Kulicke and Soffa Industries, Inc.

MODEL 4124

UNIVERSAL
THERMOSONIC GOLD BALL BONDER

OPERATION MANUAL

10.83

1. INTRODUCTION

The Model 4124 Thermosonic Ball Bonder (Fig. 1-1) is a new machine which embodies a number of features and capabilities already proven in the Model 4123 Wedge Bonder.

1.1 The following features are new on the Model 4124 Ball Bonder:

1.1.1 Three solenoids control wire feed:

DRAG SOLENOID operates the drag clamp, seating the ball against the capillary tip before the first bond.

KICKER SOLENOID throws the kicker forward against the wire, pulling wire off the spool.

CLAMP SOLENOID operates the wire clamp, opening and closing the clamp on signals from the logic board or the CLAMP switch. The clamp closes after the second bond, so that the rise of the bonding head will tear the wire from the second bond.

1.1.2 ELECTRONIC FLAME-OFF (EFO) melts the end of the wire tail to form a ball by generating an arc between the EFO electrode and the wire. The BALL SIZE ADJ. selector on the front cover of the main head selects the charge on the electrode. The EFO SOLENOID brings the charged electrode under the wire tail in response to the flame-off signal from the logic board.

1.2 The following features, proven on the Model 4123 Wedge Bonder, are embodied in the Model 4124 Ball Bonder:

1.2.1 DC SERVO/LVDT CLOSED LOOP CONTROL of the bonding head means maximum speed between positions, with gradual starts and stops, minimum jarring and vibration, and high precision of vertical placement. Only one cam is required, with all sequence and timing functions controlled by electronic logic.

1.2.2 PHASE-LOCKED-LOOP (PLL) ULTRASONIC GENERATOR AND HIGH-Q TRANSDUCER. The high-Q TRANSDUCER is sensitive to changing load during bonding, and the PLL circuit enables the generator to track the resonant frequency of the ultrasonic circuit so that the bonding power is always delivered to the bond at the instantaneous resonant frequency of the system. This means maximum efficiency, minimum power requirement and close control of the bonding process.

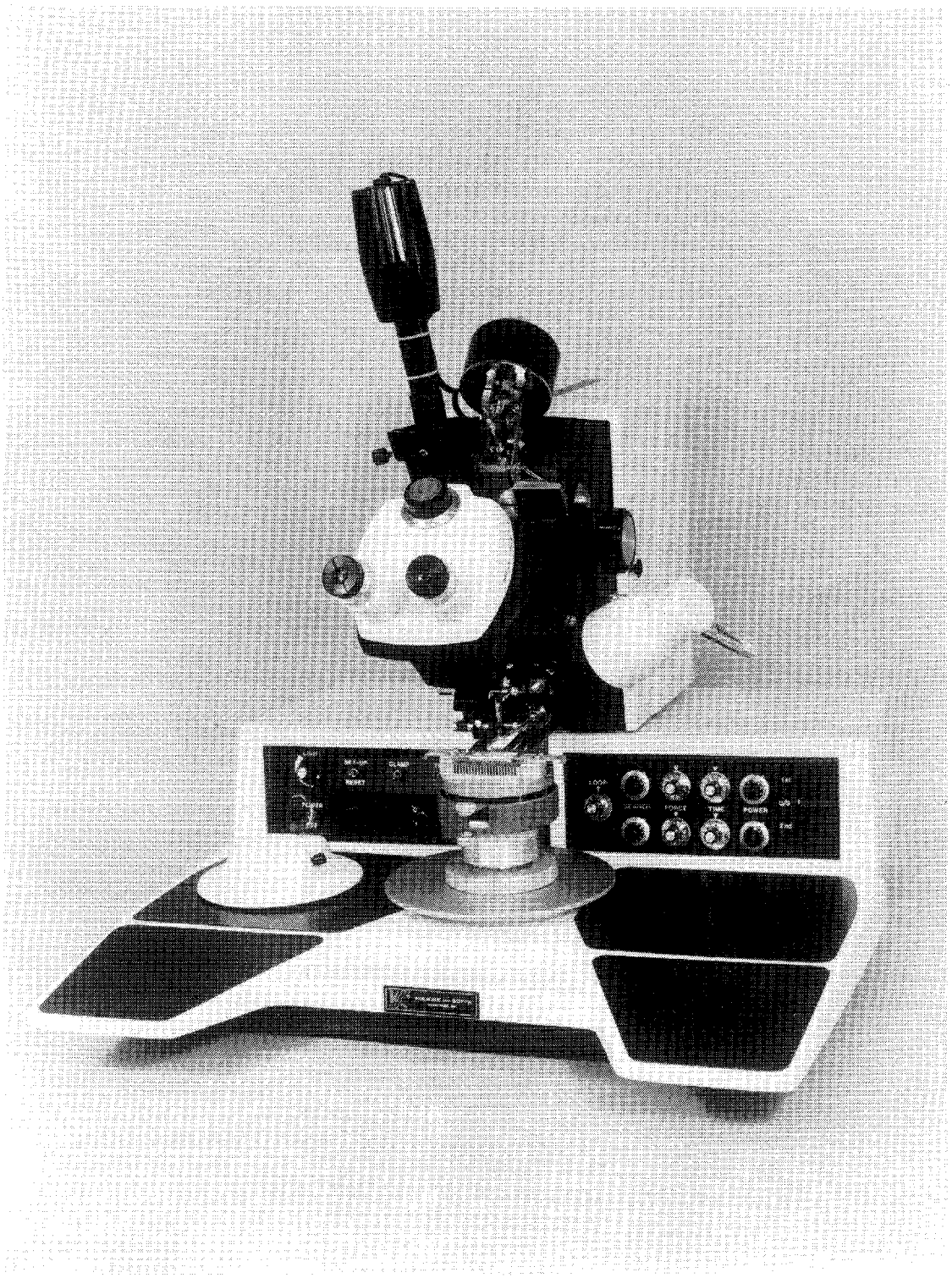

FIG. 1-1 MODEL 4124 BALL BONDER

1.2.3 ELECTRONIC DIAL CONTROL of bond forces, U/S powers, search and loop heights, and bonding duration.

1.2.4 AIR-DAMPED BONDING HEAD stabilizes the bonding head against shock and vibration and insures soft-touch impact.

1.2.5 WORKHOLDER TABLE permits a 3.75" x 3.75" (95 mm x 95 mm) access of bonding area.

1.2.6 CHESSMAN with 6:1 reduction for fine positioning of the device under the microscope.

1.2.7 CHESSMAN BUTTON for semi-automatic bonding: press to bring capillary near focus at SEARCH height, release to complete a bond.

1.2.8 STITCH BUTTON held in after 1st bond permits incorporation of one or more safety stitch bonds in the bonding cycle. After STITCH BUTTON is released, the cycle accomplishes the "2nd bond".

1.2.9 OVERHEAD MICROSCOPE permits full horizontal access to the work area.

1.2.10 TEMPERATURE CONTROLLER K&S Model KTC-101 (type J) controls and displays digitally the temperature of the workholder.

1.3 The optional features are:

1.3.1 TWO-IN-ONE OPERATION. Depending on the device, select either of two bonding modes:

CHESSMAN high-speed semi-automatic bonding where height difference between 1st and 2nd bonds is up to 0.28" (7.1 mm).

MANUAL Z bonding for accurate positioning: lower the Z-lever to accomplish the 1st bond; lower lever again to make 2nd bond. Finally, the head rises automatically to RESET.

1.3.2 SPOTLIGHT facilitates targeting by projecting a ringshaped spot of light onto the bond site.

1.3.3 WORKHOLDERS of the stationary or rotary, heated types.

1.3.4 REVERSE BOND KIT permits stitch bonding in the 1st bond parameters.

2. SPECIFICATIONS*

WIRE

Diameter range	0.7 to 3.0 mils (17 to 75 microns)
Spool	TC-3 2" (50.8 mm) dia. single flange
Material	Gold

PERFORMANCE

Cycle time	900 ms (incl. 100 ms bond time)
Bond force	5 to 160 gr
Bond time	10 to 100 ms
Ultrasonic power	Low ..... 1.3 W. max. High ..... 2.0 W. max.
EFO	1200 Vdc, adjustable ball size

MACHINE

Throat depth	5" (127 mm)
Reset to overtravel overall range	0.33" (8.38 mm)
Search/Loop height range	0.02" (0.51 mm) under RESET to: 0.02" (0.51 mm) above lowest OVERTRAVEL
Table motion	Gross ..... 6.5" (165 mm) diameter Fine ..... 0.5" (12.7 mm) diameter
Bonding area	3.75" x 3.75" (95 mm x 95 mm)
Chessman ratio	6:1
Tail length	Constant, electronically adjustable
Optics	B&L or WILD stereo zoom microscope, top mounted

OPTIONS

Spotlight targeting	Motorized workholders
Adjustable-height heated workholder	Manual Z system
All standard K&S manual workholders	Reverse bond kit

TEMPERATURE CONTROLLER KTC-101

Thermocouple input	Type J (Iron-Constantan)
Indicating range	0°C to +400°C
Set-point range	+50°C to +400°C
Zero offset	±45°C total change
Accuracy	0.5% of full scale @ +25°C ambient temp.
Operating temperature	0°C to +50°C
Cold junction compensation	0°C to +50°C ambient temp.

* Specifications are subject to changes without prior notice.

TEMPERATURE CONTROLLER KTC-101 (cont.)

Line Voltage	KTC-101-1 ..... 115 Vac	+10% to -20%
	KTC-101-2 ..... 230 Vac	50 to 60 Hz
Load Output	KTC-101-1 ..... 4 A, 115 Vac	
	KTC-101-2 ..... 4 A, 230 Vac	
Protection	Triac protected by internal fuse 4 A fb	

ELECTRICAL REQUIREMENTS

Voltage	100/120/220/240 Vac ±10%
Frequency	50 to 60 Hz
Power	70 VA max

PHYSICAL DIMENSIONS

	Machine	Shipping
Depth	26" (660 mm)	29.1" (740 mm)
Width	23.5" (597 mm)	26.8" (680 mm)
Height	26" (660 mm)	27.2" (690 mm)

WEIGHT

Machine	64 lb (29 kg)	without accessories
Shipping	110 lb (50 kg)	