ROCHESTER INSTITUTE OF TECHNOLOGY
MICROELECTRONIC ENGINEERING

Surface Mount PCB Assembly

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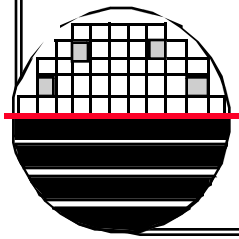
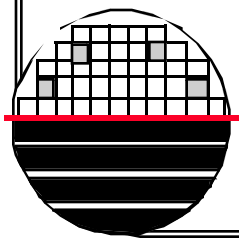


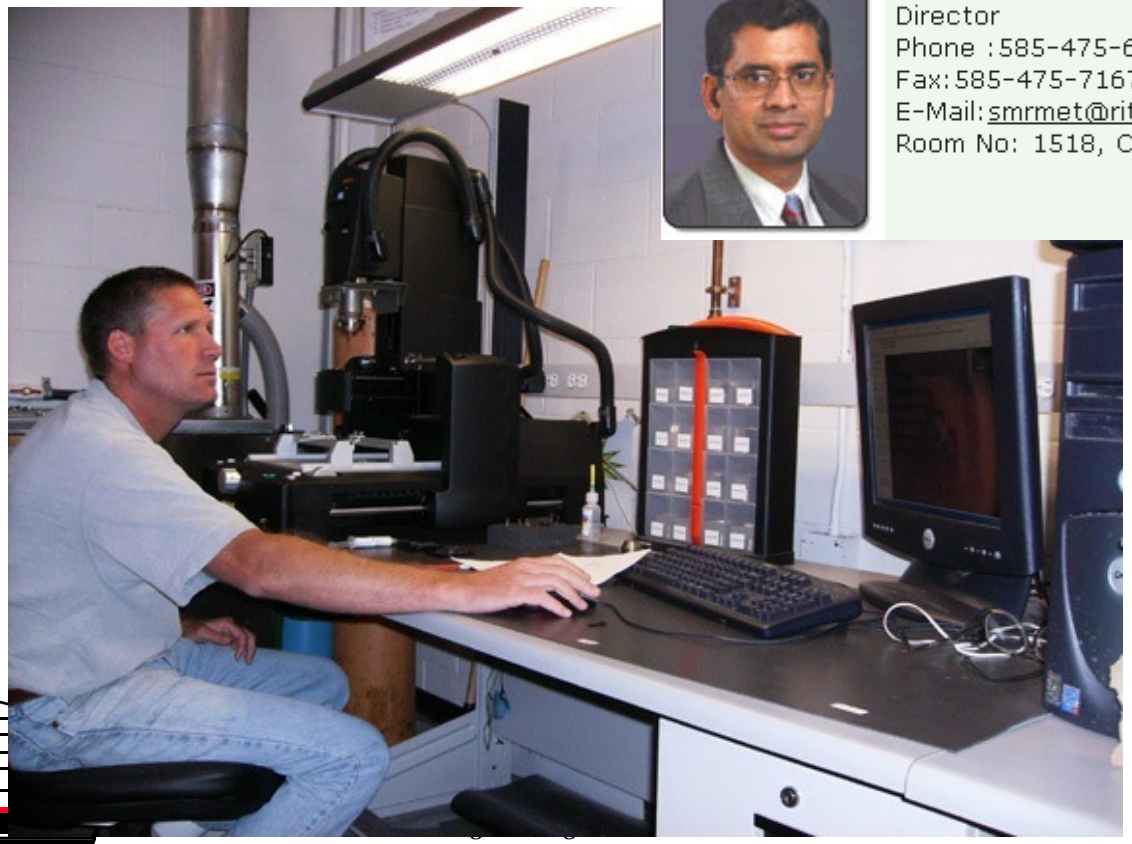
OVERVIEW

- **Step 1- Introduction to the Center for Electronics Manufacturing and Assembly**
- **Step 2- Sign In / Let lab manager (Jeff) know what you plan to do**
- **Step 3- Get solder paste from refrigerator / warm up paste**
- **Step 4- Familiarize yourself with surface mount rework station**
- **Step 5- Using the EFD 1000 XL Solder Dispenser**
- **Step 6- Using the METCAL Solder Reflow Heat Gun**
- **Step 7- Inspection of solder joints**
- **Step 8- Clean up and Sign Out**



CEMA

CEMA – Center for Electronics Manufacturing and Assembly



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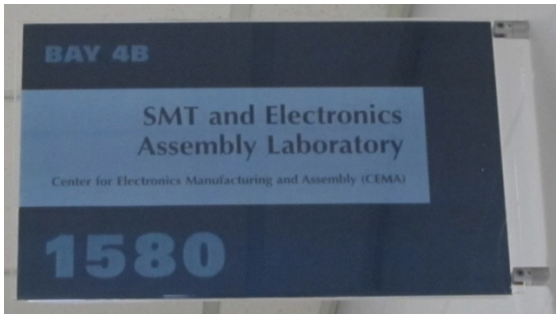
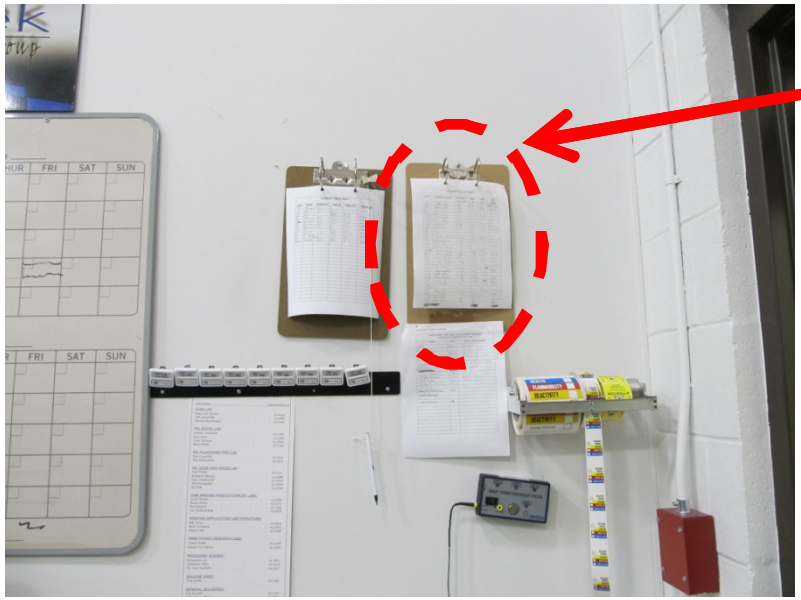


78-1580 Laboratory

Step 2- Sign In

- **As you first enter the room there will be a sign in sheet on the right wall**
  - **Sign in by giving the date, your name, major, time in, etc .**

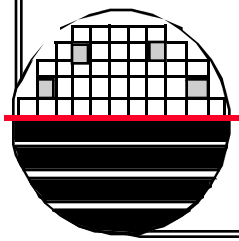
If the Sign in sheet is full, just sign you name on the back.



SIGN IN Sheet!!

Step 2- Ask for Help if you don't know what to do

- **If at any time you do not know what to do ASK for HELP.**
- **Jeff Lonneville is usually in the room and is always willing to help.**
- **Otherwise ask someone who has already used the tools and facilities**



Step 3- Get Solder Paste from Refrigerator

- **The solder paste is in the refrigerator, which is located on the far side of the room.**

Box of Solder Paste.

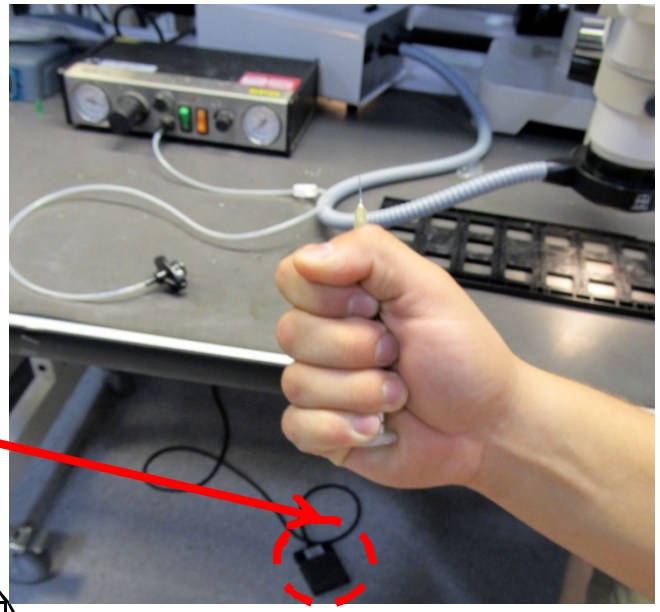
Step 3- Get Solder Paste from Refrigerator

- **Inside the refrigerator there will be a box of solder paste tubes and other chemicals used for surface mounting.**
- **The correct paste has a PN# AL-CL78 10cc**
  - **The opposite side will have a label that reads Alpha CL78**

Step 3- Warming up the solder paste

- **Warm up the solder paste by holding it in your hand before attaching it to the EFD 1000 XL Solder Dispenser**
- **Once Warm attach solder paste tube to the end of the EFD 1000 and rotate 90 degrees to lock**

Foot Pedal used to dispense solder paste

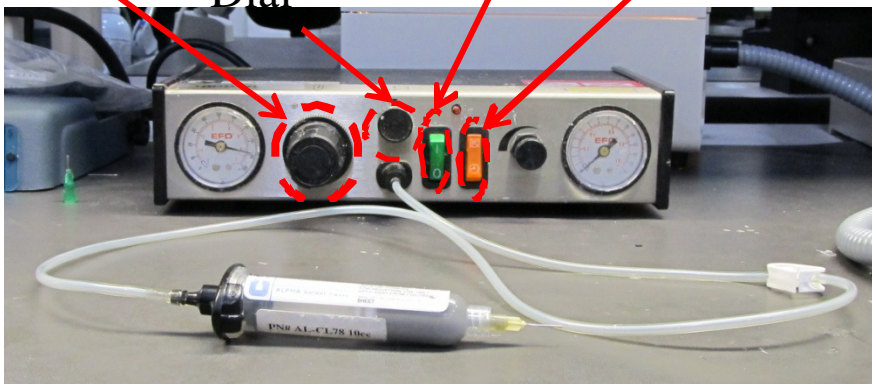


Adjusts Pressure

Dispense Time Dial

Power Switch

Timing Switch



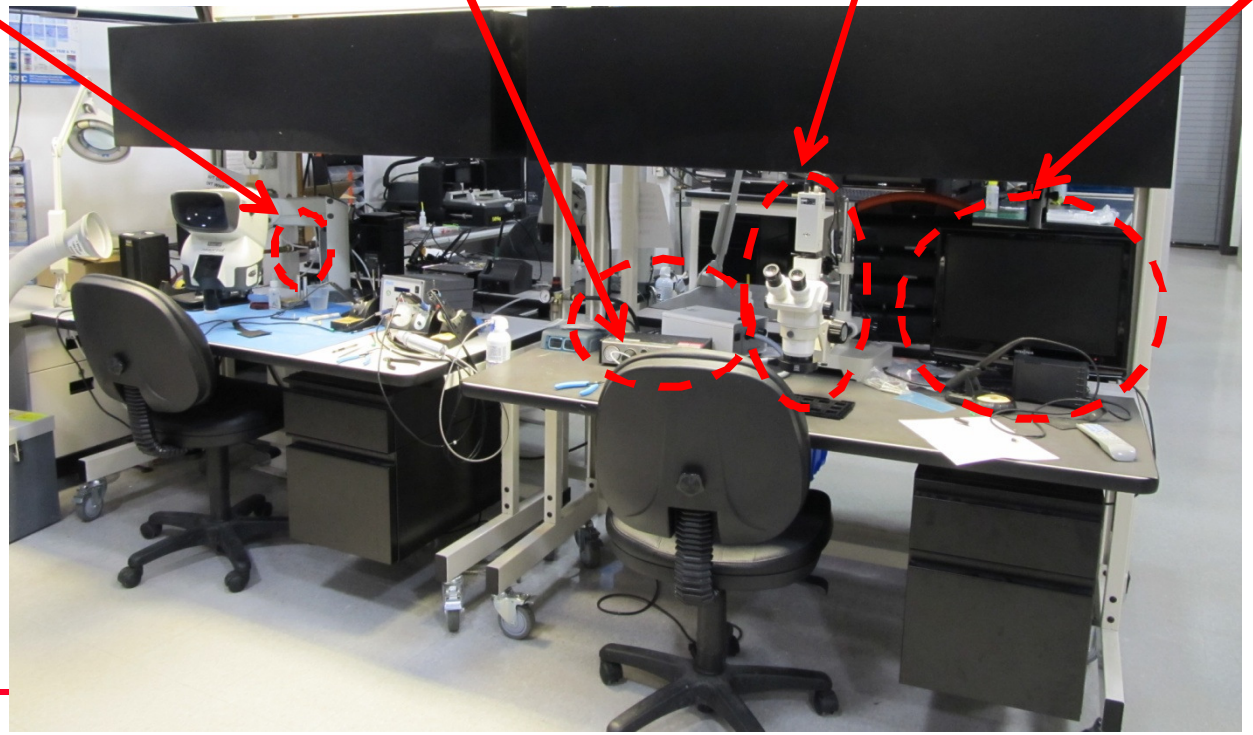
Step 4- Familiarizing with surface Mounting Station

Compressed Air
Turn on Valve

EFD 1000 XL
or 1500D
Solder Dispenser

Microscope

Display for
Microscope

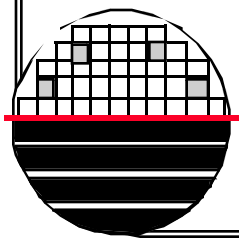


Step 5- Turning on EFD 1000 XL Solder Dispenser

- **Turn on the Compressed Air**
- **Turn on EFD 1000 XL Solder Paste Dispenser**
- **Settings for 1000 XL and 1500D**
  - **1000XL Pressure = 90 psi, Dispense Time = 0.5 seconds**
  - **1500D Pressure = 50 psi, Dispense Time = 0.25 seconds (Red Tip)**
- **Turn on Microscope and Display**
- **Make sure you have the correct tip on solder paste tube. There are many different diameters depending on how much you want to dispense**
- **Smaller is usually better (they are color coded… red is the smallest)**

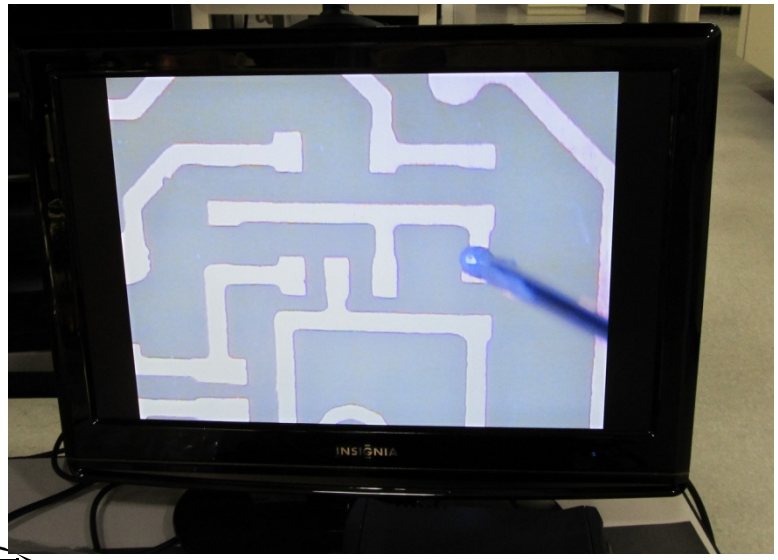
Step 5- Operating The EFD 1000 XL Solder Dispenser

- **To operate the EFD 1000 XL Solder dispenser, use the foot pedal to dispense solder paste**
- **If you changed tips hold the pedal down until solder paste begins to flow**
- **There are two modes of the EFD 1000; Manual and Automatic**
  - **Manual**
    - **Use the foot pedal to control the dispense time**
  - **Automatic**
    - **Turn on Timing (orange switch)**
    - **Set time with dial**
    - **Press foot pedal once to dispense solder paste for x-seconds**



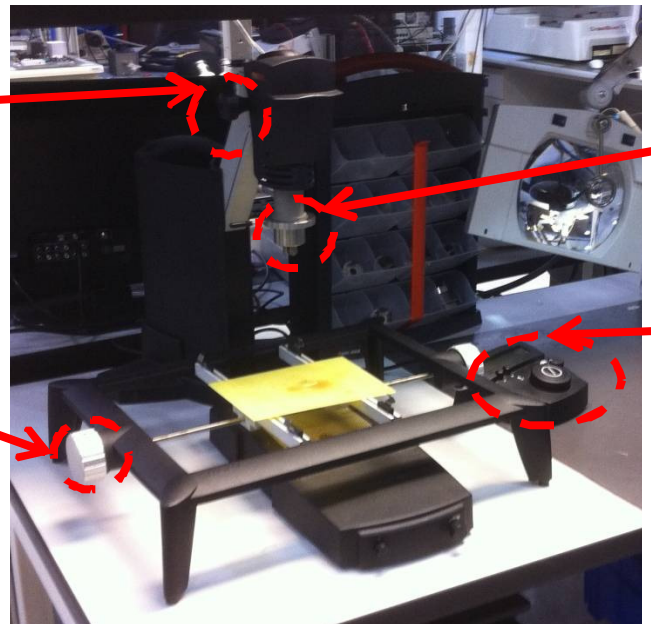
Step 5- Operating The EFD 1000 XL Solder Dispenser

- **Apply solder paste where needed for components, less is better.**
- **Place components using tweezers**
- **See movie at end of this document**



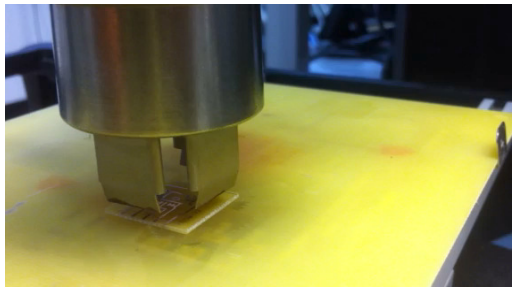
Step 6-Using the METCAL Rework Station

- **After all components are placed on the PCB take the board over to the METCAL Rework Station "heat gun" to reflow the solder**
- **The METCAL is on the opposite side of the EDX 1000**



Step 6-Using the METCAL Rework Station

- **The switch to turn on the METCAL Rework Station is located on the back of the machine**
- **Place a bigger PCB in the Clamp of the METCAL**
- **Make Sure the head is all the way up, so you do not crash the head into the PCB when lowering the arm**
- **Bring the arm all the way down and center the PCB under the head**
- **Adjust the head so it is ½" away from the PCB**
- **See movie at the end of this document**



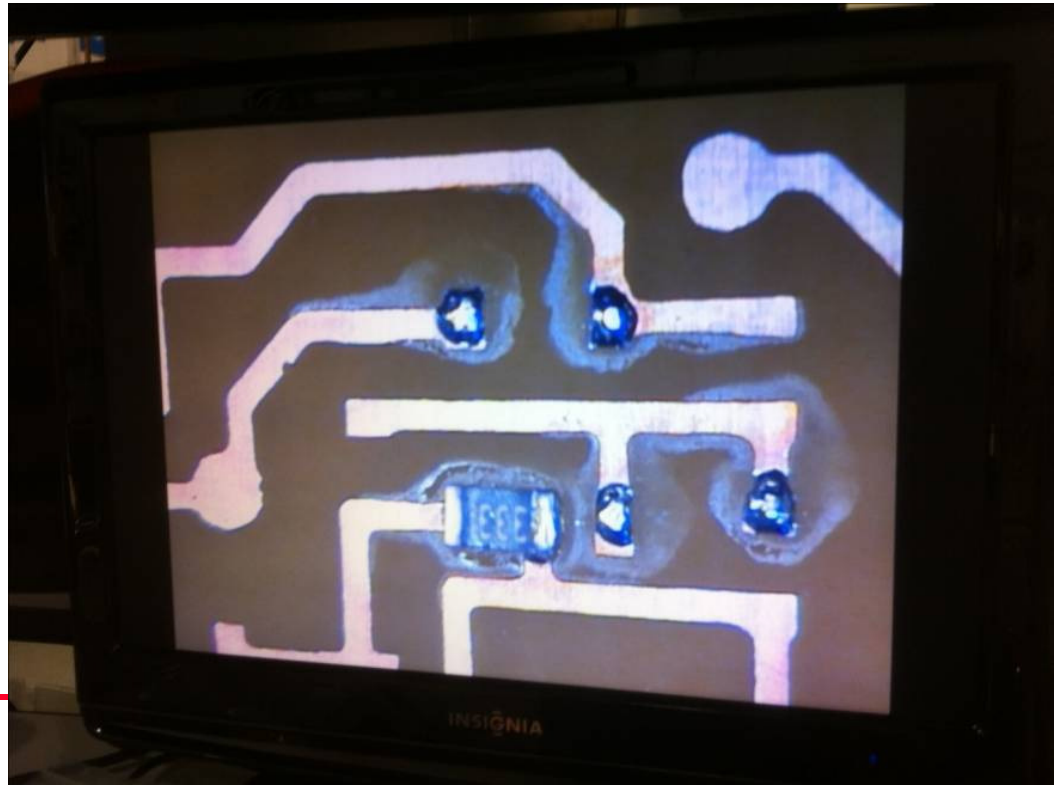
Step 6-Controlling the METCAL

- Use the +/- buttons to add time
- The large dial changes the heat from top to bottom
  - Use top if all components are on one side
  - If components are on both sides of PCB put dial in the middle
- The smaller dial controls the amount of heat

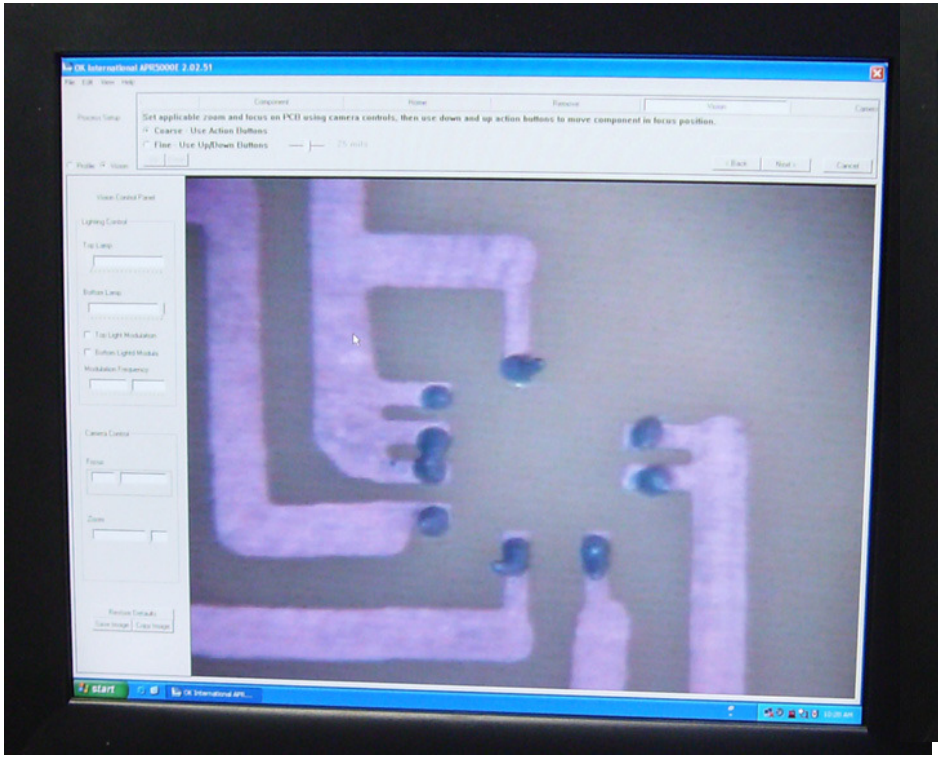
- Set time to 2:30
- Set Heat to the second level
- Push button in the middle to start

Step 7- Check Solders

- **After the METCAL is finished, check the solder joints under the microscope to make sure they are solid. This can be done by probing the components with tweezers**
- **See movie at the end of this document**



ADXL325 ALIGNMENT IMAGES



Copper Traces with Solder Paste

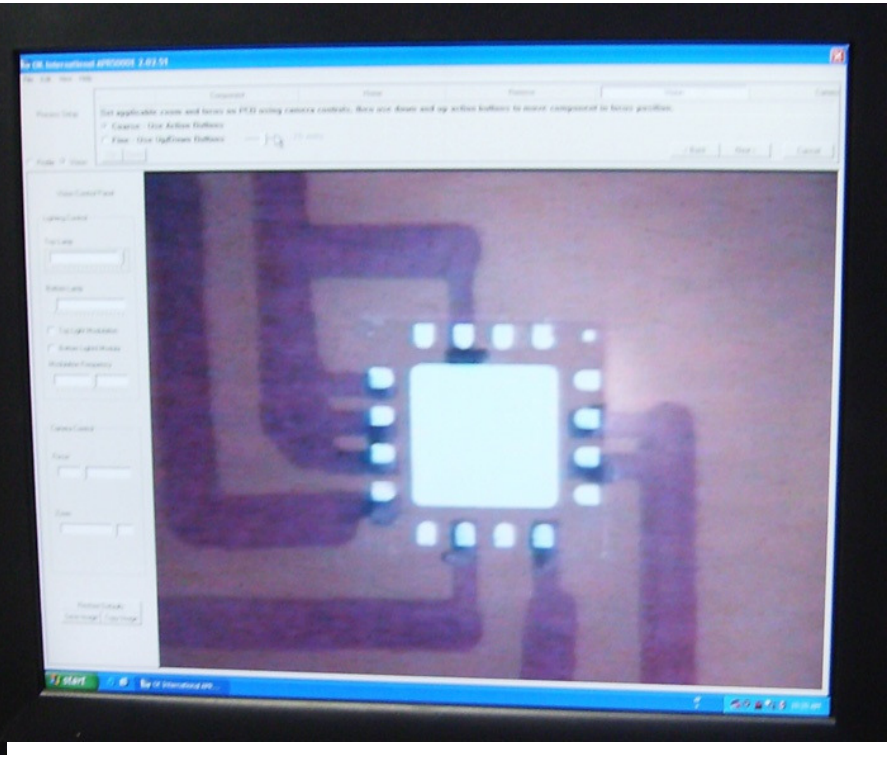
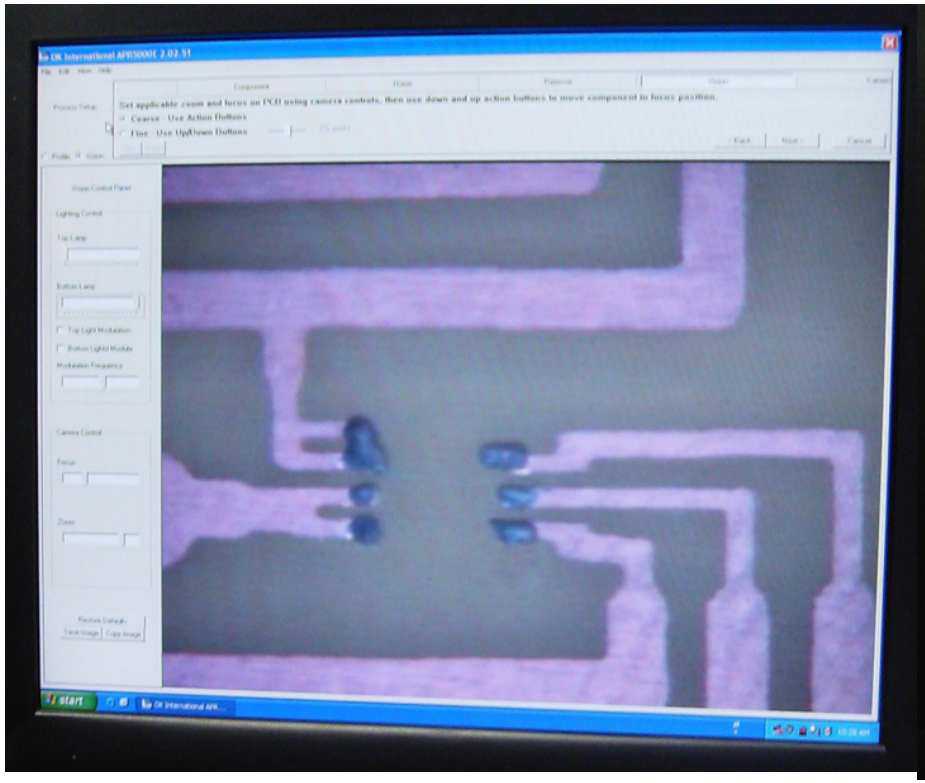


Image of bottom of ADXL325 Superimposed on Copper Traces

BMA140 ALIGNMENT IMAGES



Copper Traces with Solder Paste

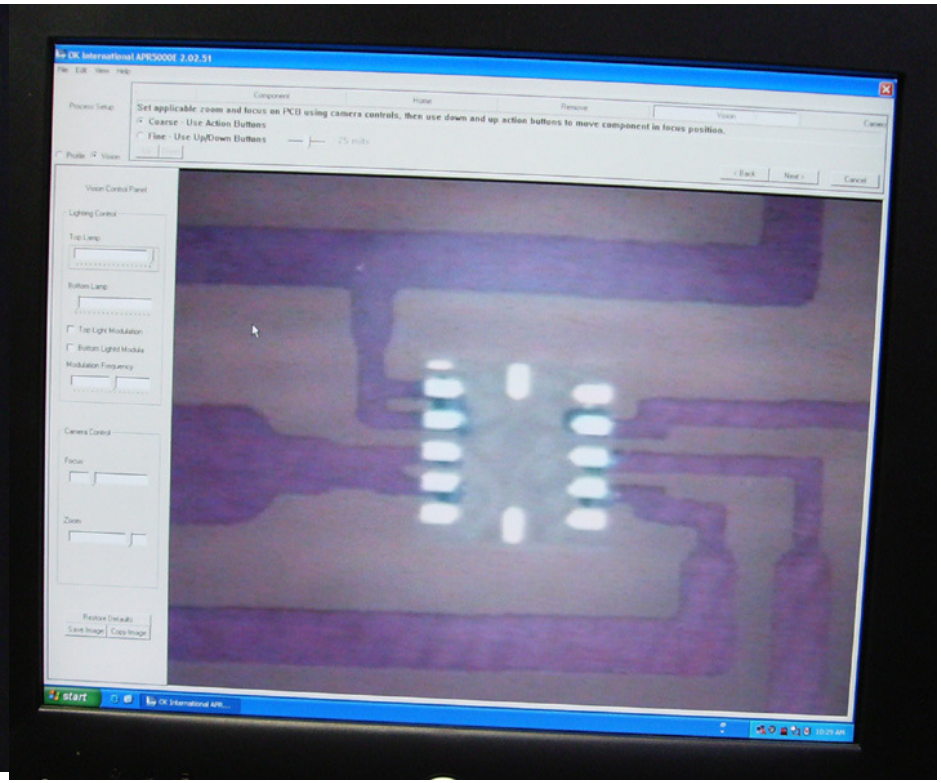
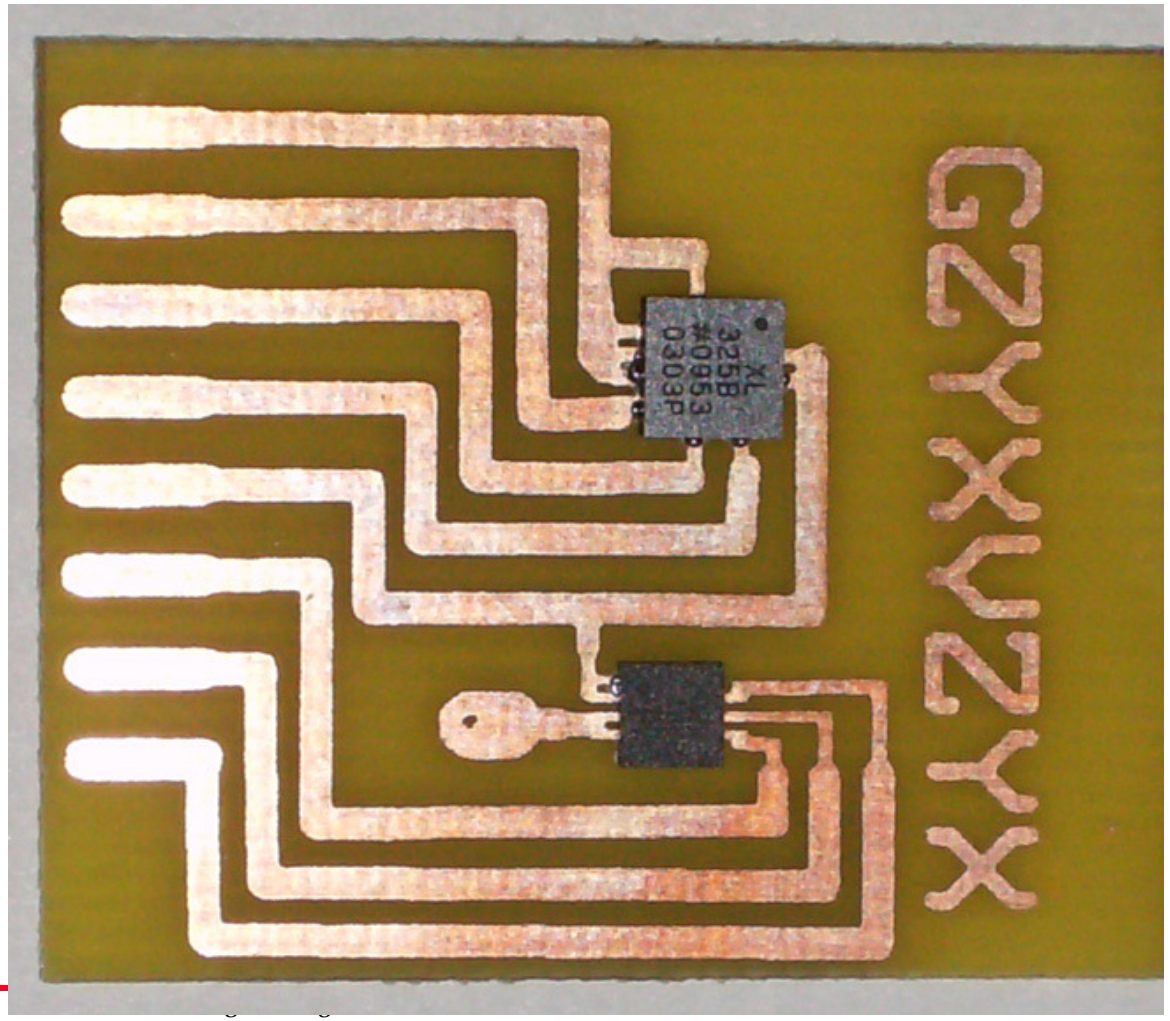


Image of bottom of BMA140 Superimposed on Copper Traces

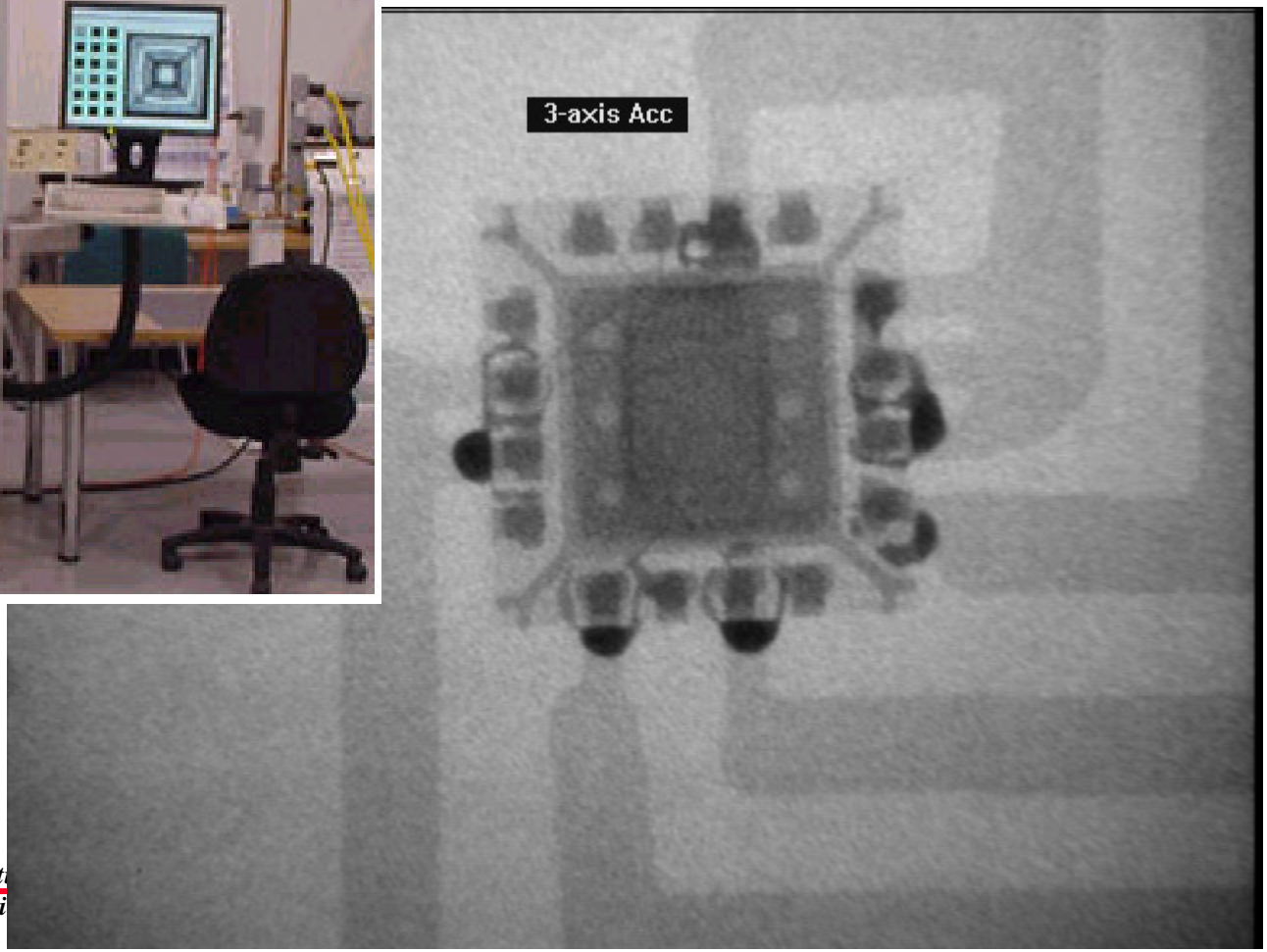
TEMPERATURE RAMP DURING SOLDERING

COMPLETED BOARD WITH SOLDERED COMPONENTS

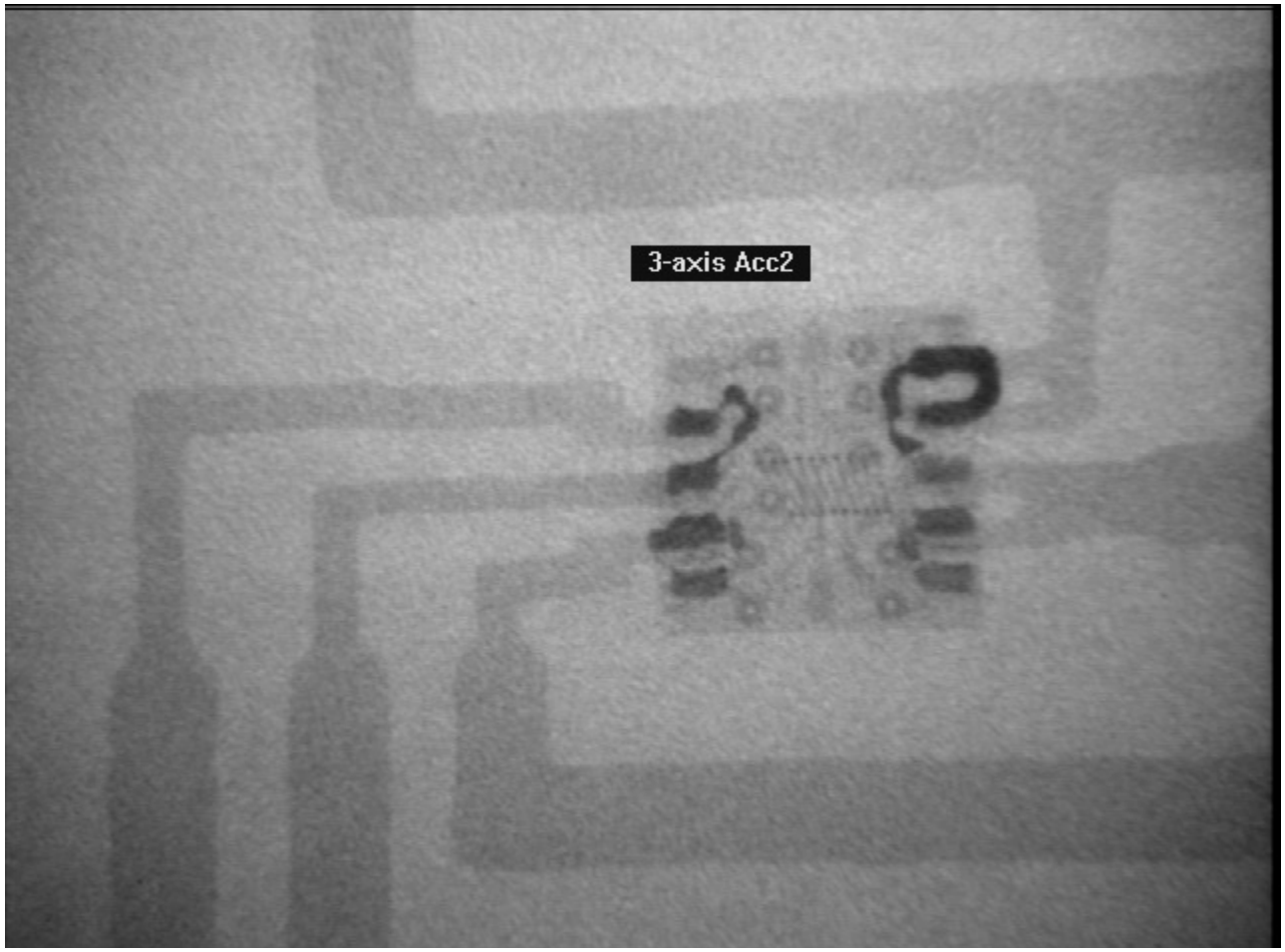


XRAY IMAGE OF ADXL325 SOLDER JOINTS

Glenbrook X-Ray Inspection



XRAY IMAGE OF BMA140 SOLDER JOINTS



Shows Possible Problem with Y and Z outputs shorted together

Step 12-Clean up and Sign Out

- **Don't forget to sign out!!**