K&S Wedge Wire Bonder Standard Operating Procedure

QUICK GUIDE

PROCEDURE OVERVIEW for manual bonding
1. Startup Procedure and Sample Loading
2. Wire Loading
3. Setting Work Holder Temperature
4. Height Adjustment
5. Semi-Auto Bonding
7. Spotlight Adjustment
8. Standard Wedge Tool and Wire Specifications for Au Wire Configuration

CRITICAL PRECAUTIONS AND COMMON MISTAKES
- Device to be bonded must be securely mounted to the substrate (epoxy)
- The workpiece must be clamped on the work holder
- Device to be bonded must be flat
- Bonding surface must be free of any organic contaminants; cleaning is an important process before wire bonding

Before you start
- This K&S Manual Bonder Model 4523 is set up with a vertical feed of gold wire. The gold wire is 1 mil (25μm) in diameter. It is an ultrasonic system with a temperature controller for the heated work holders
- Confirm wedge is threaded

Tool condition for the next user
- Do not leave the wedge tool “UN”threaded
- Lower the stage
- Pull some extra wire from the wedge tool before powering down the tool
- Logout
- Clean up anything you bring in
1. Startup Procedure

1.1 Log into the tool using Mendix system
1.2 Lower the stage by turning the work holder base counterclockwise until it stops and set holder aside; The work holder is now at its minimum height
1.3 Place the work holder on the side
1.4 Power on the tool and turn on the lights

1.5 Identify TIME mode of operation by pressing the RIGHT pushbutton
Note: Long Bonding Time Scale is preferred for Au wire
• The 1st indicator blinks rapidly - Standard Bonding Time Scale (maximum 120 ms)
• The 1st indicator blinks slowly - Long Bonding Time Scale (maximum 1000 ms)
1.6 To switch the TIME scale between standard and long bonding time:
• Set the SET UP/RESET switch to the RESET position and then release
• Immediately press and hold the RIGHT and LEFT mouse buttons simultaneously until the 2nd indicator turns off
• Release both pushbuttons

1.7 Identify TAIL mode of operation by pressing the RIGHT pushbutton
• 1st Indicator Blinks, U/S Off, 2nd Indicator On - Long Tail Length mode
1.8 To set the bonder for the Long Tail Length mode:
• Set the SET UP/RESET switch to the RESET position and release
• Immediately press and hold the LEFT button of the mouse until the 2nd indicator turns off
• Release the LEFT button
Note: The Long Tail Length mode is used when bonding thick wires with diameters of 76 µm (3 mil) or ribbon wires thicker than 25 x 125 µm (1 x 5 mil).
2. Wire Loading

Note: When threading the wire, always wear protective gloves. Never touch the wedge, wire or spool holder with your bare fingers. This leaves oil traces that affect normal operation.

2.1 Ensure that the bonding head is in the Reset position (1st indicator only is on)
2.2 Open the clamp manually by pulling the clamp plunger towards you and rotating the clamp plunger slightly to lock it in the open position
2.3 Hold the wire about 25 mm (1") from the end and feed the wire into the vertical hole of the wedge until it protrudes from the hole at the bottom; Ensure that the wire is loaded from the front side of the spool, through the wire guide and the clamp, to the wedge

2.4 Pull a small excess ~3 mm of wire out of the bottom of the bonding tool and thread the tip
2.5 Release the clamp plunger to close the clamp
2.6 Remember to bond off the excess wire

3. Setting Work Holder Temperature

3.1 If using heat, make sure “EEE” does not appears in the temperature controlled display, so plug the work holder into to the T.C. connector panel properly
3.2 To set temperature on the work holder press the SET pushbutton on the temperature controller; Press the UP and/or DOWN until the required temperature setting appears in the display and release the SET pushbutton
4. Height Adjustment

4.1 Position sample on work holder and secure by adjusting the clamp so your sample is under the spring loaded clamp.
4.2 Place the work holder on the work station.
4.3 Set the LOOP dial to 1.
4.4 Set the SEMI AUTO/MAN Z switch on the right side of the panel to SEMI AUTO.
4.5 Press and release the LEFT button and ensure that the 2nd indicator is on; the bonding head drops to its lowest position and remains there.

4.6 Rise the work holder until the wedge just touches the lowest bonding point.
4.7 Set the LOOP dial to 10.
4.8 Press the RESET switch to return the bonding head to the Reset position.

Note: The machine can now work within the maximum range of bonding heights.
5. Semi-Auto Bonding

5.1 Set the SEMI AUTO/MAN Z switch on the right side of the panel to SEMI AUTO
5.2 Set the RESET LEVEL switch to the preferred setting (high or low)

5.3 Set the POWER, TIME, and FORCE bonding parameters for the first and second bonds; The top row is for the first bond and the bottom row is for the second bond
5.4 Set the LOOP height; This is the height the bonding wedge will go to after the first bond
5.5 Set the TAIL parameter. Longer tail lengths are useful to help prevent unthreading of the wedge tip; A value of 6 is appropriate for most applications

5.6 Adjust the search height for the first bond
- Set the SEARCH height dial for the first bond to 10
- Move over the first bond pad and hold down the LEFT mouse button
- Adjust the SEARCH height dial until the bonding tip is just above the bond pad
5.7 Release the LEFT mouse button to make the first bond
5.8 After the first bond, the bonding head moves to the LOOP height; Adjust the LOOP dial if needed
5.9 Adjust the SEARCH height for the second bond using the bottom SEARCH dial and the same procedure as in 5.6
5.10 Subsequent bonds are made by holding LEFT mouse button to lower the bonding head to the SEARCH height, positioning the bonding head, and releasing the mouse button to perform the bonding action

Note: Be sure to always bond from front to back. This means start with the bond pad that is closest to you then move to the 2nd closest till the final bond is the furthest from you. This is required due to the wire feeding position.

6.1 Set the SEMI AUTO/MAN Z switch on the right side of the panel to MAN Z

6.2 Set the RESET LEVEL switch to the preferred setting (high or low)

6.3 Set the POWER, TIME, and FORCE bonding parameters for the first and second bonds; The top row is for the first bond and the bottom row is for the second bond

6.4 Set the LOOP height; This is the height the bonding wedge will go to after the first bond

6.5 Set the TAIL parameter; Longer tail lengths are useful to help prevent unthreading of the wedge tip and a value of 6 is appropriate for most applications

6.6 Lower the bonding head above the first bond location using the MANUAL Z tab and adjust the position using the mouse

6.7 Once the bonding head is properly positioned above the desired location, continue to lower it until it touches the bonding pad

6.8 Slowly release the MANUAL Z control and the bonding head will go the LOOP height

6.9 Repeat steps 6.6-7.8 to perform the second bond
7. Spotlight Adjustment

7.1 Prepare a reference bond to aid spotlight adjustment
- Set the LOOP dial to 10
- Move the mouse to position the device precisely under the wedge
- Perform the reference bond (see point 5 or 6) and do not move the mouse after the bond is performed; The bonding head is now at the Loop height and the 2nd indicator is on

7.2 Move the spotlight housing so that you see the target spot near the reference bond

7.3 Turn the focusing ring at the top of the spotlight so that the target spot appears sharp

7.4 Turn the screws near the bottom of the spotlight housing to make fine adjustments in the target spot position

8. Standard Wedge Tool and Wire Specifications for Au Wire Configuration

**Wedge**
- VF45A-T1B-2020-3/4-CQM
- VBL-045

**Wire**
- Alloy: 99.99 AU
- Size: .001
- SILE: 8 GRAMS MIN
- ELONG: 3-5%
- FT/SPL: 90 FT