Tool owner: Bert Harrop, bharrop@princeton.edu
Backup: Zuzanna Lewicka, zlewicka@princeton.edu

K&S 4124 Ball Bonder Standard Operating Procedure

QUICK GUIDE

PROCEDURE OVERVIEW

1. Mounting Sample on Work Holder Height
2. Setting Work Holder Temperature
3. EFO //Ball Formation
4. Manual Operation
5. Semi-Automatic Operation

⚠ CRITICAL PRECAUTIONS AND COMMON MISTAKES

- To prevent electric shock, never touch the EFO wand.
- Never hold the wire with your fingers (or tweezers) during spark generation or when pressing the RED E.F.O. pushbutton.
- Please contact the MNFL Staff if you are unsure of this process.

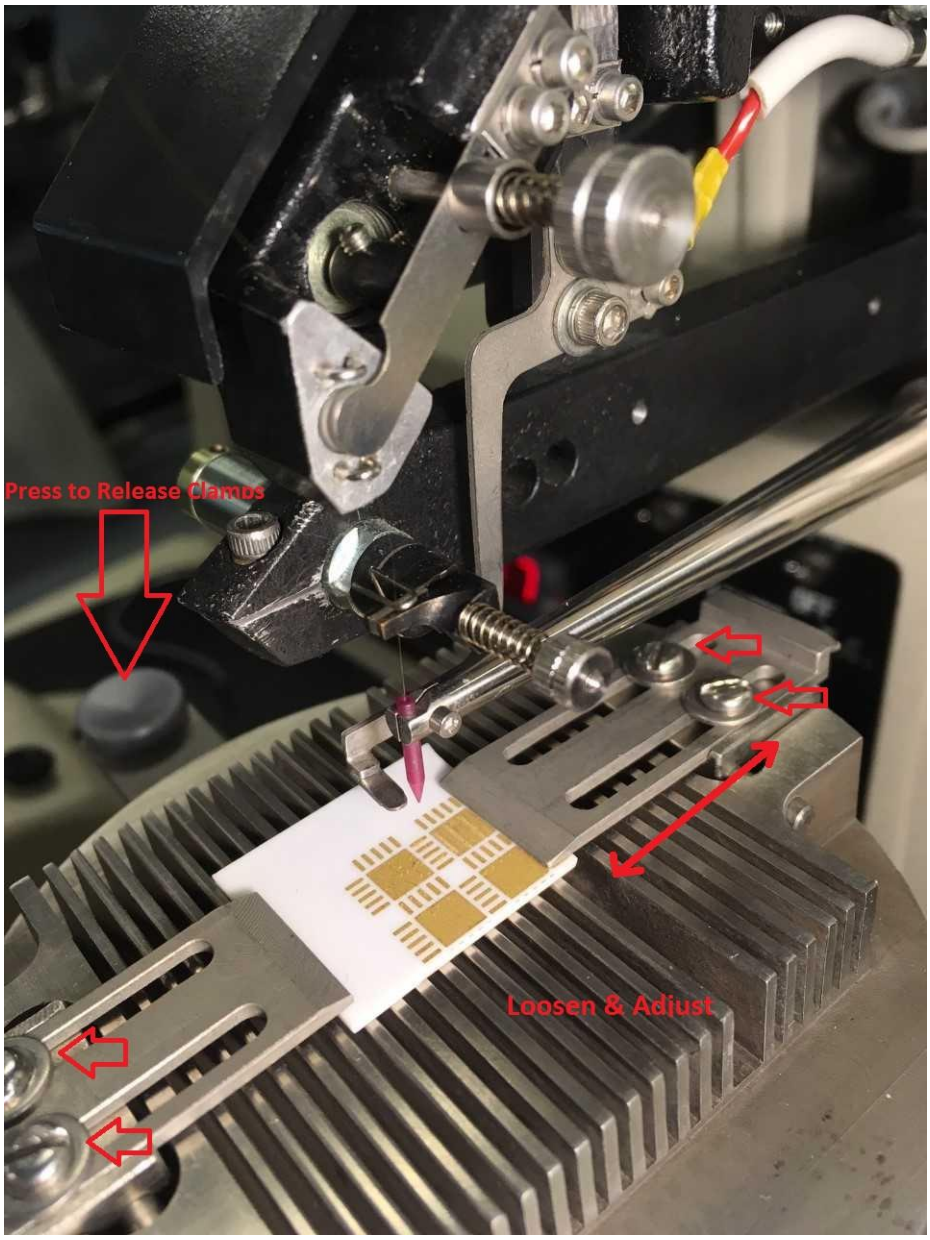
Before you start

- Know the height of your device:
  - Always set the work holder and your mounted sample at its lowest setting before placing the sample under the capillary to avoid damaging it.

Tool condition for the next user

- Always leave the capillary threaded with a ball formed before shutting down the tool.
- Never leave knobs or setting at extreme minimum/maximums.
- Clean up and tidy the area before leaving.

1. Mounting Sample on Work Holder Height



1.1 Load a device in the work holder and adjust the work holder clamps for proper clamping of the device.

1.2 Set the LOOP dial to 0 (zero) and press and release the CHESSMAN push button. This will cause the bonding head to drop to its lowest position and remain there (make sure that the 2nd indicator is illuminated on the right control panel).

1.3 Now turn the base of the work holder clockwise to raise the work holder until the capillary just touches the lowest bonding surface of the device.

1.4 Now increase the setting of the LOOP dial to 10, this raises the capillary.

1.5 Press the chessman pushbutton to return the bonding head to the reset position.

2. Setting Work Holder Temperature

Front Keypad

SET: Pushed once the setpoint 1 Value will be displayed for 3 seconds (LED “I” blinks) pushed once again within 3 seconds the setpoint 2 value will be displayed (LED “II” blinks). The setpoint can be changed with the “UP” or “DOWN” button.

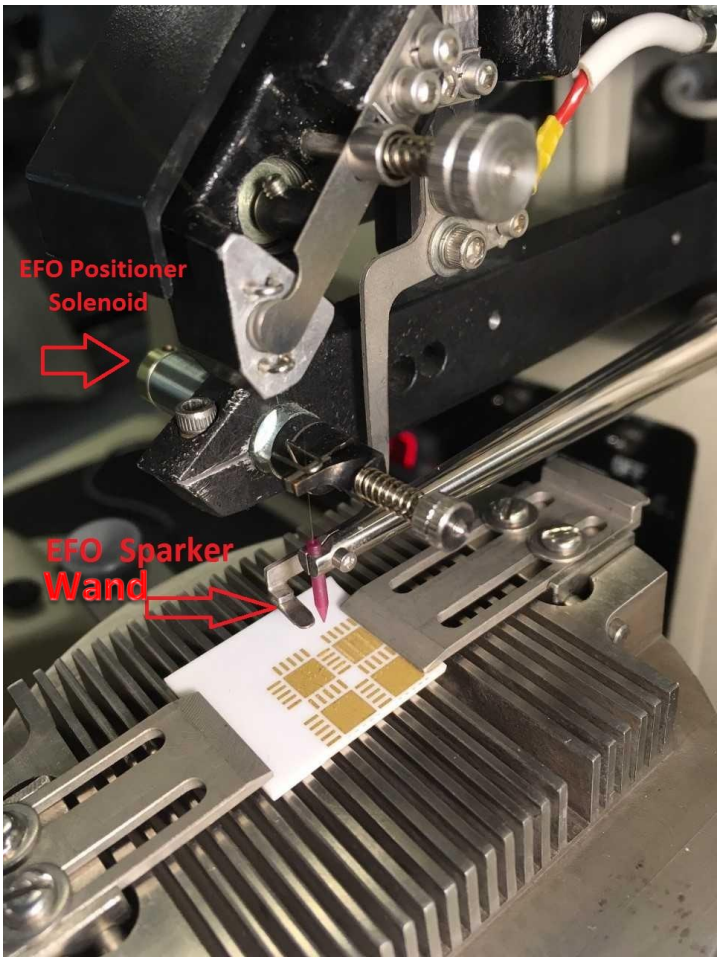
UP: Used to increase the setpoint value.

DOWN: Used to decrease the setpoint value.

3. EFO //Ball Formation Module

WARNING!

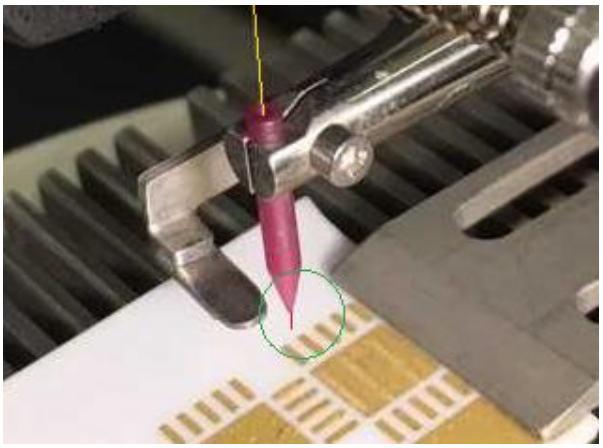
The EFO produces a “HIGH” Voltage spark! To prevent electric shock, never touch the EFO wand or hold the wire with your fingers (or tweezers) during spark generation, or when pressing the red “MANUAL SPARK” EFO pushbutton.



Reforming a Ball

3.1 In the event you need to reform a ball open (turn “ON”) the clamp switch located on the control panel.

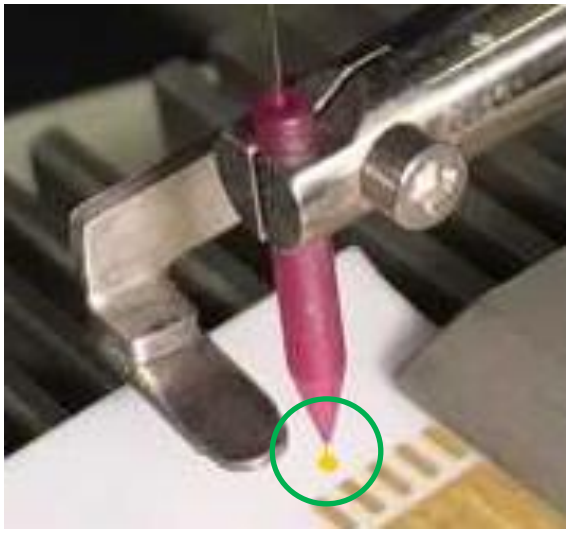
3.2 Using a pair of tweezers manually advance a short tail of Au wire past the end of the capillary but not past the EFO sparker wand.



3.3 While pressing the positioner EFO solenoid button (which will position the wand under the capillary) press the red “Manual Spark” button.

3.4 You will notice a spark and subsequent melting of the Au wire and newly formed ball.

3.5 (turn “OFF”) the clamp switch located on the control panel.



3.6 You are now ready to bond

4. Manual Operation

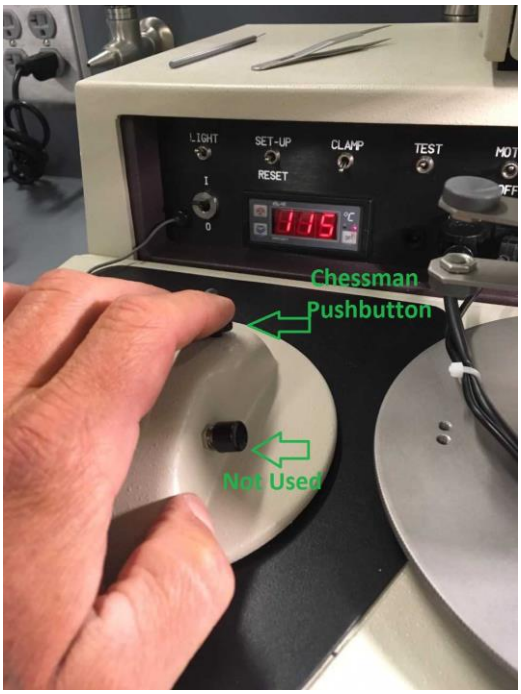
4.1 Using the Chessman Mouse, position the first bond position under the capillary, while viewing through the microscope.

4.2 Lower the manual arm located @ the far right of the control panel. Once you are in contact hold this position until the front panel "LED" indicator has switched from 1st to 2nd bond position mode.

4.3 Next reposition (using the chessman mouse) to the 2nd and final termination bond position. Once you are in contact hold this position until the front panel "LED" indicator has switched back to the 1st bond position mode.

(*** At this point you should now have a completed Ball/Wedge bonded wire)

5. Semi-Automatic Mode



Set Search Height Positions

*The search position is the height at which the bonding head stops above the bond site enabling the operator to perform fine positioning (via the chessman) of the workholder prior to bonding the wire. *Note- The search position should be set at 75-125um above the bond site level for optimum accuracy.*

****** Before setting the search positions, make sure the workholder height has been set.***

5.1 Note that the 1st indicator LED is illuminated.

5.2 Move the device in the workholder to the 1st bond site. Set the 1st (upper) dial to a "high" value (so the capillary does not hit the device surface). Press and "HOLD" the chessman pushbutton. Note the bonding head descends to the 1st positions search height.

5.3 Using the 1st bond dial lower the capillary to the desired positioning height.

5.4 Release the chessman pushbutton. Note the capillary descends, contacts, and completes the 1st ball bond and rises to the "LOOP" height setting and now the 2nd bond indicator illuminates indicating you are ready to position the 2nd bond. Adjust loop dial for proper loop length.

5.5 Now set the 2nd (lower) dial to a high value (so the capillary does not hit the device surface). Press and "HOLD" the chessman pushbutton. Note the bonding head descends to the 2nd positions search height.

5.6 Using the 2st bond dial lower the capillary to the desired positioning height.

5.7 Release the chessman pushbutton. Note the bonding head descends to the second bonding site, contacts, and completes the 2nd (terminating wedge bond) then rises back to the reset positon.

5.8 You are now ready to bonding semi-automatic mode.

When finished turn off the bonder and log out.