



Universidad de Granada
Departamento de Electrónica y Tecnología
de Computadores



ERSA IR 500 A SMT/BGA Rework System



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4^o Bachelor Degree in
Telecommunications Engineering



Contents

- 1.- Introduction**
 - 2.- Functional elements**
 - 3.- Soldering**
 - 4.- Desoldering**
- Appendix : Safety Instructions**

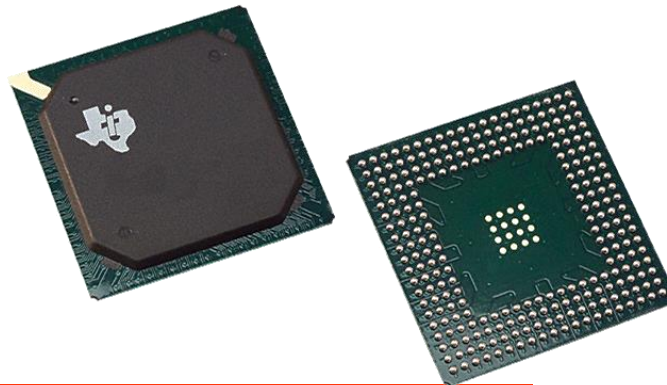


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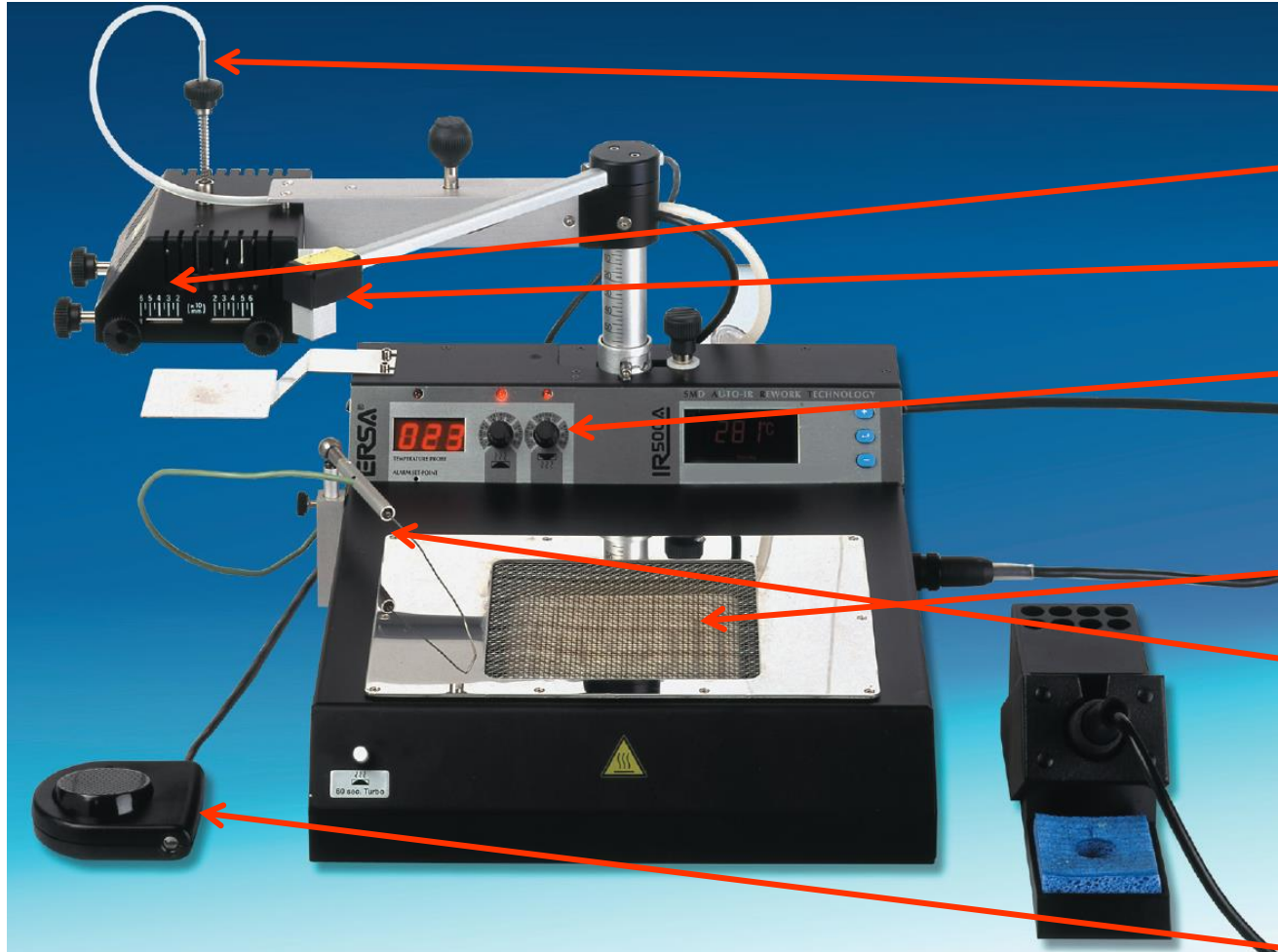
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1.- Introduction

- The aim of these presentation is to provide you with information on the application of this machine and its correct use.
- We are going to use this machine once the machine has been installed in the lab. If you adquire one of this, you should read the Operating Instructions(NAS) in order to know the first steps that you have to take.
- It's mandatory have the knowledge about the precaution (read appendix) that you have to have.
- BGA technology →



1.- Introduction



Vacumm pipe

Upper heater

Laser Pointer

Temperature control
and display

Lower heater

Temperature
Sensor

Vacumm
actuator
(by hand)

1.- Introduction

Technical Specifications

Upper IR power emitter	1 x 200 W (emitter surface 60 x 60 mm)
Lower IR power emitter	1 x 400 W (emitter surface 120 x 120 mm)
Total system power	600 W
Wavelength of IR emitter	2 - 8 μm
Power supply	230 VAC 50Hz (115VAC 60 Hz)
Fuse	3.15 AT (6.3AT)
Equipment class	1
Display	7-segment display
Operation	Potentiometer
Connecting cable	approx. 2 m
Weight	approx. 7 kg
Increase in temperature during process	between 0.3 and 1.5 K/s
Temperature recording system	NiCrNi thermocouple (K type)
Positioning	Laser class II
Footprint	300 x 380 mm (W x D)
Total height	165 - 230 mm
Maximum lift	65 mm
Working distance from upper emitter	15 - 40 mm
max. working depth	approx. 170 mm

2.- Functional elements



Lower heater control

Upper heater control

Display

- The machine is equipped with 2 separate heating zones: upper and lower heater. The energy level of each one is controlled using two potentiometers
- The LED indicator lights up via the left potentiometer as soon as the preset temperature has been reached. (The duty cycle of the upper heater is variable, the right LED indicates the pulse frequency.)
- In normal operating mode, the actual temperature measured at the temperature sensor is continuously displayed.

2.- Functional elements



Turbo button

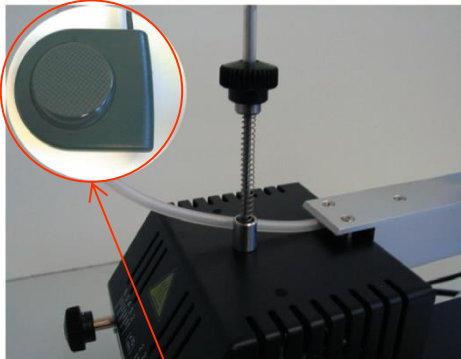
- The highest available energy level in the lower heater is activated for 60 seconds. During this working step the turbo button lights up red.
- ⚠ During this time there is no temperature control.



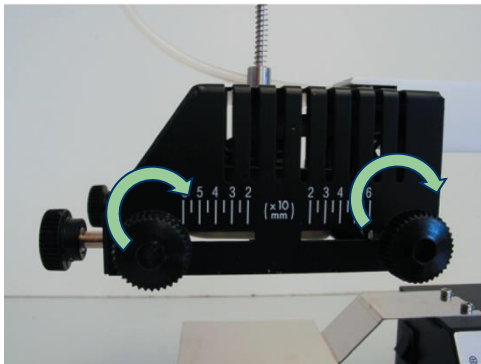
Laser pointer

- The laser positioning aid serves to **set up components** prior to the rework process.
- Ensure that the laser point on the component should be in the same position of the operating point of the vacuum pipette which is **in the centre of the radiant heater**.

2.- Functional elements



finger-switch



Vacuum pipette

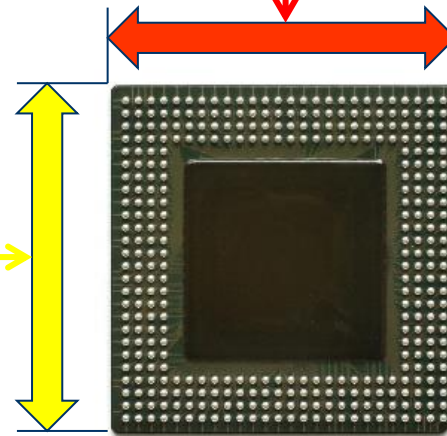
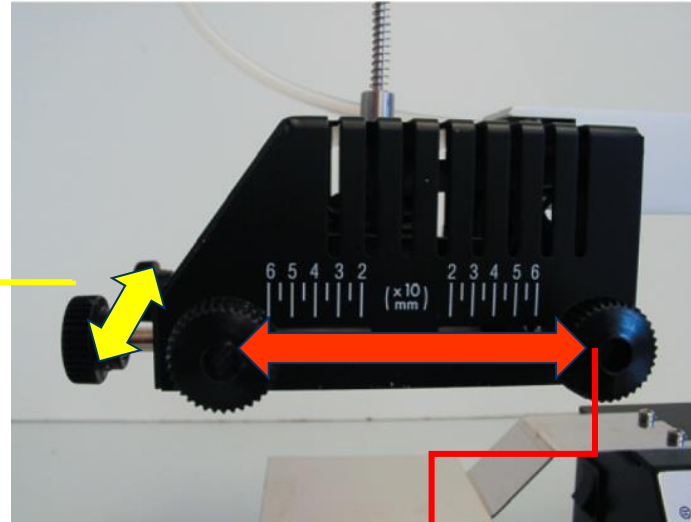
- The vacuum pipette helps remove the desoldered component from the printed circuit board, while the vacuum is active, just before the solder melts.

Aperture system

- The aperture system may be adjusted using the knurled nuts so that IR radiation only strikes components that are to be desoldered.
- We have two distances that can be changed (Square), depends on the size of the BGA. The range of adjustment is from 60 x 60 mm to 20 x 20 mm.
- Used to protect the other components.

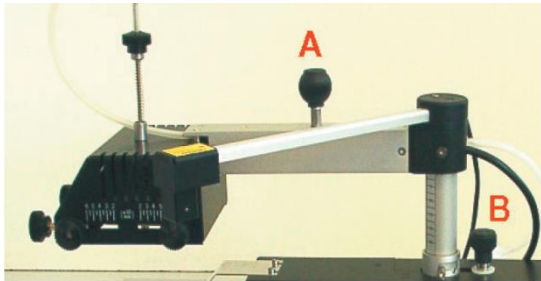
2.- Functional elements

Position of the Aperture system



2.- Functional elements

Upper emitter arm



- The height of the upper emitter arm is adjusted using button **B**. The heat energy increases as the working distance between the upper heater and the printed circuit board decreases.
- At A there is a handle for changing the position of the upper emitter.

Temperature sensor (NiCrNi sensor, K type)



- Thermocouple determines the component temperature. This is shown in the left-hand display on the unit.



During the rework process the sensor has to have a good contact (touching) with the component

2.- Functional elements



Before you start to desolder, ensure the temperature of the melting point of your device. It is really important.

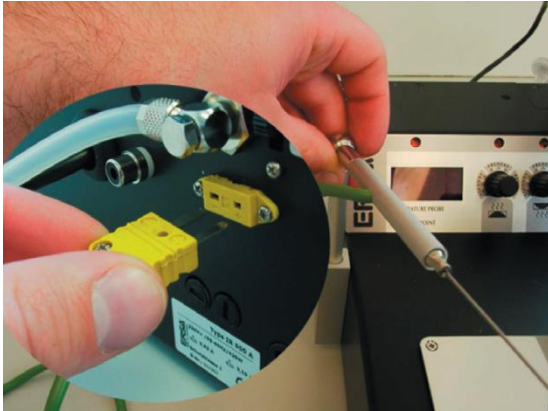
Alarm Set Point (acoustic and visual signal)

- You can set the temperature at the unit:
 - ✓ Melting point of solder=220°C (typical Pb-free solder temperature)
 - ✓ Alarm Set Point = 220°C+12°C=232°C
 - ✓ The Alarm Set Point should be fixed in 232°C.
- Change settings: set the switch at the back to < Alarm Set > adjust the potentiometer below the display using a small screwdriver



The **standard delivery** setting of the IR 500 A is 195 °C!

2.- Functional elements - First Steps

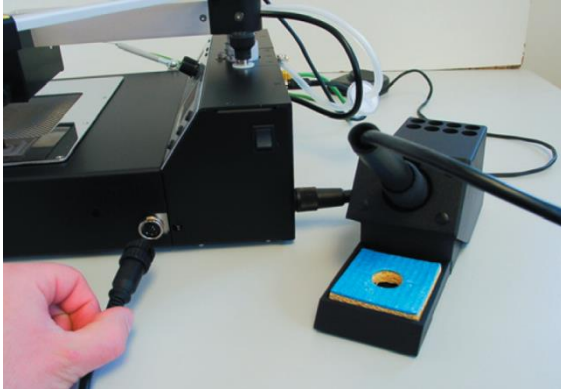


1. **Connect the termocouple** to the plug socket at the back of the unit.



2. **Connect the finger switch** to the socket provided for this on the back of the unit

2.- Functional elements - First Steps

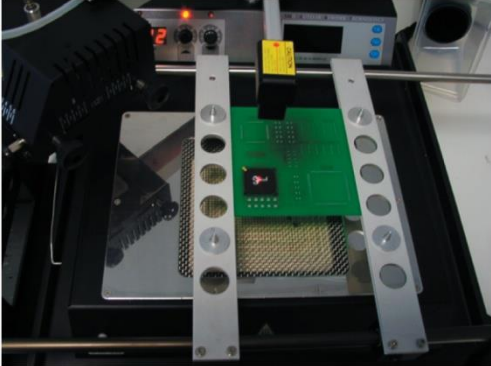


3. **Connect the Tech tool soldering iron to the integrated digital 2000 A soldering station IR 500 A base unit. The socket is on the right side of the casing.**



4. **Finally, connect the IR 500 A unit to the the power socket using the connector cable provided.**

3.- Desoldering



1. Place the PCB on the board holder and position it so that the laser point is in the centre of the BGA.

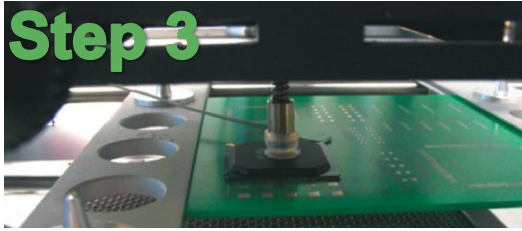
2. Set the temperature:

- ✓ Lower heater: Level 7
- ✓ Upper heater: Level 8
- ✓ Preheat the PCB to 70°C with the lower heater. Then swivel the upper emitter from the 45° position over the PCB.

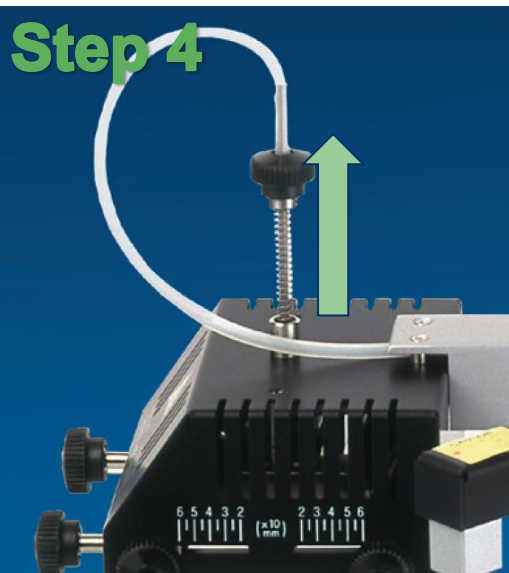


3.- Desoldering

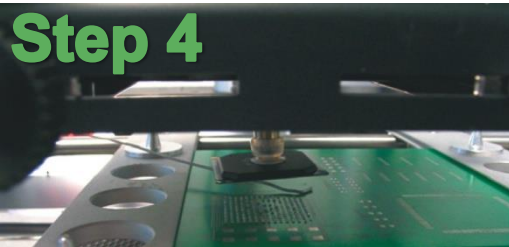
Step 3



Step 4

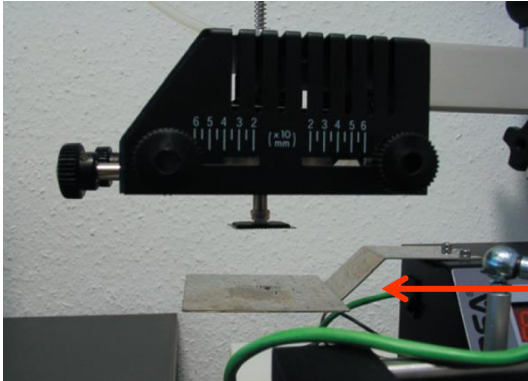


Step 4



3. Once the melting point has been reached, activate the vacuum (not too early) pressing the finger switch
4. Spring force of the pipette. Now swivel the upper emitter into the rear position. This will automatically reduce the heat energy in the upper heater.

3.- Desoldering

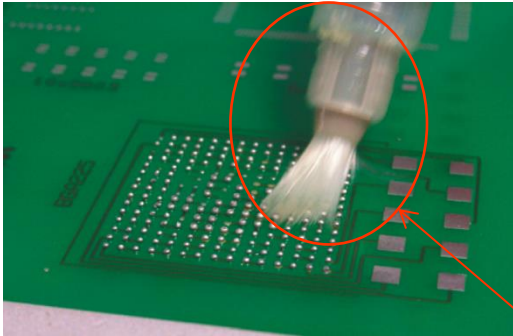


5. Activate the finger switch to switch off the vacuum. The component will then drop onto the **storage tray**.



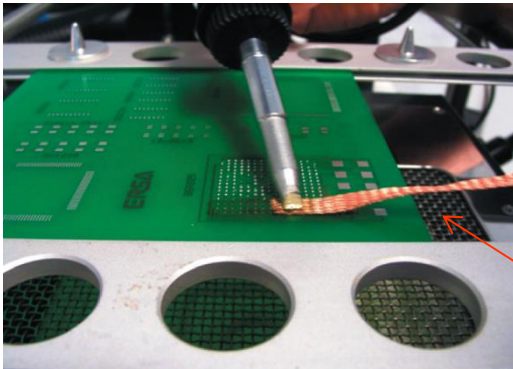
6. Lower heater to 0
7. Cool the printed circuit board using the **fan**.

4.- Soldering



1. Prepare the PCB: removal of excess solder.

Apply a small quantity of flux to the solder points where excess solder is attached



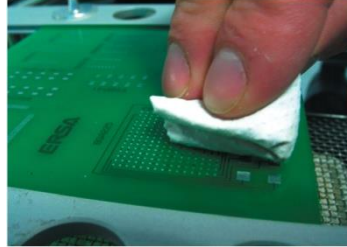
2. Place the desoldering wick on the soldering points where excess solder is attached.



flux dispenser



4.- Soldering



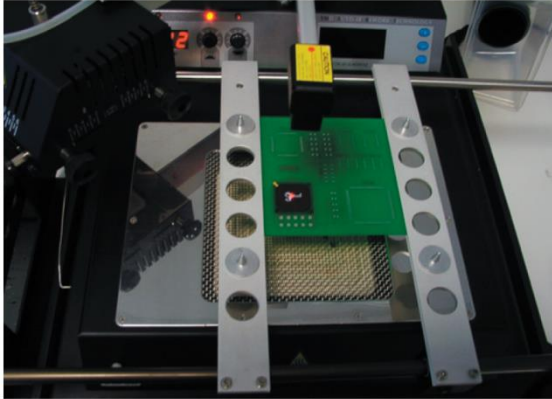
3. Apply a flux cleaner or a lint free cloth (*pañó de microfibra sin pelusa*) to remove residual flux from the soldering points.

4. To solder on a new BGA, apply flux(AGAIN) to the soldering points again.



5. Place the component on the PCB. Fix the position of the thermocouple so that its tip is in contact with the PCB next to the BGA making sure that no air gap is present. (lower temperature)

4.- Soldering

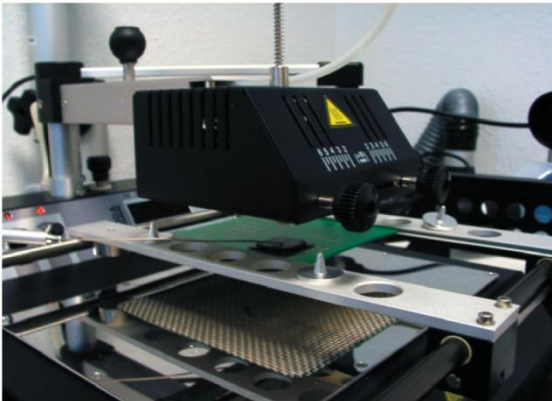


6. Place the PCB on the board holder and position it so that the laser point is in the centre of the component.

✓ Lower heater: Level 7

✓ Upper heater: Level 8

7. The same process with desoldering (70 °C with lower heater → 45 ° position)



8. Melting point has been achieved, and the component solder reaches reflow, wait until the Alarm Set Point. Then swivel the upper emitter back into the rear position.

9. Cool down the PCB with the fan.

Appendix : Safety instructions



The IR 500 A is exclusively designed for soft soldering of electronic components onto printed circuit boards. The manufacturer cannot be held liable for any damage resulting from incorrect use, or use that does not comply with the specifications.



The system may not be used to heat inflammable or explosive materials, as to do so constitutes a fire hazard. The product may not be left unattended while it is heating up.



The upper and lower emitters on the units become extremely hot during operation. Flammable items, fluids and gases must be kept beyond the operating range of the unit! Never allow skin, or materials that are susceptible to heat damage, to touch the hot parts of the casing!
The heat energy in the upper and lower emitters is sufficient to inflict severe burns to hands only a few minutes after the unit has been switched on. Allow the unit to cool down before transportation!



A Class II semiconductor laser is used in tandem with the laser positioning aid. Never look directly into the laser beam. It could damage your eyesight.



Only experienced and qualified electrical specialists may carry out repairs. The unit contains high-voltage wiring and cables. Incorrectly performed repairs will endanger life!



Example videos

- <https://www.youtube.com/watch?v=TobU9ugwY1g>
- <https://www.youtube.com/watch?v=U55j58rIsyw>
- The best one: <https://www.youtube.com/watch?v=q--U1axjD74>

GranaSAT Soldering guides

- <https://granosat.ugr.es/2017/07/27/soldering-facilities/>



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