

THIS PRODUCT FEATURES A NEW MODULAR HANDLE DESIGN WITH PLUG-IN HEATER ELEMENT.

Weller® Tech Sheet

MODEL EC2000/EC2000D ELECTRONIC SOLDERING SYSTEM

(Consisting of EC1201P Soldering Tool and EC2002A or EC2002DA Power Unit)

PRODUCT DESCRIPTION

The EC2000 unit offers the ultimate in controlled temperature hand soldering. Tip temperature is electronically controlled throughout the specified temperature range. The unit is calibrated to within $\pm 10^{\circ}\text{F}$. ($\pm 6^{\circ}\text{C}$). Temperature setting or tip temperature is displayed on a three digit LED readout with a resolution and setability of $\pm 1^{\circ}$. Tip temperature control is maintained within specification over line voltage variations of $\pm 10\%$ and ambient temperature range of 60°F to 110°F . (15°C to 43°C).

Dynamic response to soldering load variation is insured by use of a rapid response platinum sensor and fully proportional heater control. The sensor is mounted deep inside the solid copper iron plated tip to insure quick response.

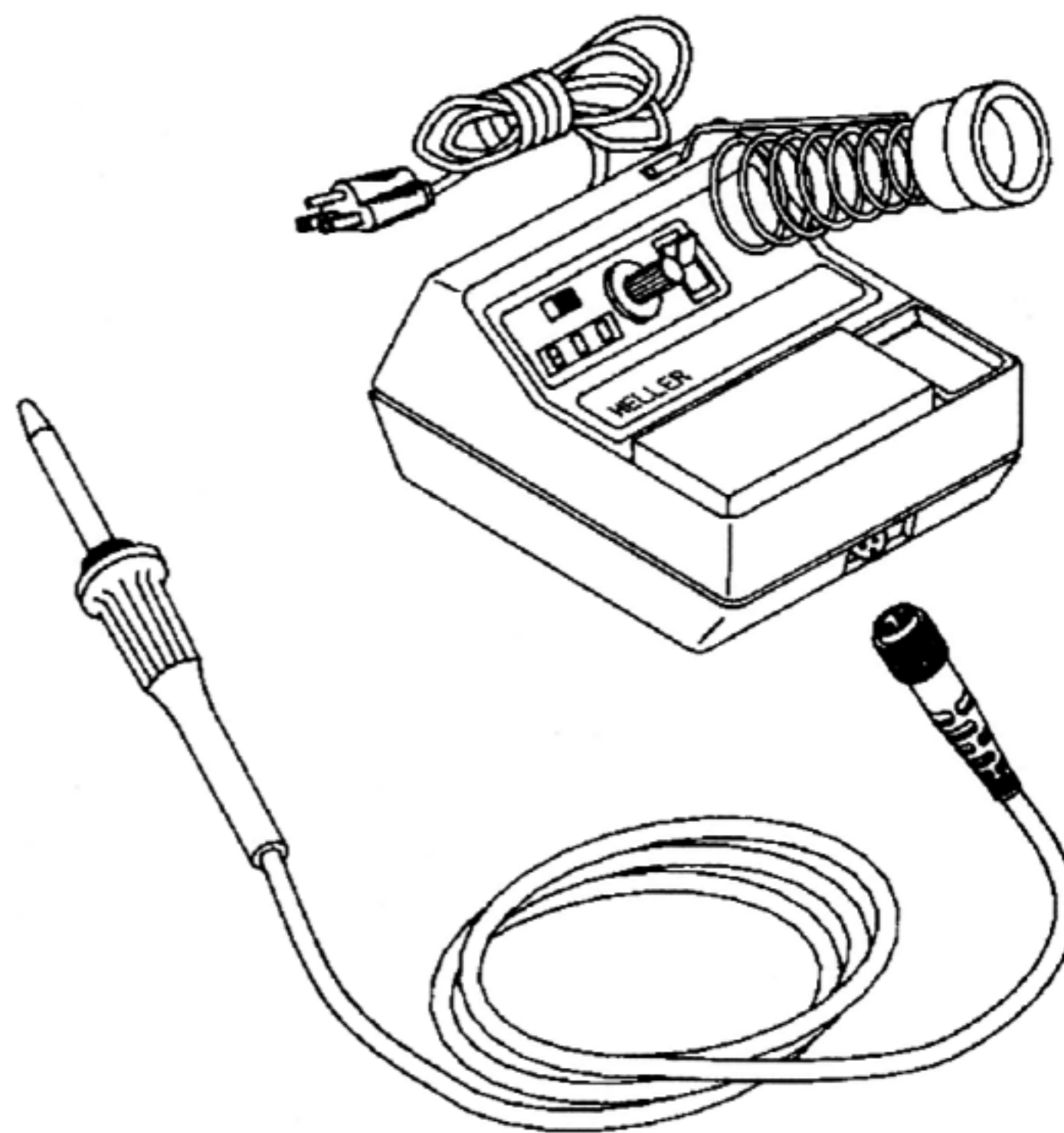
The electronic system utilizes thyristor power control with zero voltage thyristor drive. This insures that no high voltage spikes or magnetic fields will be present on the soldering tool tip. In addition, the power unit is isolated from the A. C. line by a transformer and only 24 VAC isolated voltage is used to drive the heating element. The tool tip is also grounded through the power unit three wire line cord. These features combine with the calibrated temperature control to give the ultimate in safety for sensitive, expensive electronic circuit, hand soldering.

Physically the EC2000 is divided into two units—the power unit and the soldering tool. The power unit houses the transformer, electronic circuitry, circuit breaker, digital readout, on/off switch, setting control knob, set/read switch, extra tip receptacle, soldering tool holder and tip wiping sponge. The soldering tool contains the soldering tip, stainless steel plug in heating element, platinum heat sensor, high temperature heat insulated plastic handle, non-burning silicone rubber cord and locking plug that mates with a receptacle on the power unit.

Soldering tools are interchangeable without recalibration of the unit. This is made possible by the use of a high precision platinum temperature sensor. The precision sensor also makes it possible to check the calibration and recalibrate the EC2000 using only precision resistors or potentiometers and precision resistance measuring instruments. This feature insures that the accuracy and precision of the tool can be maintained by the customer over its normal life.

A large selection of iron plated tips in sizes from $1/64''$ diameter to $3/16''$ diameter are available, however, due to the tight temperature control tolerance of this unit only certain category tips are specified for use with this tool. Other category tips may be used with only minor degradation in calibration accuracy. (See tip selection chart). The EC2000 is normally supplied with an ETA $1/16''$ screwdriver tip.

The EC2000 unit is U. L. listed or CSA certified.



EC2000/EC2000D SPECIFICATION

Power Unit EC2000

1. Power Input 120 VAC $\pm 10\%$, 60 Hz., 60 watts. (EC2000D—230 VAC $\pm 10\%$, 50/60 Hz., 60 watts)
2. Power unit output voltage: isolated 24 VAC (Full Load).
3. Size: 6¼"W x 7⅝"L x 3¾"H.
159mmW x 187mmL x 95mmH.
Not including tool holder & soldering tool.
4. Line Cord: 3 wire.
5. Tip temperature control range: 350°F (175°C) to 850°F (450°C).
6. Control setting resolution: 1°F (1°C).
7. Control accuracy: $\pm 10^\circ\text{F}$ ($\pm 6^\circ\text{C}$) of setting at idling temperature
No Load — 30 minute power unit warm-up.
60°F (15°C) to 110°F (43°C) ambient.
8. Temperature Readout Accuracy: $\pm 10^\circ\text{F}$ ($\pm 6^\circ\text{C}$) ± 1 digit.
Temperature Readout Type: .30" LED — 7 segment — 3 digit.
9. Temperature readout resolution: 1°F (1°C).
10. On/Off switch.
11. Circuit breaker with reset button.
12. Case: Flame retardant thermoplastic 94V-0 U. L. approved.

Soldering Tool

1. Wattage — 42 watts at 24 VAC.
2. Tip Voltage to Ground: Less than 2 mv
Measured from tip to line cord ground.
3. Tool Weight — 2.0 ounces (without cord).
4. Tool material: High temperature plastic & stainless steel.
5. Heater Type: Fiber glass & Ceramic Insulated, Nichrome, reverse wound for low leakage and magnetic field cancellation. Encased in 300 Series Stainless steel. Plug in type housing.
6. Tip type: Replaceable solid copper, with heavy iron, nickel & chromium plating for long life with temperature sensor receptacle. Fourteen styles available.
7. Temperature Sensor Type: Platinum R.T.D. (resistance temperature detector) probe. Fits deep inside tool tip. Precision calibrated for tool interchangeability.
Encased in stainless steel.
8. Handle Design: Heat insulated two piece design for low grip temperature, with modular heating element for replacement ease.
9. Tool Cord: Silicone rubber — Burn resistant — 4 ft.
10. Cord Connector: Special interlock five pin design for security.
11. Recovery Time: (From 100°F (55°C) drop with ETA tip at 700°F (371°C) — 10 sec.

WARNING: Do not remove ground prong from line cord plug. Removal of ground prong will cause tip temperature control to be erratic.

EC2000/EC2000D OPERATING INSTRUCTIONS

Unpack unit carefully. Place tool holder in slot provided in top of power unit. Dampen wiping sponge with water. Distilled water is preferred, especially in areas where tap water contains high mineral content. Insert soldering tool in tool holder. Insert tool plug into tool receptacle on power unit. After insertion rotate plug housing to lock plug into receptacle.

Insert line cord plug into properly grounded A. C. receptacle. Turn unit on.

EC2000 — Move "Set-Read" switch to "set" position. Rotate control knob until digital read-out reads the desired temperature. Move "Set-Read" switch to "read" position. Tip temperature is now displayed. When tip reaches 400°F (204°C), remove tool and tin the tip. When tip temperature reaches desired temperature, tool is ready for use. Knob may be locked by removing knob (Pull knob outward to remove) and tightening lock nut under knob. **DO NOT OVERTIGHTEN.**

Clean power unit case with mild detergent only. Do not use solvents.

During soldering operations, with the "Set-Read" switch in "read" position, the tip temperature as shown by the digital readout will fluctuate. This fluctuation is normal and represents the control system response to changing load. Tip selection may be optimized for a particular soldering job by observing the tip temperature fluctuations during the solder joint execution. Normally tip should be selected for minimum fluctuation. This will give the fastest joint, however, some applications may require fast response at low or high temperature with total maximum fluctuation not critical. In critical applications the EC2000 allows the user to optimize the tool for the job.

CAUTION: Do not operate tool without tip in place. Heater will be ruined. Tool life is an inverse function of the number of temperature cycles and the range of those cycles. Therefore, avoid switching the unit off unnecessarily.

EC2000/EC2000D POWER UNIT CALIBRATION CHECK

The EC2000 uses a high precision temperature sensor and therefore, soldering tools are interchangeable and cannot be calibrated. The power unit is factory calibrated and should not require recalibration. However, the power unit calibration may be easily checked using the following procedure: Two precision resistors, resistor A, resistor B, and a 13 ohm, 40 watt load w/indicator lamp are required.* Attach resistors and lamp to 15 Ga. (.057 dia.) insert pins. (Don't use long wire). Refer to the wiring diagram fig. for pin numbers and locations. Refer to tip table for resistor A and B values. A calibration reference unit (WC1000) is available as an accessory where frequent calibration is required. Refer to replacement parts list.

CAUTION: Momentary contact with receptacle pins other than those indicated may damage the electronic components. To eliminate this, turn unit off when removing or inserting resistors or indicators. Momentary shorts when connecting probes to test points will cause permanent damage to circuit components.

EC2000/EC2000D

NOTE: Allow the unit to run a minimum of 30 minutes at 750°F (400°C) just prior to checking the calibration.

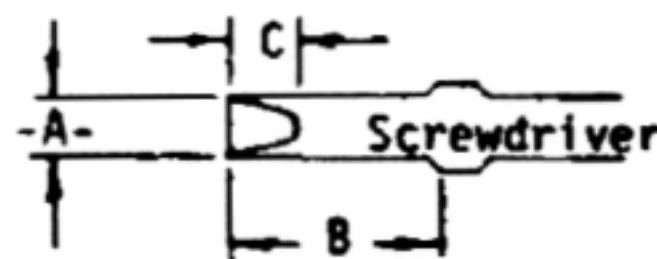
1. Remove soldering tool plug and insert resistor A in pins 3 and 4 and lamp in pins 1 and 2 of power unit tool receptacle. Connect power unit to A.C. power supply (117 ± 3 VAC) (230 ± 6 VAC).
2. Turn power unit on and move set-read switch to read. Turn Temp. set full CCW. Digital display should read $403^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($206^{\circ}\text{C} \pm 3^{\circ}\text{C}$). Note the reading.
3. Move Set-Read switch to Set. Rotate setting knob CW until display reads 70°F (39°C) above the value noted in step 2. Lamp should be on. Rotate setting knob slowly CCW until lamp just begins to flash. The display should read the value in step 2 plus approximately 30°F (16°C).
4. Rotate setting knob until lamp stops flashing and goes out. The display should read the value noted in step 2 $\pm 5^{\circ}\text{F}$ ($\pm 3^{\circ}\text{C}$).
5. Replace resistor A with resistor B. Move Set-Read switch to Read. Display should read $758^{\circ}\text{F} \pm 10^{\circ}\text{F}$ ($403^{\circ}\text{C} \pm 6^{\circ}\text{C}$). Note the reading.
6. Move Set-Read switch to Set. Rotate setting knob until display reads 70°F (39°C) above the value noted in step 5. Lamp should be on. Rotate knob slowly CCW until lamp just begins to flash. The display should read the value noted in step 5 plus approximately 30°F (16°C).
7. Rotate setting knob slowly until lamp just stops flashing. The display should read the setting noted in step 5 minus $16^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($9^{\circ}\text{C} \pm 3^{\circ}\text{C}$) (Total range of this reading is 727°F to 757°F (372°C to 389°C)).

* The 13 ohm, 40 watt load may be a resistor with a 24 volt lamp connected in parallel across it. Alternatively, the EC1201P iron may be used in place of the 13 ohm resistor by using short jumper leads from pins 1 and 2 of the receptacle to pins 1 and 2 of the iron plug; however, the EC1201P iron can be damaged from overheating if the unit is allowed to run with set control above 400°F (204°C) for extended periods with calibration resistors inserted in receptacle.

SELECTION OF WELLER ET SERIES TIPS

Weller ET tips are solid copper, plated with iron, nickel and chromium. The nickel and chrome are removed in the working area and the tips are pretinned with tin/lead solder. The nickel and chromium protects the shank from corrosion and solder creep. The Weller electronic units use ET series tips. These tips are designed to mate with the sensor probe. Due to the difference in length and mass of some tips, the unit calibration is slightly affected. When using ETA, ETB, ETC, ETH, ETP, ETD, ETCC, and ETDD no change in calibration will be required. When using ETL, ETM, and ETR the tip temperature will be 15°F (8°C) cooler than the setting at 850°F (454°C). The ETK, ETS, and ETO tips will be 25°F (14°C) cooler than the setting at 850°F (454°C). The error will be less at lower temperatures, however, the unit may be recalibrated to normal specifications with these tips. Refer to Recalibration Procedures and tip table below for calibration resistors to be used for optimum calibration of each style tip. **Use only original Weller soldering tips, parts and accessories for this product.**

TIP TABLE



GRAPHIC VIEW	CATALOG NUMBERS	DESCRIPTION	DIMENSIONS			CALIBRATION RESISTORS	
			-A-	-B-	-C-	-A-	-B-
	ETA	SCREWDRIVER	1/16	5/8	3/32	36.4 ± 1 ohm	51.4 ± 1 ohm
	ETB	SCREWDRIVER	3/32	5/8	3/32		
	ETC	SCREWDRIVER	1/8	5/8	1/8		
	ETD	SCREWDRIVER	3/16	3/4	3/16		
	ETH	SCREWDRIVER	1/32	5/8	1/8		
	ETP	CONICAL	1/32	5/8	—		
	ETCC	SINGLE FLAT	1/8	5/8	3/32		
	ETDD	SINGLE FLAT	3/16	3/4	3/16		
	ETO	LONG CONICAL	1/32	1	—	36.7 ± 1 ohm	52.3 ± 1 ohm
	ETS	LONG CONICAL	1/64	1	—		
	ETK	LONG SCREWDRIVER	3/64	1	7/16		
	ETL	LONG SCREWDRIVER	5/64	1	1/2	36.6 ± 1 ohm	51.8 ± 1 ohm
	ETM	LONG SCREWDRIVER	1/8	1	3/4		
	ETR	NARROW SCREWDRIVER	1/16	5/8	1/8		

CARE OF WELLER ET SERIES TIPS

1. Keep tip tinned; wipe only before using.
2. Use rosin or activated rosin fluxes. Acid type fluxes will greatly reduce tip life.
3. Remove tip and clean with suitable cleaner for flux used. The frequency of cleaning will depend on the type of work and usage. Tips in constant use should be removed and cleaned at least once a week. Corrosion between tip and sensor can cause erratic temperature control.

WARNING:

If tip does not remove easily do not force it. The platinum sensor will be damaged. Try removing the tip while heated. If this does not work, return tool to Weller service.

When installing new tips, tips should slide freely over stainless steel probe.

4. Don't try to clean tip with abrasive materials and never file tip; to do so will greatly reduce tip life. Tip wettability is affected by contact with organics, such as, plastic resins, silicone grease, and other chemicals. If the tip becomes unwettable it may be cleaned hot with a soft steel or brass wire brush using solder flux as a solvent. Do not overdo this or the iron plating will be removed and the tip ruined. Retin tip immediately to prevent oxidation.
5. Don't remove excess solder from heated tip before storing. The excess solder will prevent oxidation of the wettable surface when tip is reheated.
6. Do not use any compound or anti-seize material on Weller tips or sensor probe. They will cause wettability problems and may cause seizing after long heated periods.

EC2000/EC2000D POWER UNIT RECALIBRATION PROCEDURE

The following calibration procedure requires the parts used for the calibration check, or a WC1000 Calibration Reference Unit, and an accurate, high impedance voltmeter. A. C. power should be held at $117 \text{ VAC} \pm 3 \text{ VAC}$ ($230 \pm 6 \text{ VAC}$). (Refer to wiring diagram for component locations).

NOTE: If a factory calibrated replacement control board is being installed, do only display board adjustments. Connect resistor B between pins 3 and 4, lamp and load between pins 1 and 2 and follow steps 8 - 15 below for EC2000D (for units calibrated in centigrade). Follow steps 10-15 for EC2000 (for units calibrated in fahrenheit).

1. Disconnect unit from A. C. power line. Remove the case bottom by removing screw in each corner. Set the unit upside down with the receptacle toward you.
2. Connect voltmeter between test point 13, positive lead, and R6 on the control board.
3. Connect resistor B, in series with a 50 ohm multiturn potentiometer, between pins 3 and 4 (gold pins) and the lamp and load to pins 1 and 2 of the receptacle.

WARNING: Power line voltage is present in the left half of the unit case when the unit is connected to the power line even if the unit is off.

4. Connect unit to A. C. power and switch on, turn temp. set control full CCW. Allow 30 minutes for warmup. Adjust the 50 ohm potentiometer for a zero reading on the voltmeter. Use most sensitive scale to get the best possible zero reading. If a zero reading cannot be obtained, set R15 on control board to mid-range and adjust the 50 ohm potentiometer for a zero reading.
5. Move voltmeter negative lead to test point 4. Note the reading and subtract 2.450 volts.
6. Remove resistor B and insert resistor A, in series with the 50 ohm potentiometer, between pins 3 & 4 of the receptacle. Adjust R14 on control board for the reading calculated in step 5, $\pm 7 \text{ mv}$.
7. Remove resistor A and the 50 ohm potentiometer. Insert resistor B between pins 3 & 4 of the receptacle. Adjust R15 on control board for 5.250 volts, $\pm 7 \text{ mv}$.
8. Connect a jumper between test point 2 and the black wire on display board. Adjust R27 on display board for 000 display (-18 for EC2000D) Remove jumper.
9. Connect voltmeter to test point 2, positive lead, and black wire on display board. Move "SET - READ" switch to "READ". Adjust R23 on display board for 999 mv on the meter. Adjust R26 on display board until display corresponds with the number of millivolts read on the meter ($999 \text{ mv} = 999$). ($999 \text{ minus } 18 \text{ mv} = 981$ for EC2000D). Remove voltmeter.
10. Adjust R23 on display board for a reading of 758°F , (403°C).
11. Rotate temp. set control fully CW and then slowly CCW until the lamp just stops flashing.
12. Move "SET - READ" switch to "SET" position. Adjust R25 on display board for a reading of 742°F , (394°C).
13. Rotate temp. set control fully CW. Adjust R16 on control board for a reading of 875°F , $\pm 5^{\circ}\text{F}$, (468°C , $\pm 3^{\circ}\text{C}$).
14. Rotate temp. set control fully CCW. Adjust R17 on control board for a reading of 340°F , $\pm 5^{\circ}\text{F}$ (171°C , $\pm 3^{\circ}\text{C}$). Repeat steps 13 & 14 until no adjustment is necessary.
15. Replace case bottom. Do not over tighten screws, case may be damaged. If unit does not perform properly, refer to troubleshooting procedures.

NOTE: R4 is factory set and sealed and should not be adjusted.

EC2000 POWER UNIT TROUBLESHOOTING GUIDE

WARNING: AC line voltage is present inside power unit even when power switch is off. Refer service to qualified personnel.

Note: Access to internal parts may be gained by removing four bottom screws and removing bottom case.

I. Tool does not heat

A. Display not illuminated.

1. Reset circuit breaker.
2. Check power line for correct voltage.
3. With power switch in **ON** position, measure resistance of primary circuit, 12-15 ohms at line cord blades.
 - a. Line cord open — replace.
 - b. Switch defective — replace.
 - c. Transformer primary open — replace.
4. Test for 26 VAC $\pm$ 2V (117 VAC line voltage) at TP1 on control board and yellow **transformer** lead on circuit breaker.
Replace transformer.
5. Test for 26 VAC $\pm$ 2V between TP1 and TP4 on control board.
Replace circuit breaker.

B. Display Illuminated.

1. Troubleshoot EC1201P tool.
2. Test for 26 VAC $\pm$ 2V between TP1 and TP4 on control board.
3. Check continuity from receptacle pins to control board.
4. Repair or replace receptacle/leads.
5. With tool attached — check for 26V $\pm$ 2V at heater terminals (yellow leads) on control board.
Replace control board.

II. Tool overheating

A. Troubleshoot EC1201P—See EC1201P Trouble Shooting guide.

B. Rotate control full CCW.

1. Tool stops overheating—check calibration. Recalibrate or replace control board.
2. Tool still overheats—replace control board.

III. Display problems

A. No display or low brightness display.

1. Test blue & black wire for 9 - 10 VAC (117 VAC line voltage) on display board—replace transformer or check wiring.
2. 9 - 10 VAC present—replace display board.

B. Missing segments or numerals in LED display.

1. Replace display board.

C. Display readings not correct.

1. Check calibration or recalibrate. (See calibration procedures).
Replace display board.

D. Display readings unsteady.

1. Check for steady readings on "Set".
 - a. Steady on "Set", unsteady "Read"—check EC1201P for defects.
2. Unsteady on both "Set" & "Read".
 - a. Check AC line for excessive noise.
 - b. Low line voltage.
 - c. Replace display board.

IV. High tip voltage or indication of circuit component damage.

A. Check EC1201P tool per step 3 of EC1201P troubleshooting guide.

B. Check continuity from pin 5 of tool receptacle to line cord ground pin—1 ohm max. Remove case bottom and check green wire continuity from line cord—Replace line cord.

EC1201P SOLDERING TOOL TROUBLESHOOTING GUIDE*

CAUTION: Disconnect from power supply before attempting repairs.

I. Tool does not heat—power unit tests good.

A. Check resistance—Pin 1 to Pin 2, 12-14 ohms.

Pin 5 to barrel, 1 ohm max.

1. Replace heating element. Remove two screws from element flange. Grasp handle and black heat insulator in one hand and pull heater unit with other hand to unplug it from the handle assembly. Check resistance at element pins. Two closely spaced pins should show 12-14 ohms, grd. pin should show less than 1 ohm.

If element checks good, proceed to step B, 1.

If element checks bad, replace with new element.

B. Check resistance—Pin 3 & Pin 4, 21-27 ohms.

Also check resistance—Pin 3 to Pin 5 and Pin 2 to Pin 5, 10 megohms minimum.

1. If tool fails above test—Disassemble tool as follows.

a. Place tool on workbench with flat at rear of handle up.

b. Insert 3/16" flat blade screwdriver into slot at rear of handle. Compress cord by pushing downward and toward handle until cord is pushed into handle (do not pry on handle). This releases the strain relief catch. Slide handle down cord to expose sensor connections.

c. Check resistance—Black lead on sensor assembly to Pin 3—0.3 ohm max.—and red lead on sensor assembly to Pin 4—0.3 ohm max. If resistance is higher, repair or replace the cord connector assembly.

d. If measurements in step c. above are correct, unsolder black & red leads from sensor assembly. Remove sensor by pushing sensor out of heat insulator until spring snaps out of retaining groove in sensor body. Replace sensor by inserting sensor fully into heat insulator and forcing spring into retaining groove in sensor body. Resolder black & red wires to sensor terminals.

e. To replace line cord, grasp black wire with pliers, restrain heat insulator, and pull sharply to remove crimp receptacle from insulator. Repeat for white and green wires (crimp receptacles will be damaged by this, new crimp connectors are supplied with replacement cords). Discard old cord and thread blue handle over new cord. Insert crimp terminals into heat insulator (black and white wires in closely spaced (holes) with anti-rotation tabs on crimp terminals toward center of tool (terminals will not insert otherwise).

f. Install strain relief by forcing the two strain relief parts together on the cord 4.5" from flange with flat side of strain relief clamp aligned with one of the screws in the heat insulator. Gently pull handle up over sensor until it engages heat insulator. Align heat insulator screw holes with screw bosses in handle. Heat insulator is keyed such that it will not go in unless it is rotated to the proper position. Align strain relief flat with handle stop bar by looking into the small end of the handle. Pull cord evenly until strain relief snaps in place. If this cannot be accomplished, the strain relief may not be latched together properly on the cord or it is not aligned with the handle properly.

g. Install two #2x1" screws in flange. Do not overtighten. Check sensor freedom by removing tip barrel and checking tip for at least 1/16" spring action before bottoming in heater barrel.

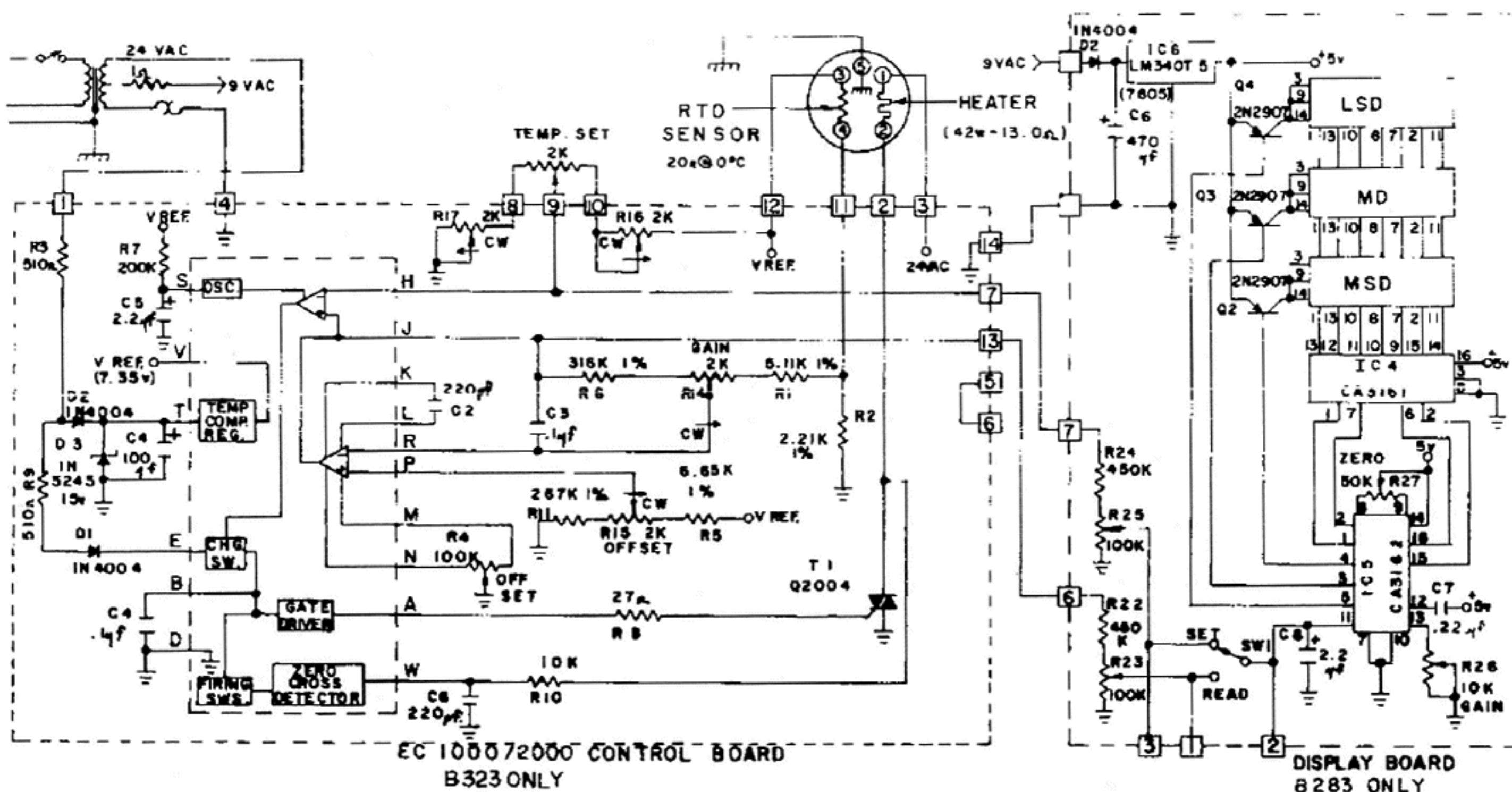
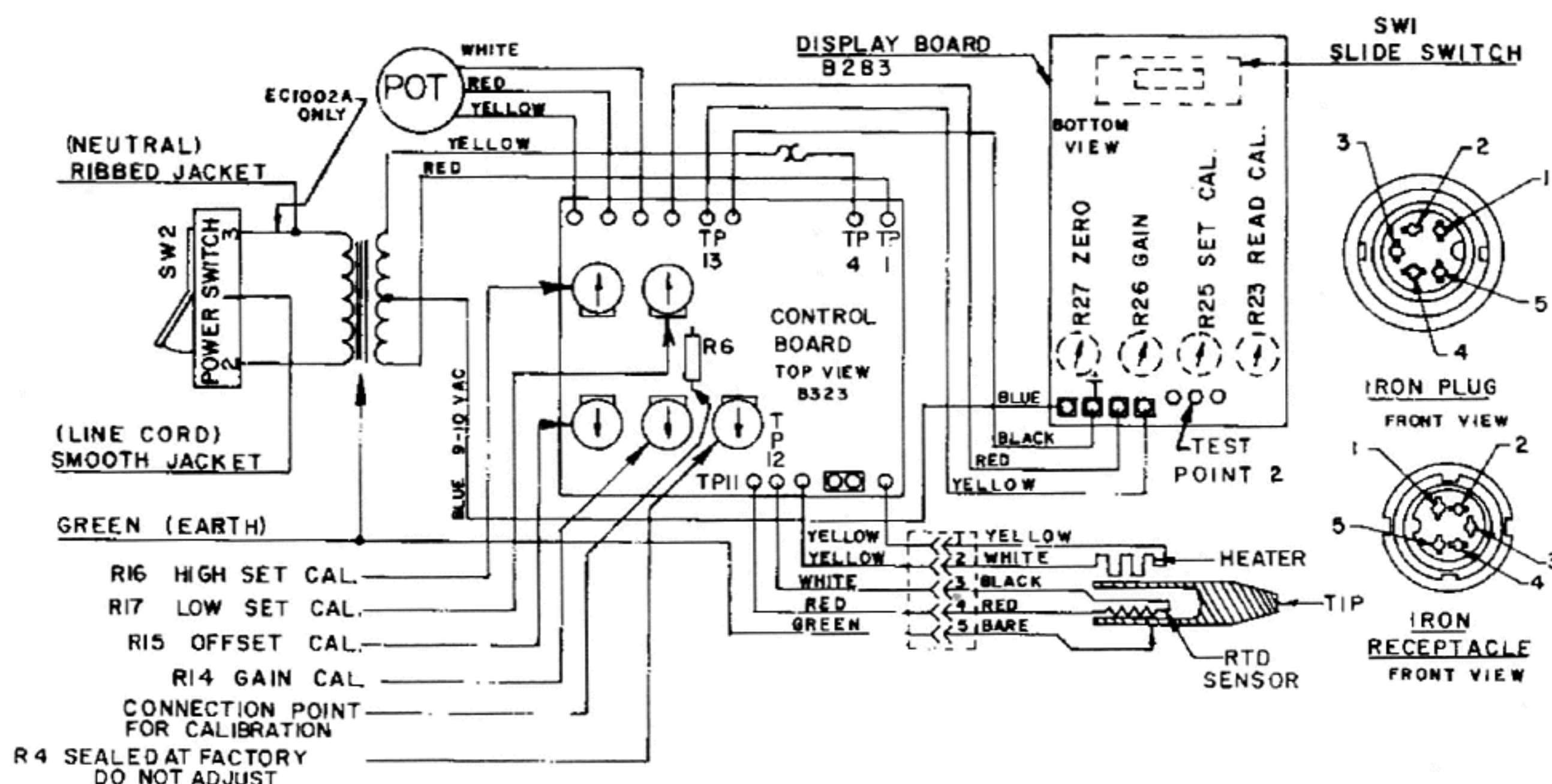
II. Tool Overheating—Note: Tool will overheat with tip removed. If Pin 3 to Pin 4 of tool receptacle is less than 21 ohms, sensor or sensor wiring is shorted. Refer to I.B.1.b. for disassembly and check sensor resistance at sensor terminals with wires removed. Replace sensor or cord.

III. High voltage on tip—Indication of circuit component damage.

A. Check tip ground for maximum 1 ohm resistance from heater barrel to connector pins.

B. Remove heating element (Step I.A.1.). Check ground pin to barrel and pin 5 to receptacle in heat insulator.

* For use with plug-in heating element tool only.



CUSTOMER SERVICE

Should your EC2000/EC2000D require repair or adjustment it may be sent to the following address:

COOPER GROUP — WELLER PLANT

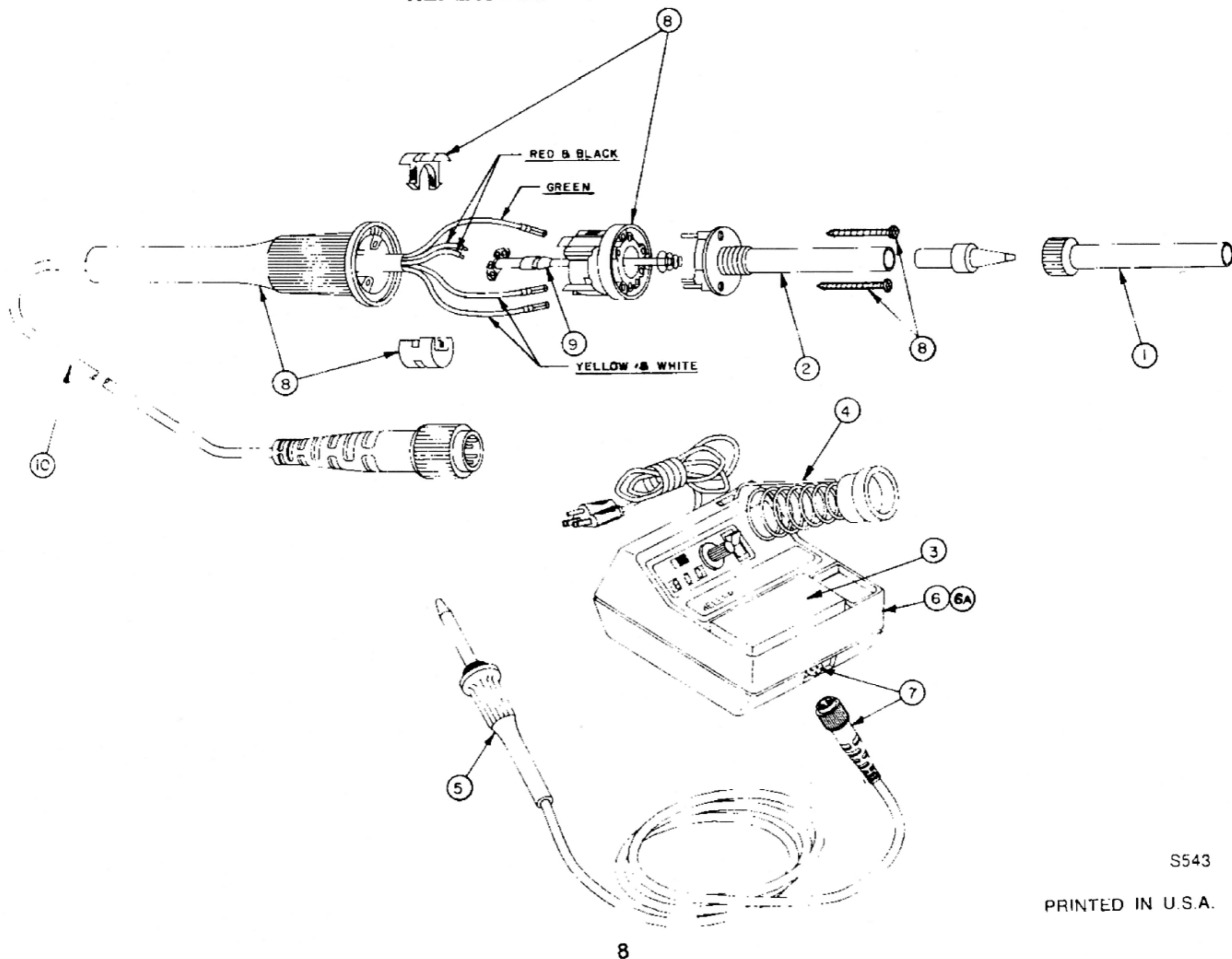
State Road
Cheraw, SC 29520
Attn.: Repair Dept.

REPLACEMENT PARTS FOR EC2000/EC2000D

(Please state product model number when ordering)

KEY NO.	PART NO.	DESCRIPTION
1	BA60	Barrel Nut Assembly
2	EC234	Heater Assembly
3	EC205	Sponge
4	TC204	Iron Holder w/Funnel
5	EC1201P	Soldering Tool w/ETA Tip
6	EC2002A	Power Unit Only, 120V
6a	EC2002DA	Power Unit Only, 240V.
7	EC213	Plug Receptacle Kit
8	EC232	Handle Assembly
9	EC229	Sensor Assembly w/Spring
10	EC233	Cord Assembly
Not Shown	EC214	Control Board Complete w/Control Potentiometer and Receptacle—Calibrated
Not Shown	EC210	Display Board—Partially Calibrated
Not Shown	EC215	Power Transformer, 120V.
Not Shown	EC212	Circuit Breaker
Not Shown	EC219	Switch
Not Shown	EC216	Power Transformer, 240V.
Not Shown	WC1000	Calibration Reference Unit

REPLACEMENT PARTS ILLUSTRATIONS:



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