# CSI 720
## Focused Infrared Welding System

## INSTRUCTION MANUAL

Thank you for purchasing CSI 720 Focused Infrared Welding System.
It is important to read the manual before using the equipment.
Please keep manual in accessible place for future reference.

This manual is designed to familiarize the technician with the proper operation and maintenance of the equipment. The "Care and Safety Precautions" section explains the hazards of using any type of soldering or reworking device. Please read carefully and observe the guidelines in order to maximize usage and minimize the risk of injury or accidents .

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# FREQUENTLY ASKED QUESTIONS (FAQ)

**1.) What IR solderlight tool temperature should I use?**

Between 180-380°C. Only increase the IR solderlight tool temperature after you have increased the pre-heater to the required temperature. Always preheat the PCB (between 30 and 90 seconds) to allow heat to conduct through the component before applying the IR solderlight tool.

**2.) What is the working distance of the IR solderlight tool and how do I move it for rework?**

Approximately 5-10mm when reworking and move up to 30mm when removing component. Use the gears attached to the device, particularly to the IR solderlight tool, to adjust the distance.

**3.) What back heat setting should I use?**

Generally 180°-200°C set on the pre-heater is a good starting point. The system is already configured to pre-heat at 200°C. With the correct pre-heater setting, the top of the PCB will reach approximately 120-140°C in about 60-120 seconds.

**4.) Why do I need the welding goggles?**

The goggles has two important functions: one is to let you view the focused infrared light for precision soldering. The other is to protect your eyes from harmful effects brought by IR exposure.

## BASIC TROUBLESHOOTING GUIDE

### PROBLEM 6: SOLDERING TEMPERATURE PANEL DISPLAYS UNKNOWN CHARACTERS

**DESCRIPTION:** After switching the soldering iron button, C10, the soldering temperature display panel shows "350C" shortly then produces three short beeps or three consecutive high pitch sounds. The panel will then display unknown characters as illustrated below.



**SOLUTIONS:**
1. Check the connection of the soldering tip. Tighten if it is loosely connected. OR,
2. The soldering tip may have been damaged and needs to be replaced.

### PROBLEM 7: DISPLAY AND OTHER DEVICE OPERATION ISSUES

**SOLUTION:** Try to press the "RESET" button on the device. Note that resetting the device will also reset all previously defined configurations.
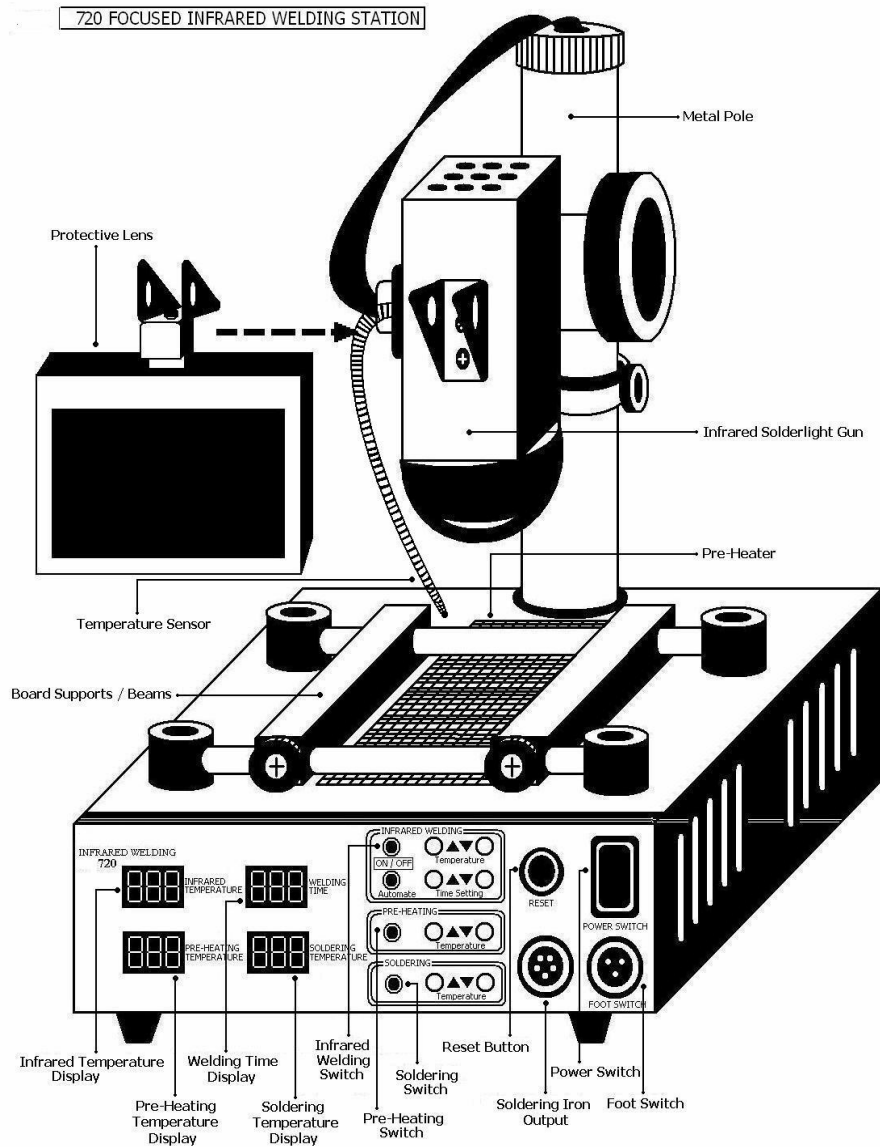
### OTHER PROBLEMS NOT MENTIONED:

Contact the vendor.

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# PRODUCT ILLUSTRATION



720 FOCUSED INFRARED WELDING STATION

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INFRARED WELDING 720

INFRARED TEMPERATURE

WELDING TIME

PRE-HEATING TEMPERATURE

SOLDERING TEMPERATURE

INFRARED WELDING
ON / OFF
Automate
Temperature
Time Setting

PRE-HEATING
Temperature

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Temperature

RESET

POWER SWITCH

FOOT SWITCH

Infrared Temperature Display

Welding Time Display

Infrared Welding Switch

Reset Button

Power Switch

Pre-Heating Temperature Display

Soldering Temperature Display

Pre-Heating Switch

Soldering Switch

Soldering Iron Output

Foot Switch

# BASIC TROUBLESHOOTING GUIDE

## PROBLEM 1: THE UNIT HAS NO POWER

1. Check if the unit is switched ON.
2. Check the fuse. Replace with the same type if fuse is blown (see MAINTENANCE section).
3. Check the power cord and ensure there are no disconnections.
4. Verify that the unit is properly connected to the power source.

## PROBLEM 2: BULB ERROR

This may be caused by either a blown fuse, old or burnt lamp, corroded lamp pins or a defective lamp socket. Check the defective component and replace when necessary.

## PROBLEM 3: INFRARED LAMP IS NOT WORKING

The IR lamp has a life expectancy of 30,000 cycles or 50 hours at full power. Replace with a new lamp if it already looks burnt.

## PROBLEM 4: POOR INFRARED LIGHT OUTPUT

Check the lamp pins and socket for corrosion. Residue on the lamp pins may prevent proper contact between the lamp pins and the lamp socket. Remove the lamp and clean the pins lightly with abrasive paper.

## PROBLEM 5: PRE-HEATER MALFUNCTIONS

This may be caused by either a blown mains or a problem with the connections. Check if the pre-heater is properly connected to the (main unit) controller.

# REWORKING TIPS

- Use flux gel. The gel will turn into fluid/liquid to indicate that the PCB is already pre-heated. The heat from the IR solderlight tool may then be applied. Using flux gel also helps in protecting and securing proper placement of components.
- The longer the component or the PCB is pre-heated, the less top heat is required to do the rework.
- When the solder is fully molten, tap the PCB and watch the surface tension of the solder draw the component into perfect alignment.

> **REMINDER:** Always wear welding goggles OR secure the protective lens when reworking.

## REMOVING OR REPLACING A COMPONENT

- Apply flux to solder joints.
- Pre-heat: Wait 30 to 90 seconds for the flux to turn into liquid.
- Reflow: Use the IR solderlight tool (there will be two bursts of smoke (flux flumes), and on the second one, you should have reached reflow).
- Remove component with the IR solderlight tool raised about 30mm above the component. Use tweezers or vacuum pen to pick up the component.

# PRODUCT DESCRIPTION

The CSI 720 Focused Infrared Welding System is a reworking equipment that combines soldering/desoldering feature and infrared (IR) technology in one sophisticated package. It is designed for reworking on double-sided and diverse technology printed circuit boards (PCB).

The system adapted the concept of heat energy reflow from top and bottom heat sources. The top heat is derived from a 200-Watt short-wave IR lamp while the bottom heat source delivers a maximum of 650 Watts medium wave IR. Under normal operating condition, approximately 25% of the energy is provided by the top heater and 75% of the energy is provided by the pre-heater.

Finally, the unique, innovative design with digital control panel offers precision, safety, and ease of use to meet all reworking requirements.

## FUNCTIONS and FEATURES

- Microprocessor-controlled ESD safe unit.
- Utilizes infrared heat wave technology. No conventional hot air required.
- Integrated IR solderlight tool, providing ease of use.
- Unique, innovative mechanical design for more precise soldering; eliminates the displacement of surrounding components brought by unnecessary or accidental movements during reworking.
- Widely used for reworking BGAs, micro BGAs, QFPs, PLCCs, SOICs, small SMD, and other circuit board components.
- Embedded pre-heating station for warming both surface of the PCB and eliminate the possibility of short-circuit.
- Easy-to-adjust IR and pre-heat temperatures with digital display.
- Built-in temperature sensor for stable (temperature) measurements.
- Timer functionality for automating reworking tasks under pre-defined temperature values.

## MAINTENANCE

### CHANGING THE FUSE

- Make sure the equipment is already cooled down and isolated from the main power source before changing the fuse.
- The fuse of the main unit is located at the back of the equipment, right below the power plug connector. Change the fuse by withdrawing the fuse holder then replace the fuse itself.
- Replace only with the same type, size and rating. Please refer to the table below for fuse ratings.

| Location | Rating | Size |
|----------|--------|------|
| Rear Panel | 5A, 220V | 5x20mm |
| | 8A, 110V | |

### CHANGING THE IR LAMP

- Switch OFF the unit and unplug the device from the main power source.
- Withdraw the lamp from the housing.
- Fit replacement.
- Be careful to handle only the outside edges of the glass reflector.

**CAUTION:** Avoid touching the bulb inside the lamp. The lamp may fail prematurely if the bulb inside the lamp is touched.

## MAINTENANCE

> ⚠️ **WARNING: All cleaning and/or maintenance should be performed when the equipment is switched off and disconnected from the main power source. Allow the system to cool down at room temperature to avoid burns or other damages from hot parts of the machine..**

### CLEANING

- At the end of each working day, wipe any excess flux and/or solder paste from the equipment with a clean cloth.
- Clean the exposed surfaces of the equipment using soft cloth and anti-static foam cleaner, periodically.
- Clean the lens assembly using Isopropyl alcohol.
- Make sure that lens cloth is clean. Any solid object on the cloth could scratch the glass surface and affect functionality of the device.

**CAUTION:** Do not use solvents for cleaning any part of the equipment as they may damage the finish.

## PACKAGE INCLUSION

| QUANTITY | PART DESCRIPTION |
|----------|------------------|
| 1 unit | CSI 720 Main Station |
| 1 unit | Metal pole |
| 1 unit | Foot switch |
| 1 unit | PCB holder |
| 1 unit | Infrared device |
| 1 pc | Infrared lamp |
| 1 pc | Protective lens/shield |
| 1 pc | Welding goggles |
| 1 pc | Soldering pen |
| 1 pc | LF-2B soldering tip |
| 1 pc | LF-K soldering tip |
| 1 pc | Heat resistant pad |
| 1 pc | 939 suction pen |
| 1 pc | IC extractor |
| 1 pc | Solder flux |
| 1 pc | Power cord |
| 1 pc | CSI 720 Manual |

## SPECIFICATIONS

| MAIN CONTROL | |
|---|---|
| Power Input: | Available in 110V / 220V |
| Frequency: | 50Hz |
| Total Current: | 4.6A |
| Main Control: | 390(l) x 270(w) x 92(h) mm |
| **INFRARED SOLDERLIGHT TOOL** | |
| Power Consumption: | 200W |
| Temperature Range: | 100°C - 450°C |
| Heating Element: | Halogen Light Source |
| **PRE-HEATER** | |
| Power Consumption: | 650W |
| Temperature Range: | 100°C - 500°C |
| Heating Element: | Quartz Infrared |
| **SOLDERING IRON** | |
| Power Consumption: | 70W |
| Temperature Range: | 200°C - 480°C |
| Heating Element: | Ceramic Heater |
| Output Voltage: | 24V |

## CARE and SAFETY PRECAUTIONS

⚠️ **CAUTION: Improper usage can cause injury and physical damage. For your own safety, please observe the following precautions.**

● Temperature may reach as high as 500°C when turned ON.
   - Do not touch the white ceramic heating element inside the pre-heater.
   - Do not expose naked eye to the infra-red light. This can cause serious damage of the eye.
   - Do not expose skin to infra-red light for a long period. Exposure for a long duration may damage the skin tissue.
● Secure footswitch and ensure that nothing can rest or fall on it.
● Handle with care
   - Never drop or sharply jolt the unit.
   - Contains delicate parts such as IR lamps that may break if the unit is dropped
   - Do not spill any liquid to the system.
● Do not tamper the electrical control unit or any wiring inside
● the device. This may cause severe electric shock.
● Disconnect plug from main power source if the device will not be used for a long period.
   - Turn off power during breaks, if possible.
● Allow ample time for the equipment to cool down before commencing maintenance.
● Use only genuine replacement parts. Turn-off power and let the unit cool down before replacing any component.

# TECHNICAL DESCRIPTION

### SYSTEM HEATING PROCESS

The heating process of the Focused Infrared Welding system is a combination of the IR solderlight tool and the pre-heater. The pre-heater can deliver 200° up to 480°C to the PCB, pads, and leads of the component. The IR solderlight tool further increases the temperature until reflow is reached.

### INFRARED LAMP

The 200-Watt Infrared (IR) lamp is located inside the lamp housing and clamped on a metal rod, which is secured on top of the main unit. The lamp emits short wave IR radiation at approximately 1.0 micron in wavelength.

### TOP HEAT

The top heat is produced by the IR solderlight tool. This increases while focusing the heat on the desired component being reworked. This also brings the solder joint temperature higher in order for heat to reflow.

### PRE-HEATER

The pre-heater provides and maintains distributed heat (or Back Heat) across the PCB and components prior to actual reworking. This protects the PCB from delaminating and the components from thermal shock — brought by sudden exposure to high temperature. About approximately 75% of heat energy is supplied by the pre-heater and the remaining 25% by the infrared solderlight tool.

# OPERATING PROCEDURES

### PREPARING THE EQUIPMENT

1. Place the equipment on a flat stable surface of at least one square meter and a height suitable to the user.
2. Attach the protective lens to the front of the IR solderlight tool.
3. Connect the soldering iron and foot switch as indicated from the product illustration.
4. Connect one end of the power cord to the socket found at the back of the main unit.
5. The recommended lighting condition should not be so bright such that the IR spot is still viewable by the user..
6. The electricity supply must be free from interference of other devices.

### SMD REWORKING PROCEDURE
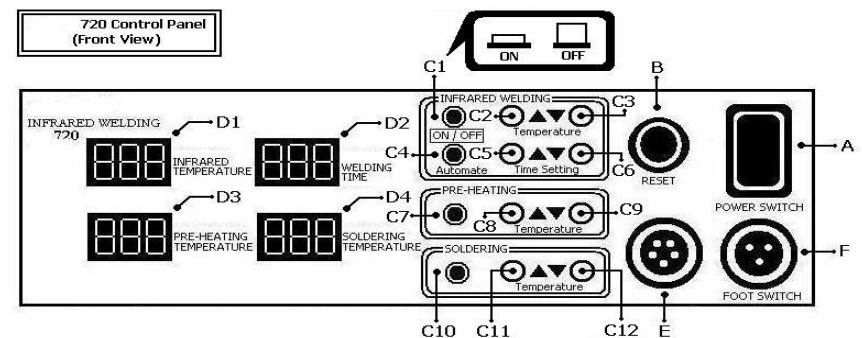


1. As soon as all the necessary components (e.g., IR solderlight tool, soldering iron, foot switch, protective lens) have been attached to the main unit, you are ready to start the reworking process.
2. Plug the equipment to the main power source.
3. Turn ON the unit using the power switch ('A' from the control panel) located at the right hand side of the front panel.

## OPERATING PROCEDURES

4. With buttons C1, C4, C7, and C10 disabled (OFF), the display panels will show the following.
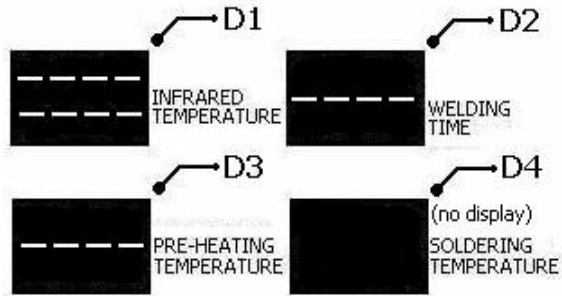


5. The PCB/component to be repaired should be placed on top of the pre-heating zone. Use the beams to hold the PCB and adjust the screws to secure the placement. Make sure that the affected component is placed at an appropriate distance, perpendicular to the IR solderlight tool. This will keep the IR light focused only to the component concerned. Move the temperature sensor tip near the component for precise temperature reading.
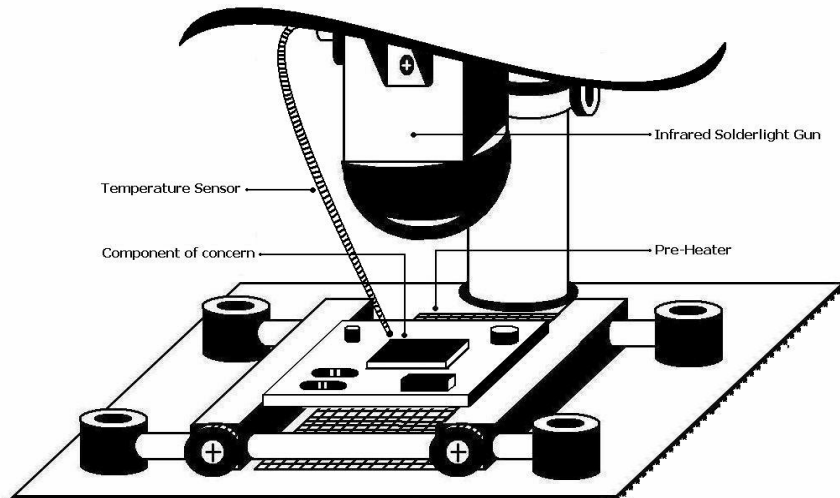
## OPERATING PROCEDURES

### USING THE SOLDERING IRON
1. With the unit switched ON and the soldering plug connected to the equipment via terminal E from the control panel, activate soldering by pushing button C10.
2. Adjust the soldering iron temperature using buttons C11 and C12.
3. Wait for a few seconds while the system is adjusting the soldering iron temperature to the desired value. You will hear a "beep" or a high pitch sound when the temperature is reached.
4. When work is finished, deactivate soldering switch.
5. Turn OFF the unit.
6. Unplug the device from the main power source.

**NOTE:** The soldering iron temperature is configurable from $200°$ to $480°C$, with $350°C$ as the default.

### USING THE FOOT SWITCH
1. Before reworking, make sure the unit is switched ON, the footswitch connected to the device via footswitch plug, F from the control panel, the PCB is properly placed on top of the equipment, and the pre-heat temperature is reached.
2. Set the temperature by temporarily activating IR welding switch, C1, and increase or decrease the desired reworking temperature using buttons C2 and C3.
3. Once temperature is set, deactivate C1.
4. Step on the foot switch to start reworking.
5. When finished, turn off the device.
6. Unplug the unit from the main power source.

**B. Automated welding using the FOOT SWITCH**

1. Before reworking, make sure the unit is ON, the footswitch connected to the device via footswitch plug, F, the PCB is properly placed on top of the equipment, and the pre-heat temperature is reached.

2. Set the temperature by temporarily activating IR welding switch, C1, and increase or decrease the desired reworking temperature using buttons C2 and C3.

3. Once temperature is set, deactivate C1.

4. Set the reworking time by selecting buttons C5 and C6 from the control panel. Note that the time is in **seconds** unit.

5. Activate automate switch, C4.

6. The countdown will start when you step on the foot switch. Releasing the footswitch, on the other hand, will hold the count. This will resume when you step on the footswitch again.

**NOTE:** Time is configurable from 20 to 9999 seconds with a 20-second increment.

**USING THE RESET BUTTON**

**IMPORTANT:** Be careful in using the RESET button as this will remove all previously defined configurations. This will also restore the system default values as follows:

|  |  |
|---|---|
| IR solderlight tool temperature: | **90°C** |
| Automate time: | **300 sec.** |
| Pre-heat temperature: | **200°C** |
| Soldering iron temperature: | **350°C** |

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6. Start the pre-heater by enabling or turning ON button C7 from the panel. The pre-heater will gradually increase the temperature to 200°C, which is the default temperature value. You may further increase or decrease the temperature by pushing buttons C8 and C9.

   **NOTE:** If the pre-heating temperature display panel, D3, shows "OFFC" during the course of pre-heating, push the RESET button, B, to show again the actual pre-heat temperature value.
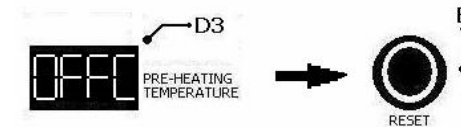


7. Once the desired pre-heat temperature is reached, you may start the IR solderlight tool. Push button C1 from the control panel to activate this. The infrared temperature display, D1, should show something like the figure below.
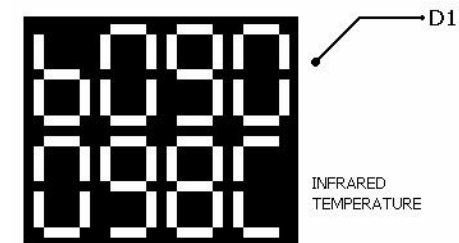


The upper half of the display indicates the default output value of the IR solderlight tool, which is 90°C. The lower half indicates the actual temperature delivered to the component. You will notice that this value will change frequently and will fluctuate a little above or below the defined temperature level. Use buttons C2 and C3 to increase or decrease the IR solderlight tool output.

After the temperature has been set, the IR solderlight tool will strike a light beam on the component for about 3 seconds and will fade afterwards. This will recur perpetually every 15 seconds until any of the following conditions is met: (1) the infrared welding switch is turned OFF by the user, OR (2) once the pre-defined automate welding time has elapsed (see "USING THE AUTOMATED WELDING FUNCTION"), OR (3) when the footswitch has been deactivated (see "USING THE FOOT SWITCH").

8. Leave the IR solderlight tool working until the component is completely desoldered or when reworking is done.
9. Deactivate the infrared welding switch, C1, when rework is completed. Note that the system will wait for the temperature to drop to 90℃ before it completely turns OFF. You will also notice a slight change on the display panel like below while the temperature is gradually decreasing (i.e., "**E**xxx" instead of "**b**xxx").
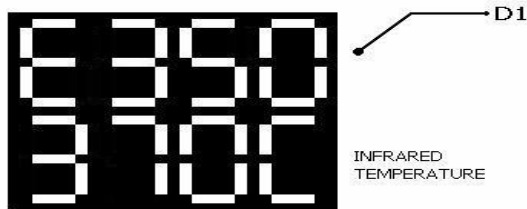


10. Deactivate the pre-heating button, C7, to cool down the pre-heating element. The panel will then show the initial display as in item number 4 once everything is settled.
11. Switch OFF the equipment using button A from the control panel.
12. Unplug the equipment from the main power source.

**REMINDERS:**
- Always place the PCB on board supports or beams, with the component positioned at the center of the pre-heater.
- Always apply flux to joints before reflow.
- Before replacing a component, check if there is enough solder on the pads to solder new component.
- When replacing a component, make sure the new component does not have any bent leads.

### USING THE AUTOMATED WELDING FUNCTION
**IMPORTANT:** The automated welding function will ONLY work if the infrared welding switch is ON **OR** when the foot switch is activated.

### A. Automated welding using INFRARED WELDING switch
1. Before reworking, make sure the unit is ON, the PCB is properly placed on top of the equipment, and the pre-heat temperature is reached.
2. Set the reworking time by selecting buttons C5 and C6 from the control panel. Note that the time is in **seconds** unit.
3. Activate the IR welding temperature using button, C1, and adjust the temperature by selecting buttons C2 and C3.
4. Activate automate switch, C4.
5. The IR solderlight tool will work until the time has elapsed.

**NOTE:**
- Time is configurable from 20 to 9999 seconds with a 20-second increment.
- The countdown will pause if C1 button is disabled while C4 is ON. It will resume once C1 is enabled again.