute your site's Lockout/Tagout procedure.  

**WARNING**

The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Remove the FlexJet Head cover.

**CAUTION**

Be careful when handling the FlexJet Head. The head is precisely adjusted and contains delicate parts, especially in the OTH Camera Assembly.

4. Remove the FlexJet Head from the machine. Refer to the *FlexJet Head Removal* procedure located in this document.

5. Place the FlexJet Head assembly face down in order to access the clutch assemblies from the rear. Care must be taken not to damage the camera or other parts on the front of the head.

**CAUTION**

Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.

6. Remove the cable ties securing the clutch lead wires to the Head Control Asm PC BD.

7. Remove the spring bar by carefully removing the 3 screws. Refer to the following illustration.

8. Disconnect all 7 EXT (Special) Springs from the arm springs. Disconnect each spring from its retainer, then remove the springs.
9. **Top Shaft Clutches:** Use the following procedure for the top shaft clutches, 1, 3, 5 and 7. Refer to the following illustration.

   a. Remove cover from Z Encoder.
   
   b. Loosen the 2 set screws holding the Z Encoder to the shaft. Install U-clip in encoder.
   
   c. Remove 3 screws securing the Z Encoder to the Z-Axis Housing.
   
   d. Remove E ring and spacer from shaft.
   
   e. Loosen 3 screws holding top Z-Motor in position. Loosen and remove belt.

![Diagram of FlexJet Head Assembly](image)

**Lower Shaft Clutches:** Use the following procedure for the lower shaft clutches, 2, 4, 6 and mirror.

   a. Remove Z-Safe Clutch.
   
   b. Loosen 3 screws securing bottom Z Motor in position. Loosen and remove belt.

10. Remove the 2 set screws holding the Z-Axis Pulley in position and remove pulley. Remove spacer and place spacers off to one side.

**NOTE**

The spacers removed in step 10 must be installed in the same location from which they were removed.

11. Loosen 2 set screws holding the Timing Belt Pulley. Loosen the timing belt Idler Pulley.
12. Loosen 8 set screws securing clutches to shaft. Slide clutches out of the way and remove C clips.

### Top Shaft

![Top Shaft Diagram]

- Idler Shaft
- Clutch Shaft
- E-Ring
- Z Encoder
- Idler Pulley
- Timing Belt Pulley
- Clutch Assembly
- Clip Spacer

### Lower Shaft

![Lower Shaft Diagram]

- Cable Clamp
- Pulley
- Screw
- Hex Nut
- Clutch Assy
- Clutch Standoff
- Idler Shaft
- Clutch Shaft

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**NOTE**

Each clutch assembly and pulley are matched sets. These parts are not interchangeable.

13. Slide shaft out of housing. Remove spacers, one for each clutch.
14. Disconnect the clutch wire of the clutch to be replaced from the Head Control Asm PC BD. Refer to the following illustration.

15. Clean the clutch shaft with denatured alcohol or equivalent using a clean, white cloth.

16. Remove the cable clamp from Mirror Clutch. Remove the screw and hex nut from the pulley on the clutch assembly.

**NOTE**

The pulley cannot be removed from the clutch shoe and so a new pulley will be needed for each clutch removed.

17. Clean the inner diameter of each clutch solenoid and clutch shoe with a cue tip swab or equivalent.

18. Check each clutch assembly to make sure the clutch shaft rotates freely within its diameter.

19. Apply Loctite 222 to the screw removed in step 16 and reassemble the screw into cable clamp and hex nut.

20. Connect the clutch wire to the Head Control Asm PC BD.

21. Remove the set screws from the new clutch assembly.

22. Replace defective clutch verifying all spacers have been installed correctly.

23. Route wire with label of Plug # through the grommet. Refer to the Z-Axis Index Housing Assy document for information on clutch cable routing.
24. Insert the shaft through the clutch assembly diameters.

25. Slide all the top shaft clutch assemblies to the left. Starting at the right end of the clutch shaft, replace the e-rings.

Slide all the lower shaft clutch assemblies to the right. Starting at the left end of the clutch shaft, replace the e-rings.

26. Remove set screws from the Z Axis pulley. Apply Loctite 222 (BLKMO7389) to each pulley set screw and install the set screws into their respective pulley assembly.

27. While tightening each clutch set screw, hold the clutch against the E clip and rock the clutch shaft to ensure that the set screw is seated on the center of the shaft. When it is seated, tighten the set screw hand tight onto the center of the flat.

28. Torque and Loctite to drawing specifications.

29. Install the Clutch Mounting Idler Shaft through the stops on all clutches. Attach E clips.

**NOTE**

Ensure that the clutch wires are behind the mounting shaft.

30. Replace Z Encoder. The Z Encoder must be centered on the shaft. Refer to the following illustration.

**Top Shaft**

31. Replace Z Encoder Cap.

**NOTE**

As the Z axis cycles, the clutch shaft will make a squeaking sound if the Z Encoder is not centered on the clutch shaft.
32. Install the timing belt onto the pulleys. Verify belt tension using the Z-Axis Spindle Drive Belt Tension Adjustment procedure located in this document.

33. Install the spring bar by carefully installing 2 screws and assemble 7 EXT (Special) Springs onto the retainers. Refer to the following illustration.

34. Move the arm spring up and down below the clutch assembly on all 7 clutch assemblies to ensure that the pulley on each clutch moves and does not bind.

35. Install all 7 EXT (Special) Springs onto the arm springs.

36. Replace the cable ties around the cable bundle and clutch wiring.

37. Mount the FlexJet Head on the machine. Refer to the FlexJet Head installation procedure located in this document.

38. Install the FlexJet Head cover.


40. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.
This section describes how to replace a Manifold Assembly due to damage or wear. Replace the Manifold Assembly using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.
2. Place the machine in the powered down mode. Execute your site’s Lockout/Tagout procedure.

**WARNING**
The machine must be powered down and your site’s Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Remove the FlexJet Head cover.
4. Remove the cable ties securing the AirKiss HD Cable Assembly (17PL) and the Vacuum HD Cable Assembly (25PL).

**CAUTION**
Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.

5. Disconnect the AirKiss HD Cable Assembly (17PL) and the Vacuum HD Cable Assembly (25PL) from the Head Control Asm PC BD. Refer to the following illustration.
6. Disconnect the input pneumatic line from the male elbow fitting on the FlexJet Head. Refer to the following illustration.

7. Disconnect the Clearflo Tubing from 7 hose fittings on the Manifold Assembly. Refer to the following illustration.

8. Remove the 3 screws that secure the Manifold Assembly to the Z-Axis Index Housing.

9. Remove the faulty Manifold Assembly.

10. Install the new Manifold Assembly.

11. Install the 3 screws that secure the Manifold Assembly to the Z-Axis Index Housing.
12. Connect the Clearflo Tubing to the 7 hose fittings on the Manifold Assembly. Refer to the following illustration.

![Diagram of hose fittings and Clearflo Tubing]

13. Connect the input pneumatic line to the male elbow fitting on the FlexJet Head. Refer to the following illustration.

![Diagram of male elbow fitting and input pneumatic line]

14. Connect the AirKiss HD Cable Assembly (17PL) and the Vacuum HD Cable Assembly (25PL) to the Head Control Asm PC BD. Refer to the following illustration.

![Diagram of Head Control Asm PC BD with connections for AirKiss HD Cable Assy and Vacuum HD Cable Assy]

15. Install the cable ties securing the AirKiss HD Cable Assembly (17PL) and the Vacuum HD Cable Assembly (25PL).
16. Install the FlexJet Head cover.

17. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

**Fiber Optic Cable Replacement**

This section describes how to replace a Fiber Optic Cable due to damage or wear. Replace the Fiber Optic Cable using the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.

2. Place the machine in the powered down mode. Execute your site's Lockout/Tagout procedure.

   **WARNING**

   The machine must be powered down and your site's Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Remove the FlexJet Head cover.

   **CAUTION**

   Use ESD precautionary measures when handling the Head Control Asm PC BD and associated cabling.

4. Disconnect all cables from the Head Control Asm PC BD. Remove the 6 screws that secure the Head Control Asm PC BD.

5. Remove the Head Control Asm PC BD. Refer to the following illustration.
6. Remove 4 screws that secure the bracket.

7. Remove the 2 screw that secure the Optical Sensor Assy to the Optic Bracket. Refer to the following illustration.

8. Remove the 7 EXT (Special) Springs.

9. Pull all 7 spindle assemblies down and remove Optic Bracket.

10. Loosen 7 set screws holding the optical tubes in place. Slide all 7 tubes down over housing pins.

11. Loosen 3 screws securing the Optical Sensor Assy to the head and remove.

12. Remove and replace faulty optic cable.

13. Install the Side View Attach.


15. Install the 2 screws that secure the Optical Sensor Assy to the Optic Bracket.

16. Install the bracket.

17. Install the Head Control Asm PC BD.
18. Install the 6 screws that secure the Head Control Asm PC BD. Connect all cables to the Head Control Asm PC BD. Refer to the following illustration.

19. Install the FlexJet Head cover.

20. Record on the appropriate copied sheet from the Maintenance Log document that this procedure was performed and include the date.

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**Spindle Drive Belt Replacement**

The Spindle Drive Belt may require replacement in the event of damage to the timing belt. To replace the Spindle Drive Belt, perform the following procedure.

1. Park the FlexJet Head Assembly at a maintenance position.
2. Place the machine in the powered down mode. Execute your site’s Lockout/Tagout procedure.

**WARNING**
The machine must be powered down and your site’s Lockout/Tagout procedure executed during this procedure to ensure personal safety.

3. Remove the FlexJet Head cover.

4. Remove the FlexJet Head from the machine. Refer to the FlexJet Head Removal procedure located in this document.

**CAUTION**
Care must be taken not to damage the head and camera assembly.

5. Place the FlexJet Head assembly upright in order to access the damaged Timing Altered Belt from the rear.

6. Remove the screw securing the Belt Clamp to the Arm Spring. Refer to the following illustration.

7. Remove the damaged Timing Altered Belt.

8. Install the new Timing Altered Belt onto the pulleys. Assemble the Belt Clamp to the Arm Spring to secure the Timing Altered Belt.

9. Verify belt tension using the Z-Axis Spindle Drive Belt Tension Adjustment procedure located in this document.
10. Mount the FlexJet Head on the machine. Refer to the *FlexJet Head installation* procedure located in this document.

11. Verify the spindle height using the *Touch-Down Sensor Setup* procedure located in this document.

12. Verify the vacuum level following the *Vacuum Level Verification* procedure located in this document.

13. Install the FlexJet Head cover.


15. Record on the appropriate copied sheet from the *Maintenance Log* document that this procedure was performed and include the date.
Changes To This Revision

- Added Clean the Pin Mirrors procedure to the Procedures and Adjustments section.
- Added 160 hours as frequency for cleaning Pin Mirrors in the maintenance concept.
- In the Comprehensive Head Maintenance section:
  - Merged the Spindle Height Calibration and CPE sections into the Perform Required Calibrations section and added Mirror Calibration.
  - Revised the illustration and text in the Verify/Adjust Camera Mirror Cable section to refer to the 2.6 OTH Camera procedure for the proper gap specification.
  - Added note in introduction that CPE is required to ensure specified accuracy.
  - Added to the Pin Mirror Cleaning section: Clean the mirrors with a dry swab after cleaning them with a solution-soaked swab.
- In the Theta Encoder Zero Setup section:
  - Added step to power up machine after connecting the Encoder cable.
  - Deleted steps to remove camera and install camera after setup.