Capacitive Sensor Upgrade for Automation Autoloaders

INTRODUCTION

For fabs whose wafers have different levels of reflectivity on the wafer backs, the reflective banner sensors can cause problems with wafer detection as the cassette is indexed downwards.

This upgrade to your Automation Autoloader replaces the input and output slot reflective "banner sensors", with "capacitive sensors". This sensor uses the capacitance between the back of the wafer and the sensor to 'sense' when the next wafer is available to load/unload. It is unaffected by differences in reflectivity between wafers.

The Upgrade consists of:

- Replacing the 'banner sensors' with 'capacitive sensors'
- Replacing the banner sensor mounting hardware
- Replacing the output elevator indexer motor
- Replacing Banner Sensor Modules A1 and A2, on the automation board, with the Capacitive Sensor board.
- Installing a power cable to power the capacitive sensor board.

PACKING LIST

Qty	PN	Description
2	5106-000011	Capacitive sensor with cord and plug
1	5106-000012	Capacitive sensor board
1	5106-000013	Capacitive sensor power cable
1	5106-000014	Output Elevator Stepper Motor, single shaft
1	5106-000015	Input Capacitive sensor mounting bracket
1	5106-000016	Output mounting bracket with spacer and screws
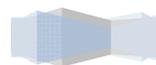
INSTALLATION

* For the following instructions,

the "Input" side of the autoloader is the left side as you stand in front of the loader as it is mounted on the stepper. This is the side that removes wafers from the input cassette and feeds wafers "into" the stepper.

the "output" side of the autoloader is the right side as you stand in front of the loader as it is mounted on the stepper. This is the side that receives wafers from the stepper and places them into the output cassette.

CAPACITIVE SENSOR POWER CABLE INSTALLATION

1. With the stepper and autoloader powered up, using a voltmeter verify that you have +24VDC and Ground on any one of the following terminals on the Autoloader Interface board (the board the main autoloader board M380 plugs into.) You just need to find one "Ground" terminal and one "+24vdc" terminal that you can attach the power cable to.
    a. Gnd: 35, 40, 42, 5, 16, 22
    b. +24vdc: 9, 13, 45, 47
2. Write down the two terminals you will use for +24vdc and Ground
3. Power down the stepper.
4. Attach the "orange" wire on the power cable to your +24VDC terminal
5. Attach the "black" wire on the power cable to your "ground" terminal
6. Route the remaining cable so that it can plug into the capacitive sensor board on the top right corner of the automation autoloader main PCB.
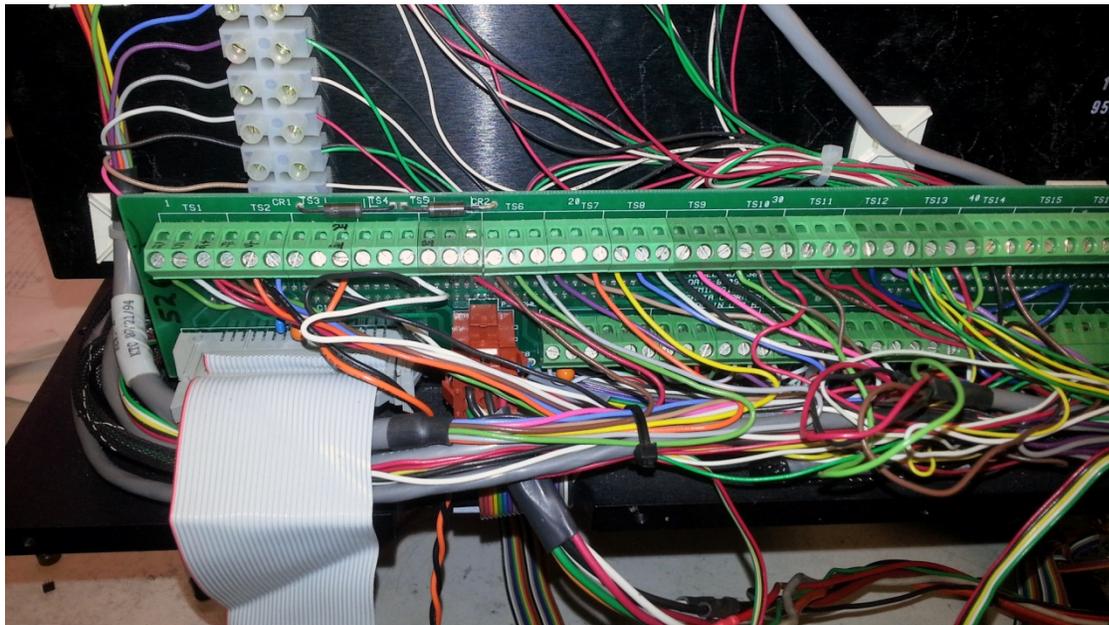
Autoloader Interface Board

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OUTPUT STEPPER MOTOR INSTALLATION

1. Power down the stepper.
2. Installation of the "single shaft" output elevator stepper motor is required for 6" autoloaders with the elevator motors on top of the loader base. (the motors are visible when looking directly down on the loader from the top). The output elevator motor shaft interferes with the placement of the capacitive sensor. So it is necessary to install a motor without the protruding shaft.
3. Follow the instructions in your Ultratech maintenance manual for removal of the output indexer elevator motor. (output is the side where the stepper unloads the wafer to the loader)
4. Follow the instructions in your Ultratech maintenance manual for installation of the replacement single shaft stepper motor, PN 5106-000014
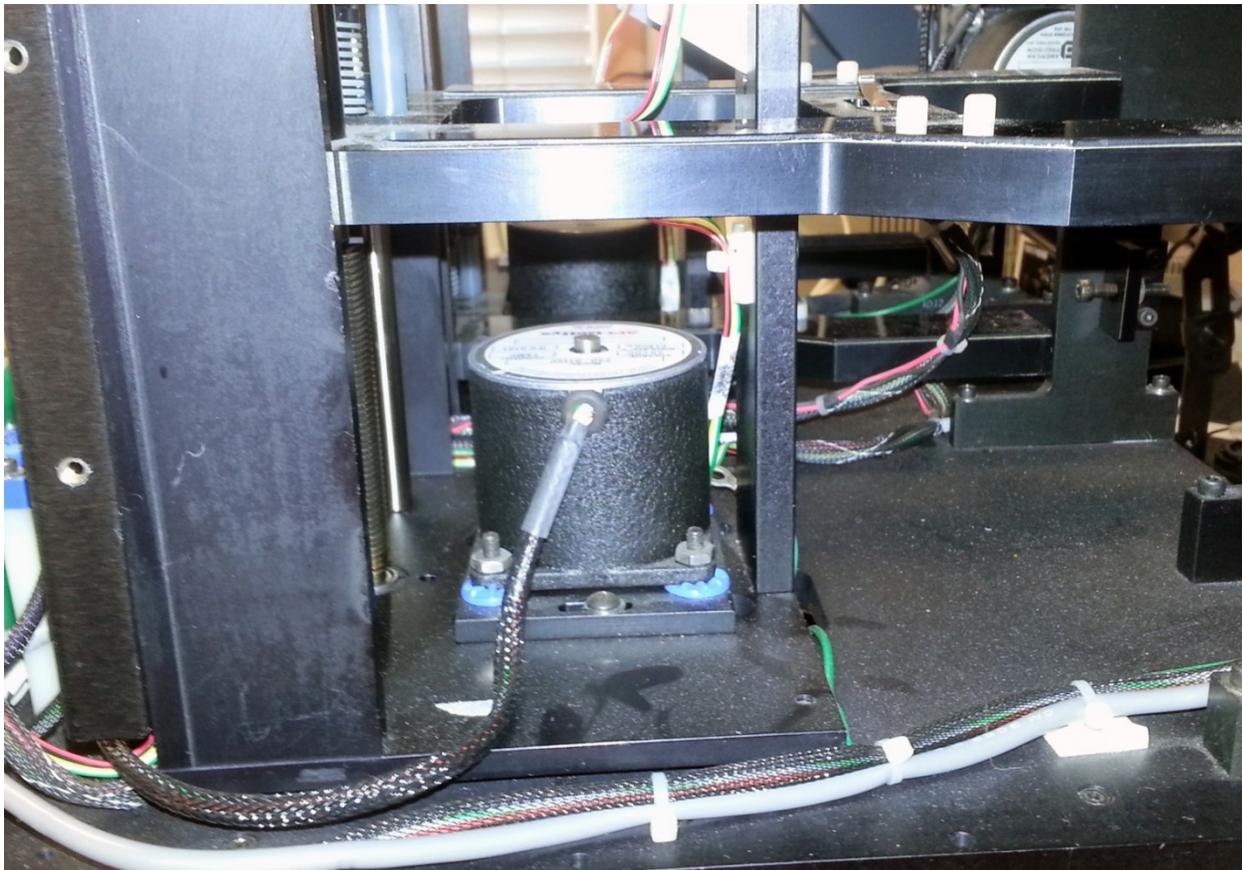
Modified Output Stepper Motor, with the shaft cut so it does not interfere with sensor.

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CAPACITIVE SENSOR BOARD INSTALLATION ON AUTOMATION CONTROL BOARD M380

1. Power down the stepper.
2. Remove the automation board from the loader and bring it to your workbench
3. Desolder banner modules A1 and A2 (top right on board). Remove and set aside.
4. If the A1 and A2 Banner sensor modules plug into a socket on the main PCB, desolder and remove the sockets also.
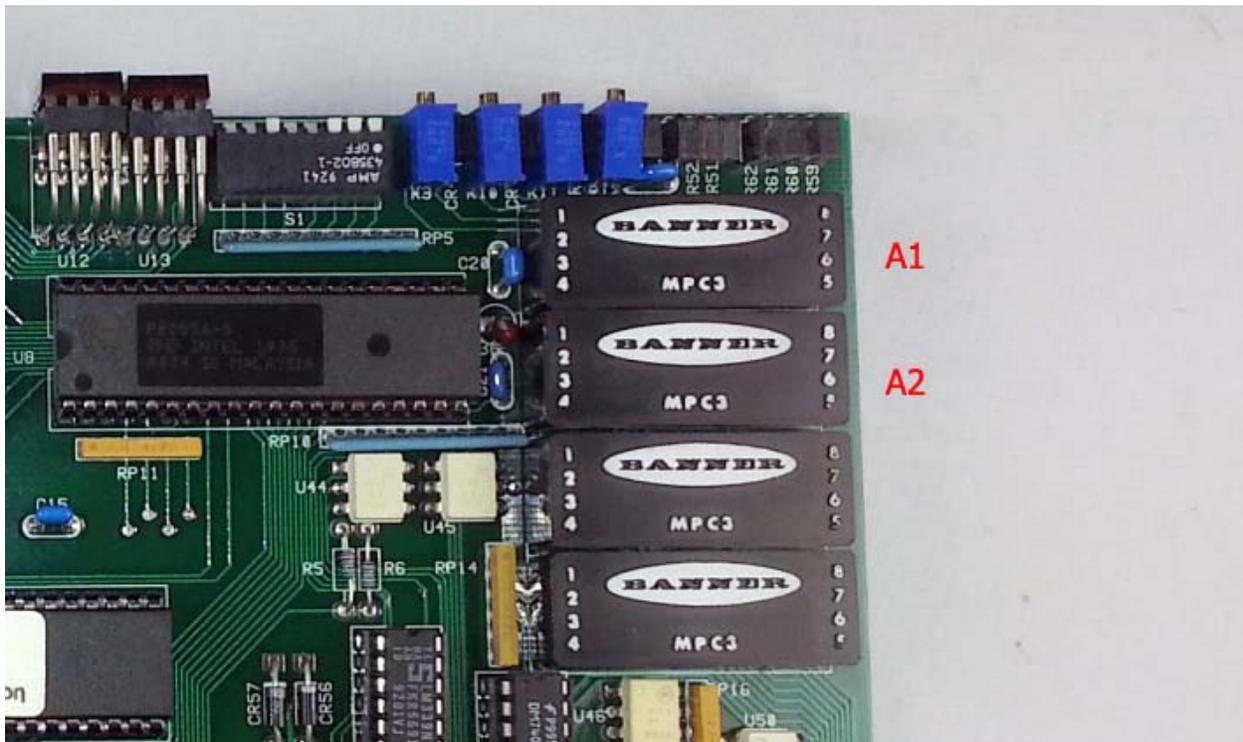
5. Install the Capacitive Sensor Board PN 5106-000012
   a. The 8 male header pins go into the holes vacated by the A2 module (bottom)
   b. The 8 wires go into the corresponding holes vacated by the A1 module (top). Make sure the wires go into the correct hole opposite where the wires come out of the sensor board.
   c. When properly installed, the three white connectors (J2, J1, J3) will be aligned with the right edge of the main autoloader board.

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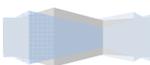
Position of Capacitive Sensor Board over A1 and A2 sockets.

6. Flip the main board over so the back is exposed. Solder the 8 pins coming through the A2 holes to the corresponding pads. Cut off any excess pins.
7. Solder the 8 wires coming through the A1 holes to the corresponding pads. Cut off any excess wires from the A1 module holes.
8. Reinstall the main autoloader PCB into the automation autoloader
9. Plug in the power cable into J3 of the capacitive sensor board.

CAPACITIVE SENSOR AND BRACKET INSTALLATION ON INPUT SIDE OF AUTOLOADER

1. Power down the stepper.
2. Remove the input banner sensor mounting bracket by unscrewing the two mounting screws
3. Remove the banner sensor from the old bracket. Remove the banner sensor from the autoloader, unscrewing the wires from the terminals of the M380 Interface board.
4. Remove the axel bearing with o-ring, and install it on the new Capacitive Sensor mounting bracket.
5. Install the capacitive sensor into the bracket, as shown in the pictures.
6. Install the bracket onto the loader, as shown in the picture. The top of the bracket should be flush with the top of the mounting post.
7. Adjust the height of the top of the capacitive sensor so it is about 1/4" below the top of the belt on the pulley.
8. Route the sensor wire to the back of the loader and plug it into the capacitive sensor board J1. Make sure that
   a. The wire does not come into contact with any moving parts on the elevator assembly
   b. The wire is properly secured with tywraps or wire holders.

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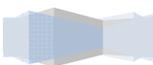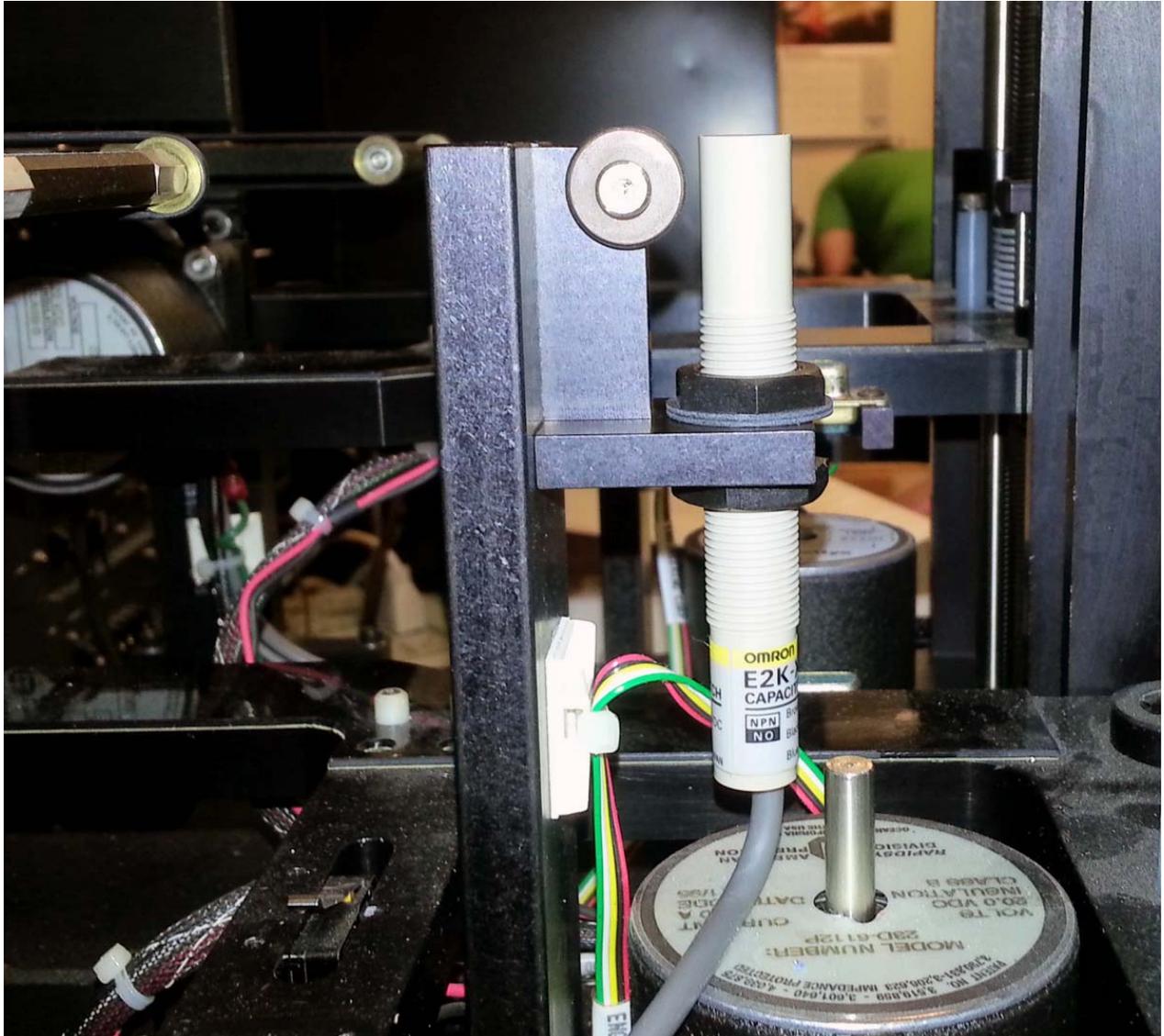
Side view of Input Cap sensor installed in bracket and mounted.
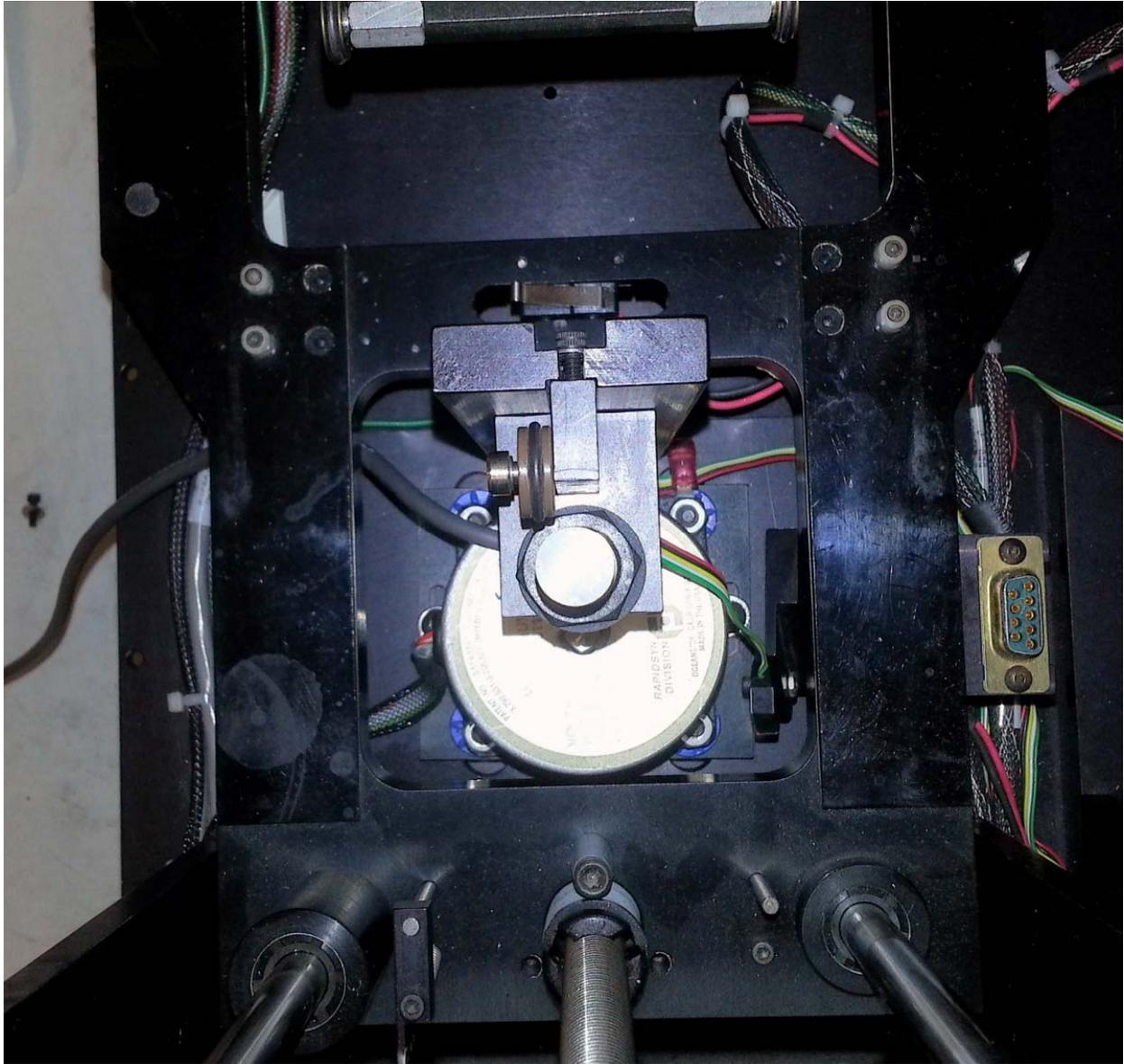
Top view of Input Cap sensor installed in bracket.
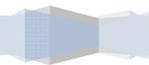
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CAPACITIVE SENSOR AND BRACKET INSTALLATION ON OUTPUT SIDE OF AUTOLOADER

1. Power down the stepper.
2. Remove the output banner sensor mounting bracket by unscrewing the two mounting screws
3. Remove the banner sensor from the old bracket. Remove the banner sensor from the autoloader, unscrewing the wires from the terminals of the M380 Interface board.
4. Remove the axel bearing with o-ring, and install it on the new Capacitive Sensor mounting bracket.
5. Install the capacitive sensor into the bracket, as shown in the pictures.
6. Install the bracket onto the loader, as shown in the picture. The two nylon spacers move this bracket farther towards the front of the loader than the input bracket. This helps to feed the wafers coming from the stepper completely into the cassette. The top of the bracket should be flush with the top of the mounting post.
7. Adjust the height of the top of the capacitive sensor so it is about 1/4" below the top of the belt on the pulley.
8. Route the sensor wire to the back of the loader and plug it into the capacitive sensor board J2. Make sure that
   a. The wire does not come into contact with any moving parts on the elevator assembly
   b. The wire is properly secured with tywraps or wire holders.
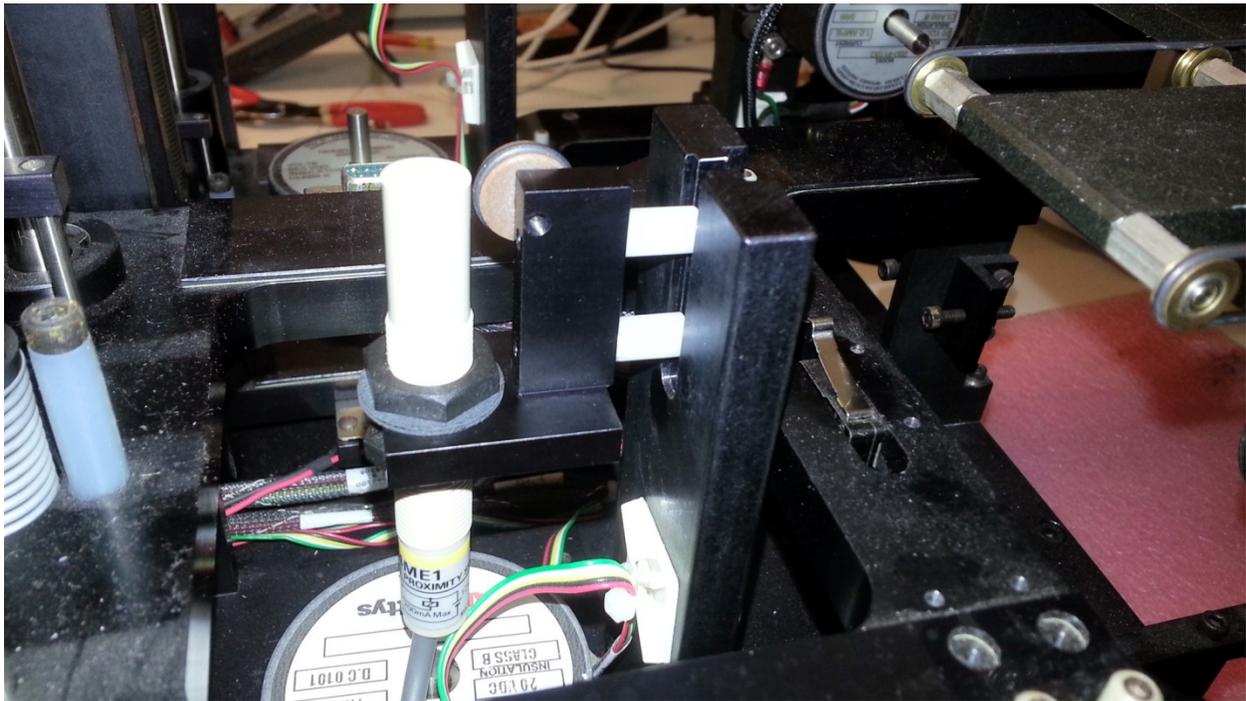
Side view of Output Cap Sensor installed, with spacers. This sensor sits farther back so the wafers go completely into the cassette.

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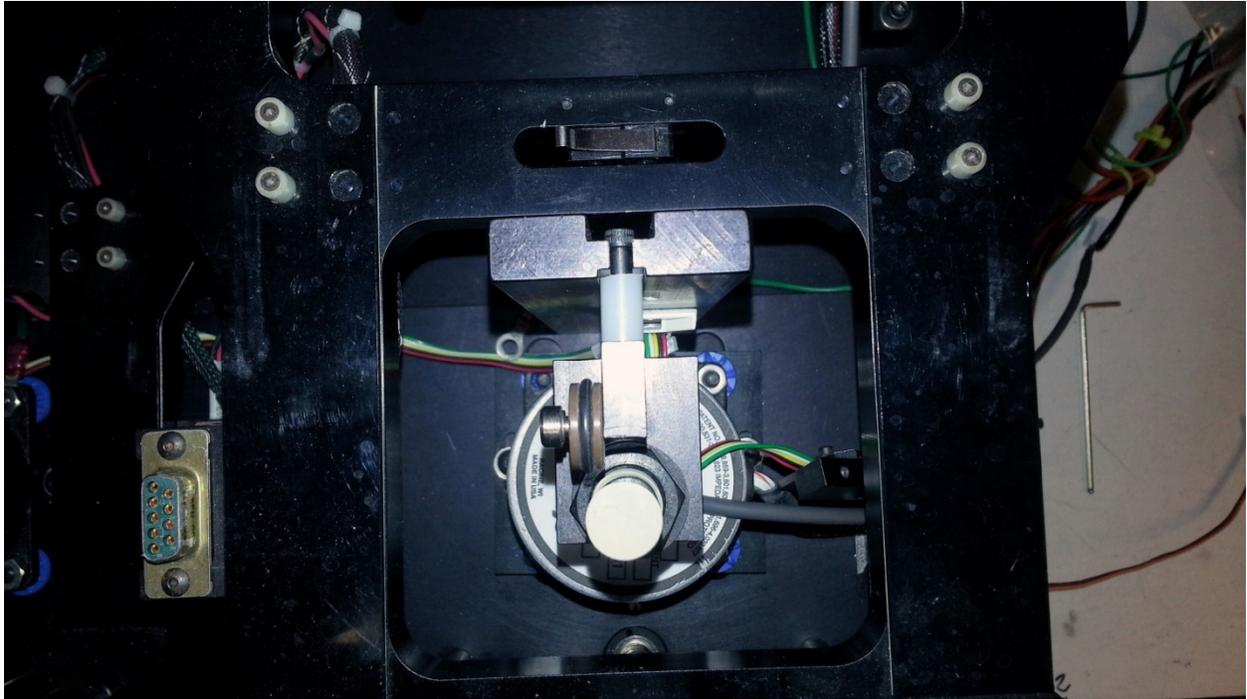
Output CAP sensor installed, top view
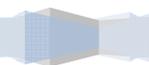
ADJUSTING THE INPUT CAPACITIVE SENSOR

1. Power up the stepper. Let the autoloader initialize completely.
2. Set the autoloader DIP switches so that #6 and #4 are ON.
   a. This sets the loader into "Input elevator setup" mode
   b. Do not change dip switches #1 and #2, as they set the wafer size for the loader.
3. Place a cassette on the input platform with a wafer in slot #1.
4. Adjust the capacitive sensor position relative to the back of the wafer, so that the Input Yellow LED light (leftmost LED) on the loader is OFF. (this is the same LED that the banner sensor used. Note that with this mod the LED will either be ON or OFF. It does not flash, and the potentiometers that adjusted the Banner sensor have no effect.)
5. Press the yellow button on the main loader PCB to index the input slot down one slot to the wafer
6. If the LED is not lit, indicating the wafer is sensed, adjust the position of the CAP sensor closer to the back of the wafer, until the LED lights.
7. Press the yellow button on the main PCB again, with the LED lit, to move the platform up to the initialized position.
8. Make sure the LED is OFF at this position. Adjust the cap sensor position as needed so the LED is OFF at the initialized position, and ON at position #1 with the wafer in the slot.

ADJUSTING THE OUTPUT CAPACITIVE SENSOR

1. Set the autoloader DIP switches so that #6 and #5 are ON.
   a. This sets the loader into "Output elevator setup" mode
   b. Do not change dip switches #1 and #2, as they set the wafer size for the loader.
2. Place a cassette on the output platform with a wafer in slot #1.
3. Adjust the capacitive sensor position relative to the back of the wafer, so that the output Yellow LED light (2nd from the left) on the loader is OFF. (this is the same LED that the banner sensor used. Note that with this mod the LED will either be ON or OFF. It does not flash, and the potentiometers that adjusted the Banner sensor have no effect.)
4. Press the yellow button on the main loader PCB to index the output slot down one slot to the wafer
5. If the LED is not lit, indicating the wafer is sensed, adjust the position of the CAP sensor closer to the back of the wafer, until the LED lights.
6. Press the yellow button on the main PCB again, with the LED lit, to move the platform up to the initialized position.
7. Make sure the LED is OFF at this position. Adjust the cap sensor position as needed so the LED is OFF at the initialized position, and ON at position #1 with the wafer in the slot.
8. Set dip switches #6 and #5 to the OFF position. Press the RESET button on the loader to reinitialize it.
9. Run a dummy cassette of wafers through the autoloader using Run Mode #5 with Mechanical Align, to verify that the sensors are operating correctly.