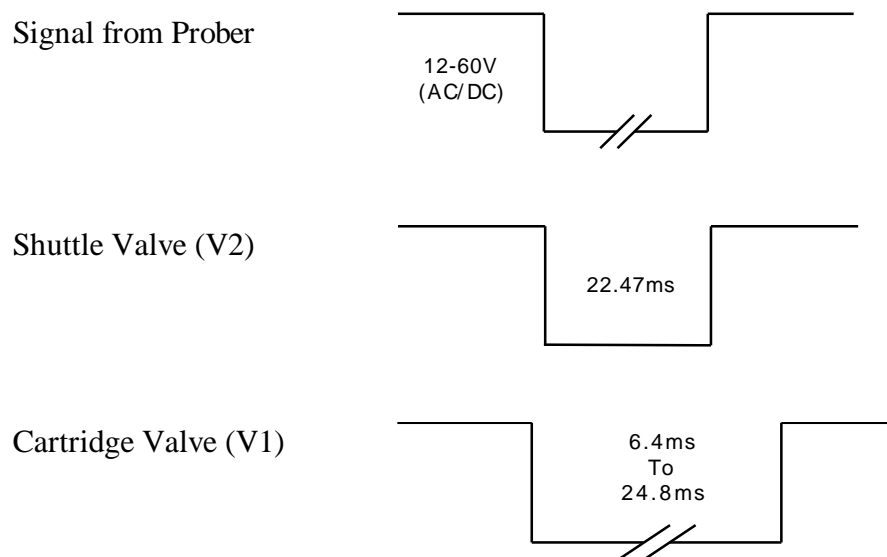


Controller Maintenance and Diagnostics**Controller Sequence of Operation**

To initiate an ink dot, the Prober sends a 12-60 V (AC/DC unregulated) active-low signal to the Controller. After receipt of the signal, the microcontroller performs various checks of system status prior to firing the pneumatic valves.

Upon completion of the status checks, a 22.47ms pulse is sent to the Shuttle Valve (V2), while at the same time a 6.4-24.8ms pulse (depending on position of the Dot Size Thumbwheels) is sent to the Cartridge Valve (V1).



As the shuttle extends to the lower position, the air pulse from Valve 1 forces ink out of the cartridge barrel and forms a drop at the end of the needle tip. When the shuttle is at its lowest position, the drop makes contact with the wafer surface and forms a dot. The shuttle then returns to the normal position.

At the completion of each dot, a small amount of vacuum is developed in the cartridge by the closure of the valve, preventing dripping. If another dot sequence is not initiated within 10 seconds, a short "puff" pulse equal to 1/2 the dot size duration (10-20ms) is sent to the cartridge to displace a small amount of ink back into the Teflon[®] tube to aid in maintaining proper dot size after a long delay between dots.

A software kit is available from Xandex for those customers who wish to remove the "puff" pulse from normal Auto-Z operation. Order part no. 355-1037 "Auto-Z No Puff Kit"

Controller Diagnostics

There are five internal diagnostic tests available for testing the Controller. To enter the Diagnostics mode, apply power to the Controller with the “RESET” button to the right of the thumbwheels depressed. All references to “mode switch” in the following tests refer to the top mode (toggle) switch. The bottom mode switch should be set to RUN during testing.

A. Test Thumbwheels

1. Place the mode switch on the front panel to SETUP, set the DOTS X1000 thumbwheels to 12345, then reset the LCD Counter.
2. Press the RESET button and verify that the counter increments 15 counts.
3. Place the toggle switch to RUN, set the thumbwheels to all 1's, reset the LCD Counter, and press RESET. The counter should increment one count.
4. Repeat the procedure for the rest of the digits (2 through 9). With the thumbwheels set for 00000, the counter increments 10 counts.

B. Test Cartridge Valve

To test fire the Cartridge Valve 20 times:

1. Set the DOT SIZE thumbwheels to 02
2. Place the mode switch to CALIBRATE
3. Reset the LCD Counter
4. Press RESET.

The cartridge valve fires 20 times, each time incrementing the LCD Counter.

C. Test Shuttle Valve

To test fire the Shuttle Valve 20 times:

1. Set the DOT SIZE thumbwheels to 03
2. Place the mode switch to CALIBRATE
3. Reset the LCD Counter
4. Press RESET.

The shuttle valve fires 20 times, each time incrementing the LCD Counter.

D. Test Sensor Valve

To test fire the Sensor Valve 20 times:

1. Set the DOT SIZE thumbwheels to 09
2. Place the mode switch to CALIBRATE
3. Reset the LCD Counter
4. Press RESET.

The sensor valve fires 20 times, each time incrementing the LCD Counter.

E. Life Test

This test will continuously fire the Cartridge and Shuttle valves for a predetermined number of cycles as set on the thumbwheels.

1. Place the mode switch to CALIBRATE
2. Set the DOTS X1000 thumbwheels for the desired number of cycles X1000 (i.e.: 250 Equals 250,000 cycles).
3. Reset the LCD Counter.
4. Press RESET.

The Controller begins continuous firing, incrementing the Counter each cycle. To discontinue the Life Test prior to reaching the set amount, remove power.

Controller Internal Maintenance**Controller Logic Board Removal**

CAUTION: Use appropriate ESD precautions when working inside of the Controller!

With Power and Main Air removed:

1. Remove the cover of the Controller.
2. Disconnect the *Molex connectors* (P2 through P7) from the **top** of the *controller logic board*.
3. Push back both locking devices on the card guides to unlock position, then lift the *logic board* from the mounting location.
4. Disconnect the P1 *connector* from the *logic board* and remove from the *controller*.
5. Place the *logic board* on ESD protective surface or store in ESD protective anti-static bag.

Reverse this procedure for installation of *logic board*.

Removal/Replacement of Microcontroller**With the Logic Board removed:**

1. Carefully remove the Motorola 6870R3 *microcontroller* from the socket (U7) using the appropriate IC Removal Tool or flat blade screwdriver.
2. **Use caution when removing the Microcontroller to prevent damage to the leads.**
3. Place the *microcontroller* on anti-static foam, then in ESD protective anti-static bag for storage.

To re-install:

1. Match pin one markings on *microcontroller* and *logic board*, line up component leads with socket (verify correct orientation of *microcontroller* and gently press to install, using caution to prevent bending or damage to the leads.
2. Visually inspect the socket and *microcontroller* to insure the integrity of the installation prior to re-installation of *logic board*.

3. After installing the *microcontroller*, re-install the *logic board* by reversing the procedure outlined in the “Controller Logic Board Removal” above.
4. Install the cover, apply power and main air, and test to verify operation. If problems are noted, review the installation of the *microcontroller* to insure none of the component leads are bent, and verify connection of P1 through P7 connectors on the *logic board*.

Cartridge (V1) or Shuttle (V2) and Sensor (V3) Valve Replacement

 *This procedure is to be used for replacement of all three valves, as they are identical.*

With Power and Main Air removed:

1. Remove the four (4) cover screws from each side of the controller and remove the controller cover.
2. Disconnect the input and output pneumatic hoses from the defective valve by depressing the colored fitting collar and pulling on the pneumatic hose simultaneously.
3. Using diagonal cutters, cut the two wires from the valve at the splice.
4. Remove the two Phillips mounting screws securing the valve to the Controller base and remove the valve.

Prepare the new valve for installation by:

1. Trimming the two wires to 1.0” nominal.
2. Strip and tin the wires accordingly.

Installation:

1. Install the replacement valve (P/N 160-0001) in the *controller base*, securing with the two Phillips screws previously removed.
2. Strip and tin the existing wires. (Install shrink tubing as required.)
3. Make connections.
4. Install the pneumatic lines accordingly, insuring that each hose is firmly seated in the valve fitting.
5. Apply power and main air and perform appropriate valve functional and diagnostic tests. If diagnostic tests are successful, re-install the controller cover.