



I. SYSTEM INVENTORY

- A. Base Unit
- B. One (1) foot pedal
- C. Laser pointer assembly
- D. Power cord
- E. Blow-through nozzle assembly (Model GW-10A only)
- F. Solder nozzle

NOTE: Any section referring to blow-through (blowoff) nozzle pertains only to systems with that option included.

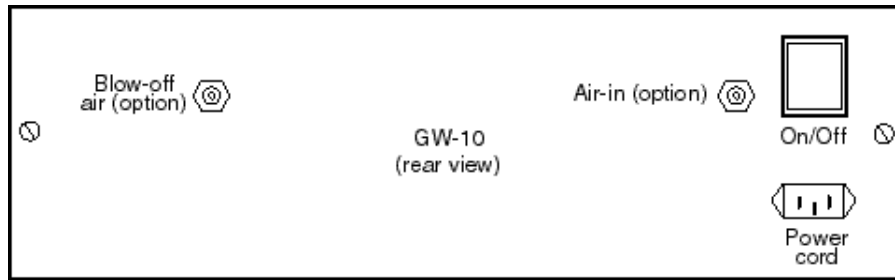
II. UTILITIES

Electrical Power STD: 120VAC, 60 Hz, 20 Amps max
optional 220 VAC, 50 Hz, 10 Amps max
Compressed Air Option (clean, dry air) 50-100 psi, 1 CFM
Solder Capacity 50 lbs (23 Kg)approx.

WARNING

FAILURE TO READ AND FOLLOW THESE INSTRUCTIONS IN THEIR ENTIRETY PRIOR TO INSTALLATION AND OPERATION MAY VOID WARRANTY AND RESULT IN PERSONAL INJURY AND DAMAGE TO PROPERTY! Be sure that all personnel who are to operate this machine are first fully familiar with this manual and are instructed on proper safety procedures, practices and precautions.

CAUTION SHOULD ALWAYS BE USED WHEN SYSTEM IS IN OPERATION DUE TO HIGH TEMPERATURE!



Rear view of base unit

Fig. 1

V. INSTALLATION & SET-UP (Refer to Figs. 1, 2 & 3)

A. Placement of the unit:

The GW-10 needs a stable benchtop for set-up. **Important**, Using a horizontal bubble level, adjust the four leveling feet until the machine is properly leveled.

Refer to figures 1, 2 and 3 for set-up.

B. Attach laser light locator assembly and tighten all joints with set screws provided Ensure that laser light locator beam centers in wave solder nozzle.

C. Connecting to Power: Electrical connection should be made by qualified electrician.

D. Attach appropriate solder nozzle and turn to secure. (see fig. 3.)

C A U T I O N !

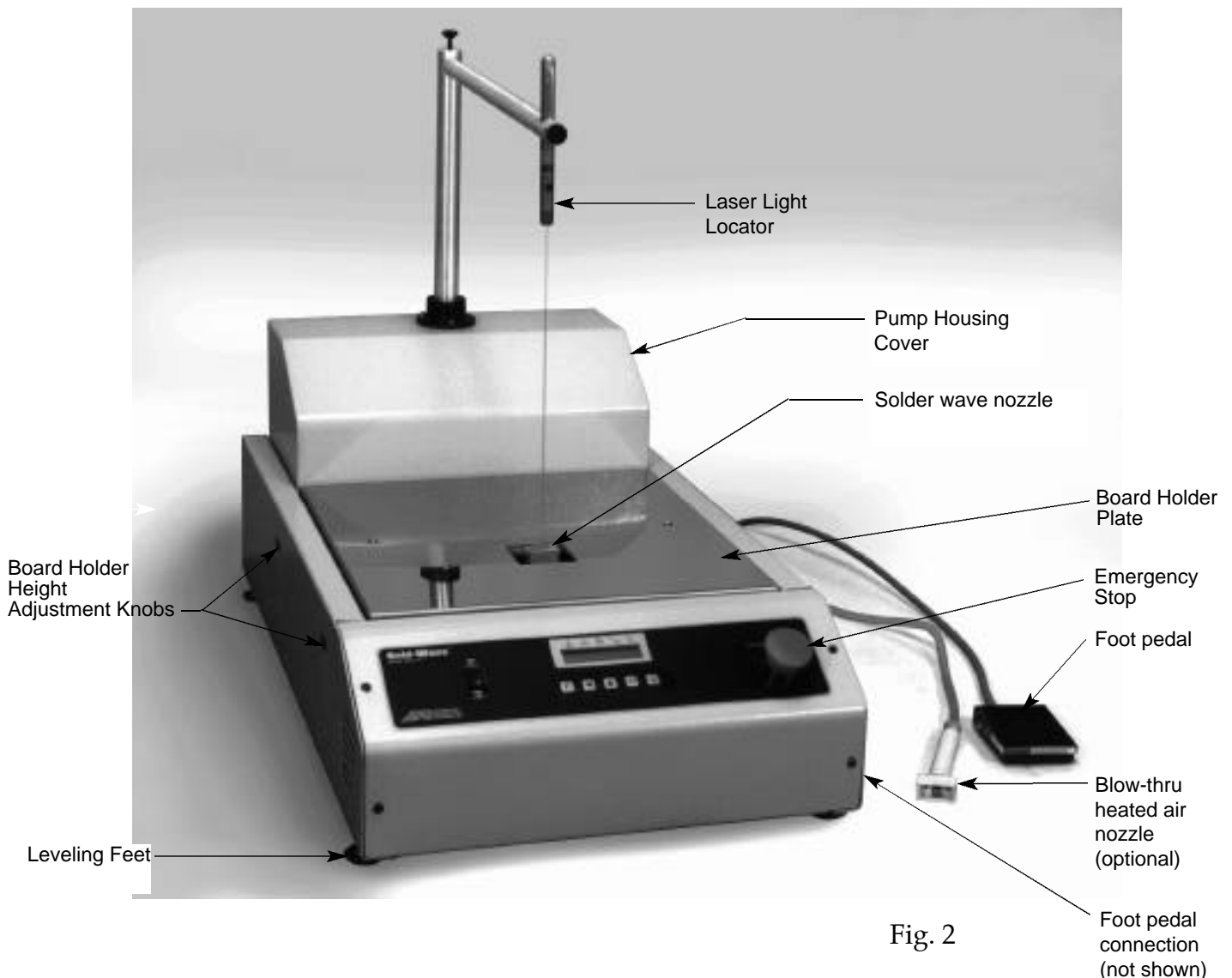
Do not turn on solder heater until solder pot is filled with solder.

E. Attach foot pedal to connector at front right side of machine.

F. Initial Filling of Solder:

1. Remove board holder plate, and top insulation.
2. High purity virgin solder is recommended for good solderability. During initial solder charge, small solder chunks should be used to line the bottom and sides to avoid burn-out of elements. Larger solder bars or sticks may then be added to speed up loading.
3. The heater elements are located at the bottom of the solder pot. Ensure that the solder is nicely packed around the entire bottom surface.
4. When the solder melts, the level of solder will be below the top edge of the solder pot. Add more solder to raise the solder level to about 1/4 in. (6.35 mm) from the top edge of the solder pot.

5. When solder falls below recommended level, add solder until the proper level is reached.
 6. Replace top insulation, and board holder plate.
 7. Turn machine ON at rear of unit: When machine is first turned on, display will show RUN mode and program (00) will show factory set parameters. Heating elements will begin melting solder to set temperature. (Refer to sec VI.)
- G. Option: If equipped with heated blowoff option (model GW-10A), attach shop air and blowoff nozzle assembly to rear of unit (refer to Fig.1)



INSTALLING OR CHANGING THE NOZZLE:

CAUTION: SOLDER IS HOT!

CAUTION: USE SAFETY PRECAUTIONS WHEN PERFORMING THIS OPERATION. USE SAFETY GLASSES, FACE SHIELD, HIGH TEMPERATURE GLOVES, & APRON.

CAUTION : Nozzle must be completely dry of any moisture (from cleaning etc.) prior to immersing in solder bath.

1. Using high temperature gloves, lift off Board Holder Plate to access solder.
2. IMPORTANT! Ensure nozzle is completely dry of any moisture! It is recommended that nozzles recently washed may be preheated at temperatures up to 200° F (94° C) in order to expedite the drying process.
3. Using pliers, place nozzle in molten solder for at least 2 minutes before installing on high pressure chamber Bayonet -Mount.
4. Using pliers, install nozzle on Bayonet-Mount at pressure chamber.
5. Replace Board Holder Plate before using nozzle.

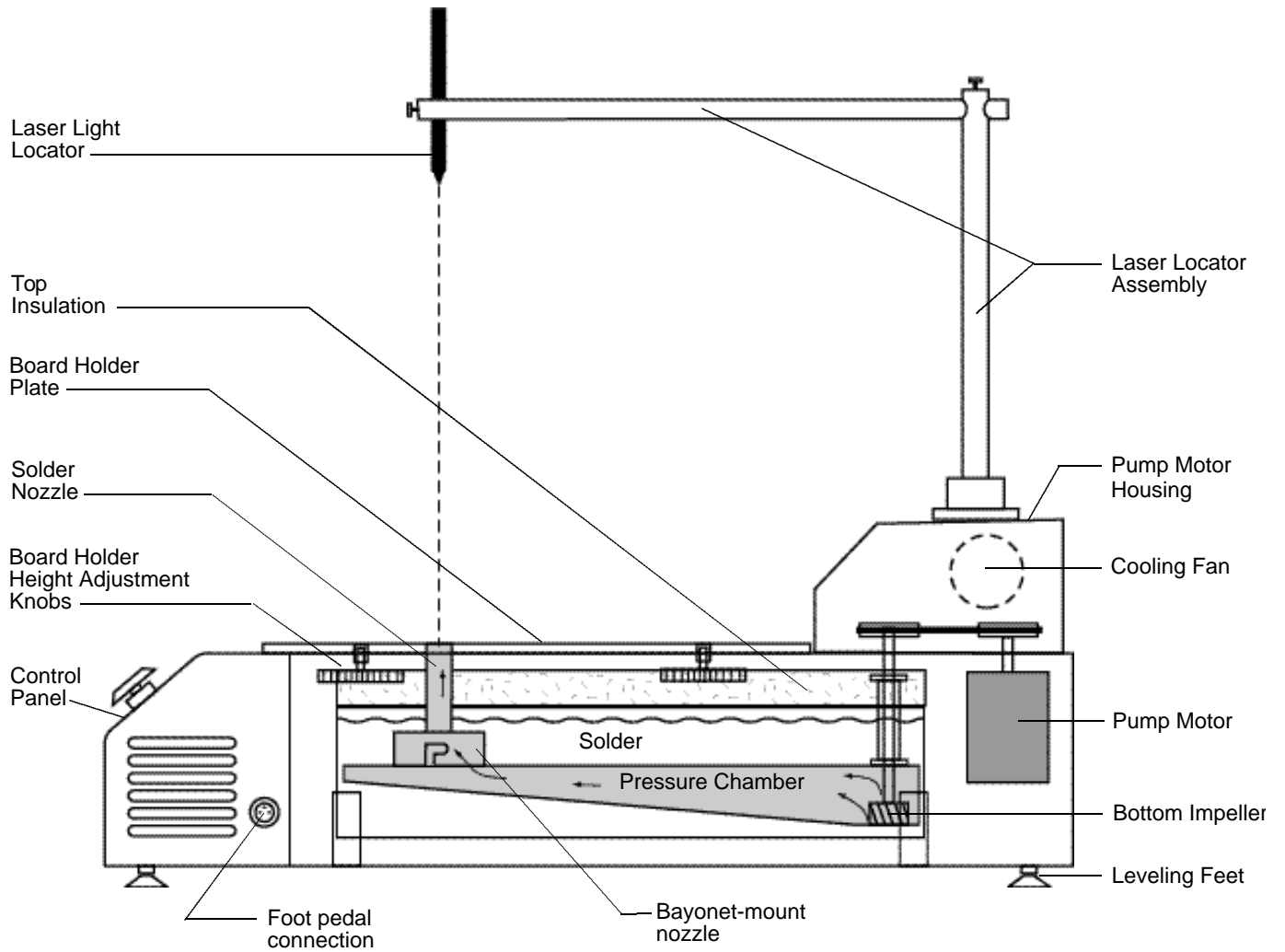


Fig. 3

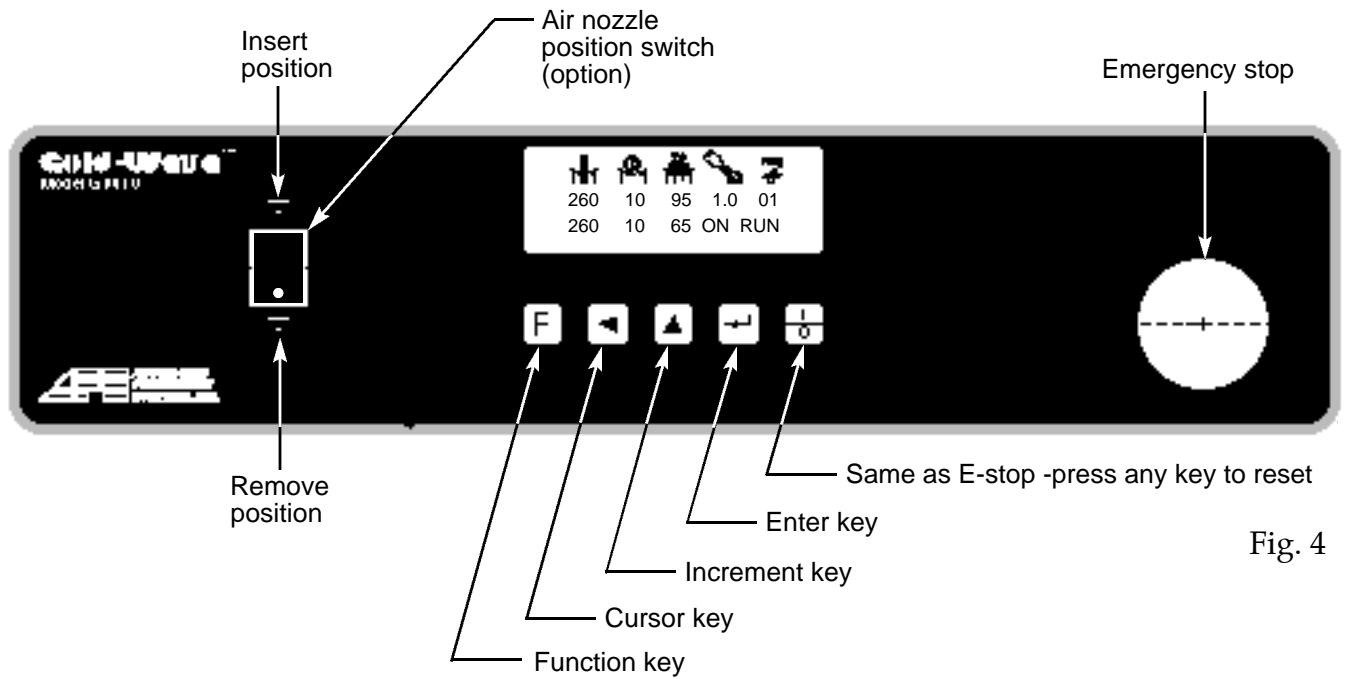


Fig. 4

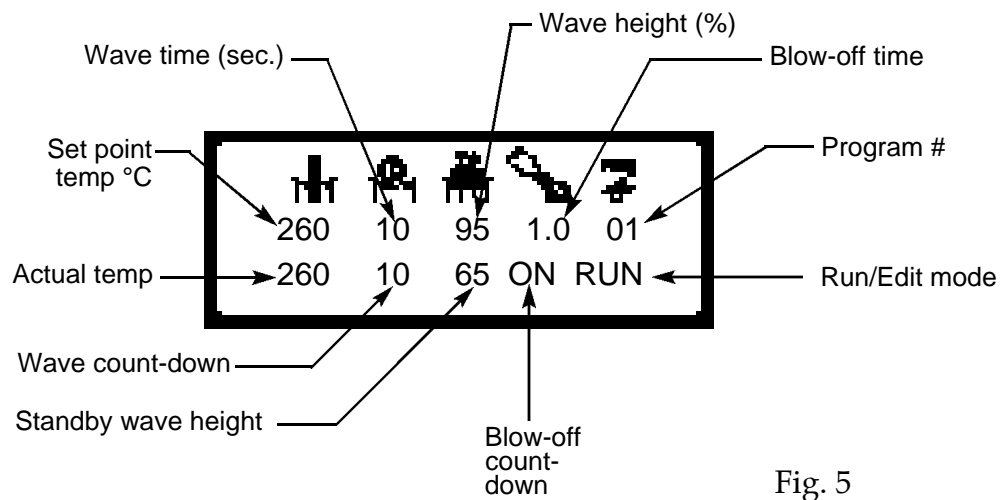


Fig. 5

VI. OPERATION USING COMPUTER CONTROL

A. The microprocessor based controller display has the following capabilities:

1. 12 automatic programs (menus) of parameter setting storage.
2. Program 00 is manual operation mode.
3. You can set all machine parameters in the EDIT mode.
4. The machine will operate in the RUN mode

B. Front Panel:

The keys: There are five keys on the controller.

[F] Function key changes the status of the machine. By pressing this key you can toggle the machine to RUN mode or EDIT mode.

In EDIT mode parameters can be changed as required. In RUN mode, the machine is ready for use per the pre-set parameters.

[◀] The cursor key controls the cursor movement. Pressing it will move the cursor to the digit you want to edit.

If the key is pressed for more than 1 second, the cursor will keep moving until the key is released.

[▲] The increment key changes the parameter values. By pressing the key once, the digit will increase by one.

If the key is pressed for more than 1 second, the digit keeps incrementing until the key is released.

[↵] This is the ENTER key. When you are satisfied with the value of the parameter or ON/OFF status in the edit mode, press [↵]. This will save the settings and automatically go to the next parameter.

[$\frac{1}{0}$] This key turns the pump OFF (same as E-stop).

C. Display:

The display consist of a 16 x 2 character LCD module. The LCD module displays the machine status in two lines. The upper line displays **set** values of the parameters. The lower line displays the current status or **actual** value of the parameter. The display can also indicate the calibration mode.

D. Operation:

When the machine is turned ON, the display will momentarily show the cursor in the left hand corner and a program code in the middle.

The program last stored in the machine will then be displayed. The machine is now in RUN mode and will operate according to the parameters set in this program.

E. Changing Programs:

To change to a different program, press [F], Prg /EDIT will be displayed, press [▲] to change the program #, then press [F] to switch the machine into the RUN mode.

F. Editing Parameters:

1. Press [F], the screen will display the Prg # /EDIT. The machine is now in EDIT mode.
2. Press [←], the cursor will move to the solder temp. setting. Change the value of the first digit by pressing [▲]. To shift to the next digit press [◀]. When satisfied, press [←] to store the changes. The cursor shifts to next parameter. Make changes by using the [▲] and [◀] keys. When satisfied with the entire menu, press [F] to switch the machine to RUN mode.

G. Changing Manual / Auto Mode:

For convenience, it is sometimes desirable to switch the machine to manual mode. For example, when you want to make trial runs for a certain board type or to do some troubleshooting work.

Press [F]. Prg # /EDIT will be displayed. Change to Prg # 00. The machine is now in the manual mode. You can now change the parameters and run the machine.

1. When position switch is in INSERT position the wave will activate as long as the foot pedal is pressed. (Refer to Fig. 4)
2. When position switch is in REMOVE position the optional blow through will activate as long as the foot pedal is pressed. (Refer to Fig. 4)

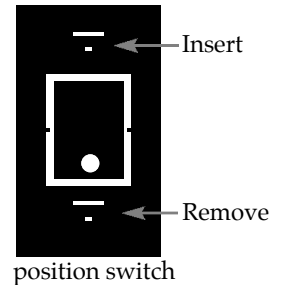
When satisfied with parameters, select the (new) Prg # and press [←] to go to Auto Mode. The # selected will now be stored.

H. Turning Individual Parameters ON and OFF:

Go to Prg # 00 and press [←], the cursor will be on the status line (lower line of the display). Press [▲] to toggle the parameter ON or OFF. Press [←] to go to next parameter.

VII. REMOVING AND REPLACING THROUGH-HOLE COMPONENTS (ENSURE THAT YOU ARE IN AUTO MODE)

- A. Prepare board surface and component to be inserted appropriately
- B. Ensure laser light locator is centered in wave nozzle
- C. Enter program # desired (in edit mode)
- D. Ensure position switch is in Remove (down) position (see fig. 4)
- E. Press foot pedal and wave will activate for wave time indicated
- F. Remove component with tweezers while wave is activated
- G. **(For GW-10A only, machine with blowoff feature):**
 1. Press position switch to Insert (up) position (see fig. 4)
 2. Place blowoff nozzle flush onto holes on board
 3. Press foot pedal and nozzle will activate for blowoff time indicated
 4. Remember to press position switch back to Remove (down) position before next step
- H. Press foot pedal and insert part while wave is active (**apply flux if required**)
- I. Remove board to let solder joint cool



NOTE: If you have no blowoff option, always leave position switch in the remove position.

IX. SHUTDOWN

CAUTION: After turning off main power, leave unit plugged in for 1 hour minimum to cool unit.

- A. Turn main power OFF at rear of unit. Last program will be saved for next startup.

X. MAINTENANCE

A. Solder Surface:

As a natural result of oxidation, a film of oxide (dross) will appear on the surface of the solder. The oxide film protects and inhibits further oxidation of the solder. But the accumulation of too much dross is not desirable.

Remove this dross daily using a stainless steel spoon or ladle. After removing the dross, restore solder to correct level by adding solder bars to the pot.

B. Solder Quality:

In time the solder may become contaminated. Check the solder annually or more frequently if necessary. A small sample may be sent to your local solder supplier or to a qualified lab for analysis.

To remove copper contamination from solder, set the solder pot temperature to 369°F (187°C) and keep it ON for 8 hours. Excess copper-rich solder can be skimmed off from the top of the solder. For better results repeat this procedure 2-3 times.

Note: This procedure applies only to eutectic tin/lead alloy (Sn63/Pb37).

XI. TROUBLESHOOTING SOLDERABILITY

If all variables and parameters which lead to good solderability are not properly controlled, some typical defects will occur. The description and causes of some common defects are listed below.

1. Poor Wetting:

Wetting is the primary factor in achieving good solder joints. A condition when the surfaces to be joined are only partially covered with molten solder, leaving areas of unwetted surfaces, behind is called non-wetting or poor wetting. It shows up as pin holes and areas of bare copper or insufficient solder on the surface of the parts to be soldered. There is virtually no adherence of the solder.

2. De-wetting:

This condition is similar to poor wetting. It differs in that the areas to which the solder does not adhere results from the solder pulling back from the surfaces prior to solidifying.

3. Disturbed Joint:

When components move in relation to PCB during the solidification stage disturbed joints are formed.

4. Excess Solder:

This condition occurs when too much solder remains on the joint. Excess solder joints have solder fillets which appear round and fat.

5. Icicling:

Icicling is excess solder which solidifies during the peel-back stage. An icicle has a fillet shape which appears conical and ends in a sharp point.

6. Solder Webbing:

When solder adheres to the solder mask between the metallization, it is called solder webbing. The surface leaves thin lines of solder which form a pattern resembling a net or web.

7. Pinholes and Blowholes:

Small holes are seen on the solder fillet. The bigger ones are called blow holes and the smaller ones pinholes. A pinhole often conceals a much larger internal cavity.

8. Bridging:

Bridging occurs when excess solder shorts two adjacent pads, conductors or leads.

XII. TROUBLESHOOTING MACHINE

<u>Failure</u>	<u>Corrective Measures</u>
Solder does not melt	Check the circuit breaker, solid state relays and heaters. If the circuit breaker is tripped, turn it on. If the SSR is fused, replace it. If the heater is burned, replace it.
Solder takes too long to melt	Check heater elements. Replace defective one.
Pre-set temperature is not achieved	Check heater elements, replace defective one.
No solder wave	If solder is molten and has reached the preset temperature, then check the solder pump and motor.
Solder motor not running	Check voltage to the motor. Check the relevant SSR and circuit breaker. Replace the SSR and/or turn on the circuit breaker, if tripped. Check belt tension. Reduce belt tension if too tight.
Impeller escaped from pump shaft	If motor is running with no solder wave then motor pulley or pump pulley may be loose. Tighten set screw. Remove the pump and reinstall impeller.
Low solder wave	Check solder level. Check for clogged pump impeller fins. Dross or any other foreign objects such as components may have fallen in solder. Remove pump and clean the impeller fins. Check belt tension and increase if too slack.

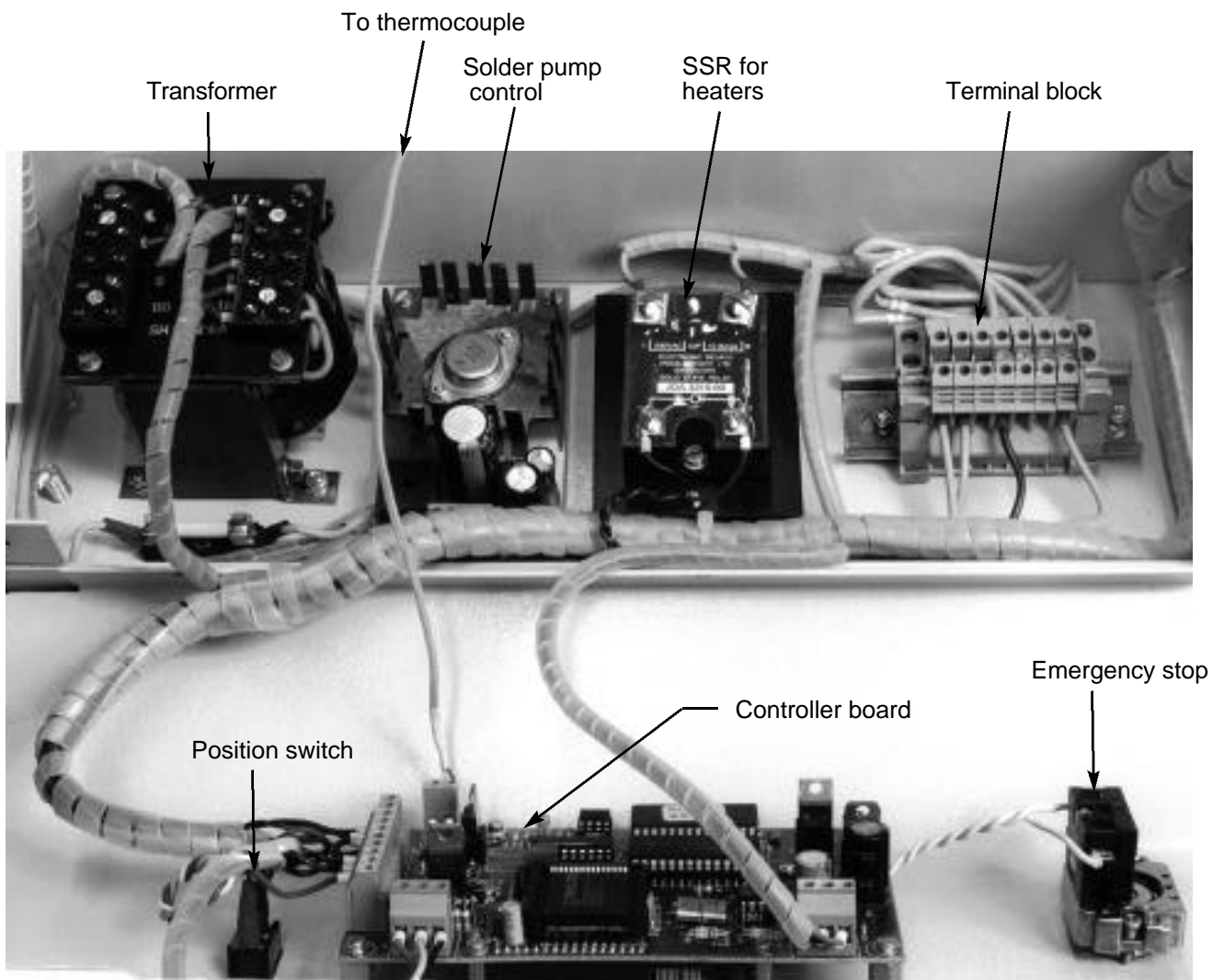
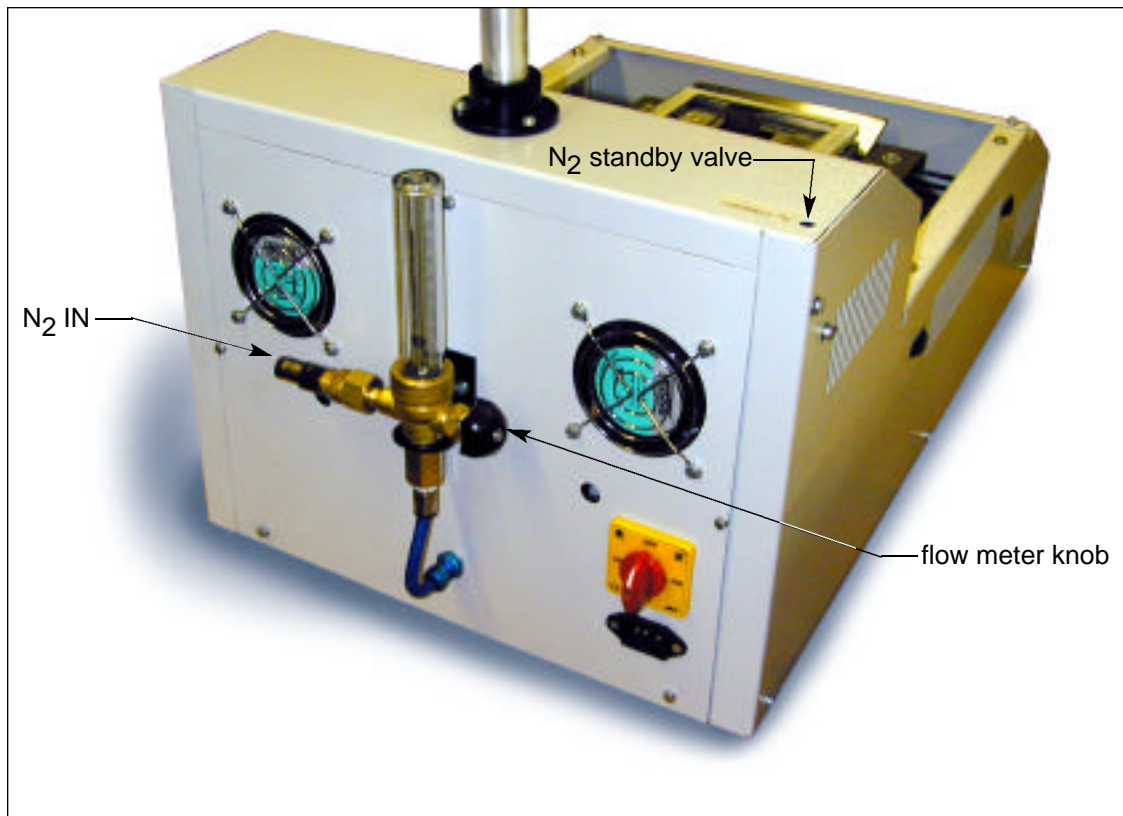


Fig. 6 (See electrical schematics for details)

For GW-10/10A with Nitrogen Option

Adjusting Nitrogen Flow

1. Supply nitrogen at 60 psi (4 bars)
2. Machine must be heated up to soldering temperature
3. Close N₂ standby valve completely by inserting flat screwdriver and turning clockwise
4. Open flow meter valve fully by turning flow meter knob counterclockwise
5. Adjust N₂ standby valve by turning screwdriver counterclockwise until desired N₂ standby rate appears on flow meter
6. Press foot pedal to operate solder wave & adjust flow meter valve to desired soldering N₂ rate



GW-10 SPARE PARTS LIST

BASE UNIT

GW-10-MB	main control board
GW-10-CO	controller overlay
GW-10-PM	pump motor
GW-10-PB	pump bearing
GW-10-HP	high pressure pump assembly
GW-10-MP	motor pulley
GW-10-FAN	cooling fan
GW-10-CORD	AC cord
GW-10-BLT	belt
GW-10-SPT	solder pot
GW-10-HTR	heating element
GW-10-HW	heater wire assembly complete
GW-10-PI	pump impeller assembly w/pump pulley
GW-10-BHP	board holder plate
GW-10-BHAK	board holder adjustment knobs (4)
GW-10-T/C	thermocouple
GW-10-LF	leveling feet (4)
GW-10-FP	foot pedal
GW-10-LLL	laser light locator
GW-10-LLA	laser locator assembly
GW-10-TRN	transformer
GW-10-SPC	solder pump control
GW-10-SSR	solid state relay
GW-10-TB	terminal block
GW-10-SWITCH	position switch
GW-10-ES	emergency stop switch
GW-10-UBF	universal board fixture (option)
GW-10-BTA	blow-thru air nozzle assembly (option GW-10A)
GW-10-ASV	air solenoid valve (option GW-10A)

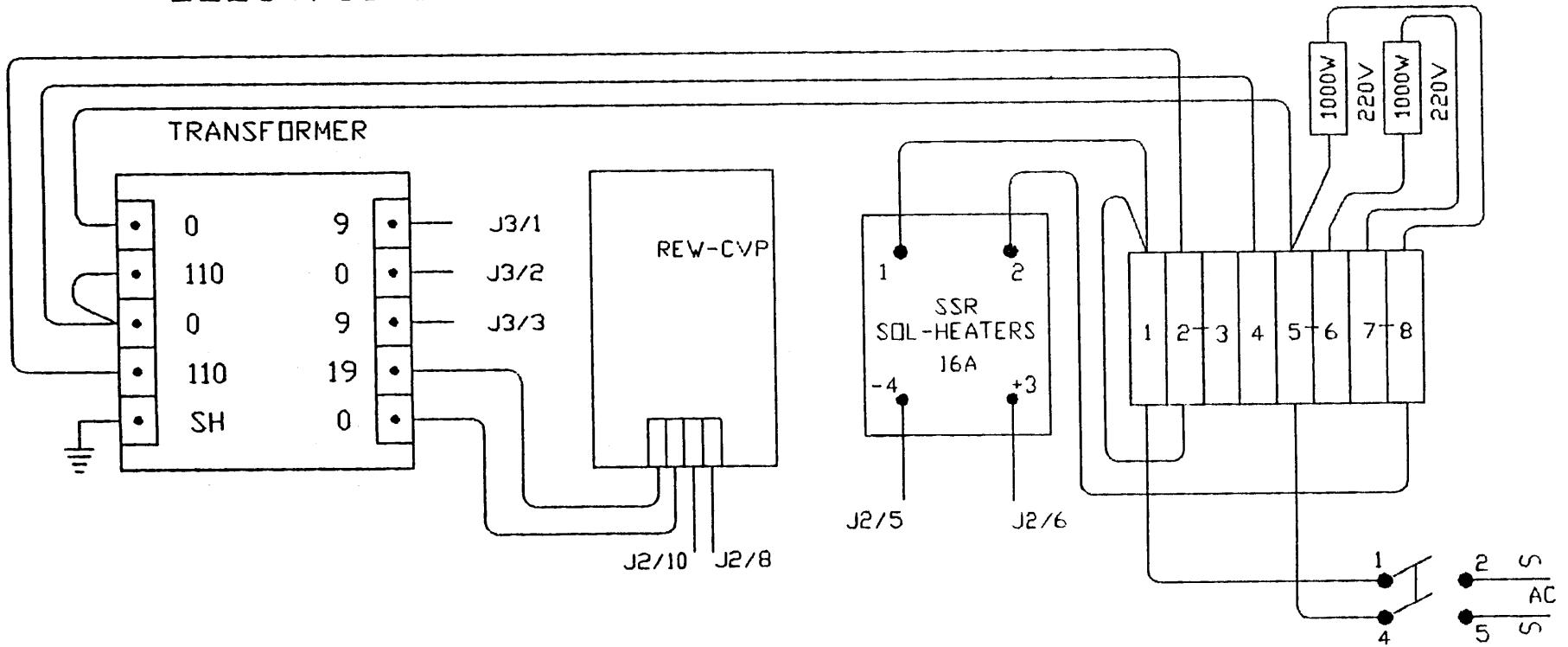
WAVE NOZZLES

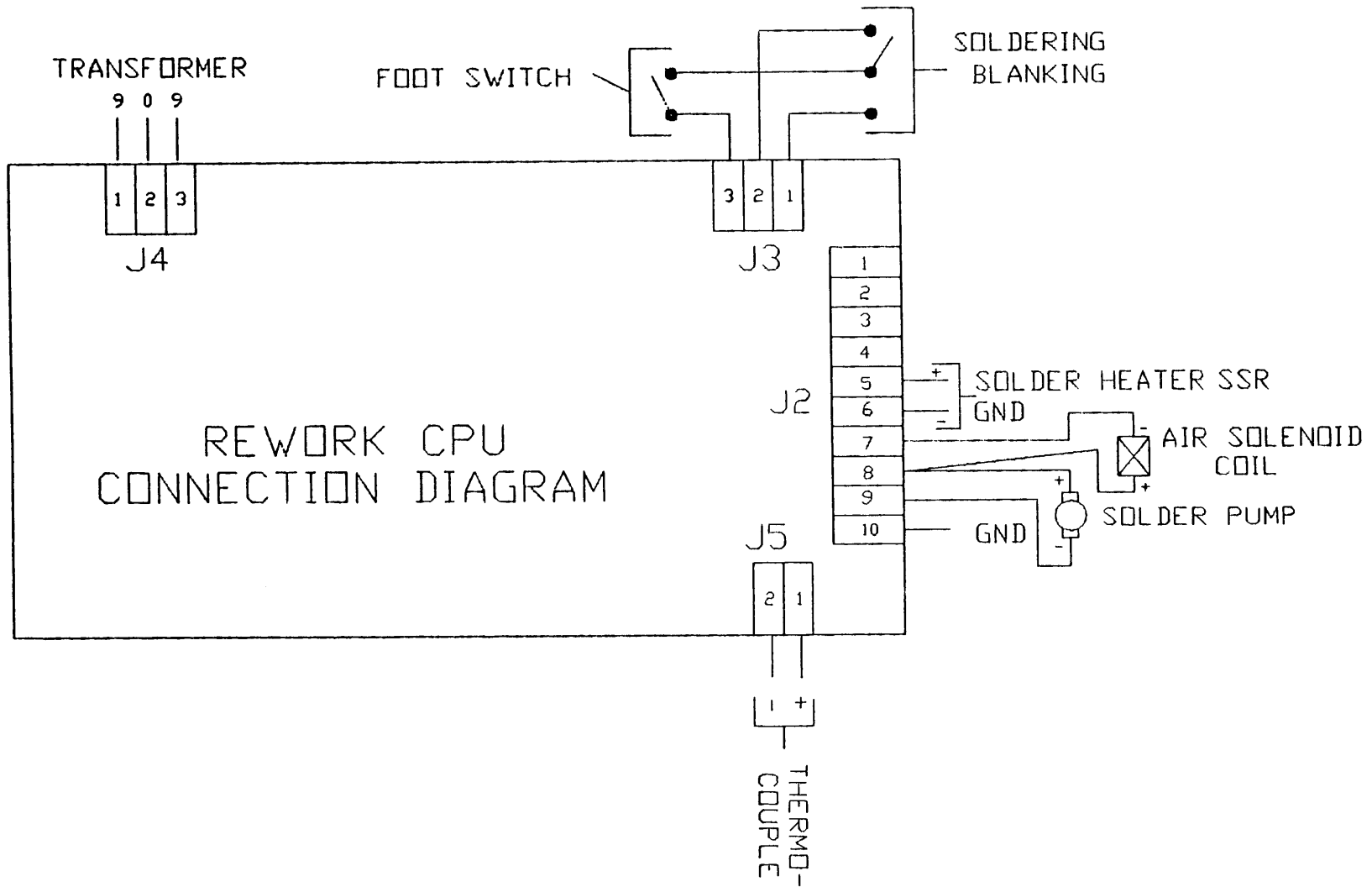
WN-10	1.00" x 0.50" (25 x 13 mm)
WN-20	1.50" x 0.75" (38 x 19 mm)
WN-30	2.50" x 0.75" (64 x 19 mm)
WN-40	1.00" x 1.00" (25 x 25 mm)
WN-50	1.50" x 1.50" (38 x 38 mm)
WN-60	2.00" x 2.00" (50 x 50 mm)
WN-70	2.75" x 0.35" (70 x 9 mm)
WN-80	4.00" x 0.75" (102 x 19 mm)

AIR NOZZLES FOR GW-10A ONLY

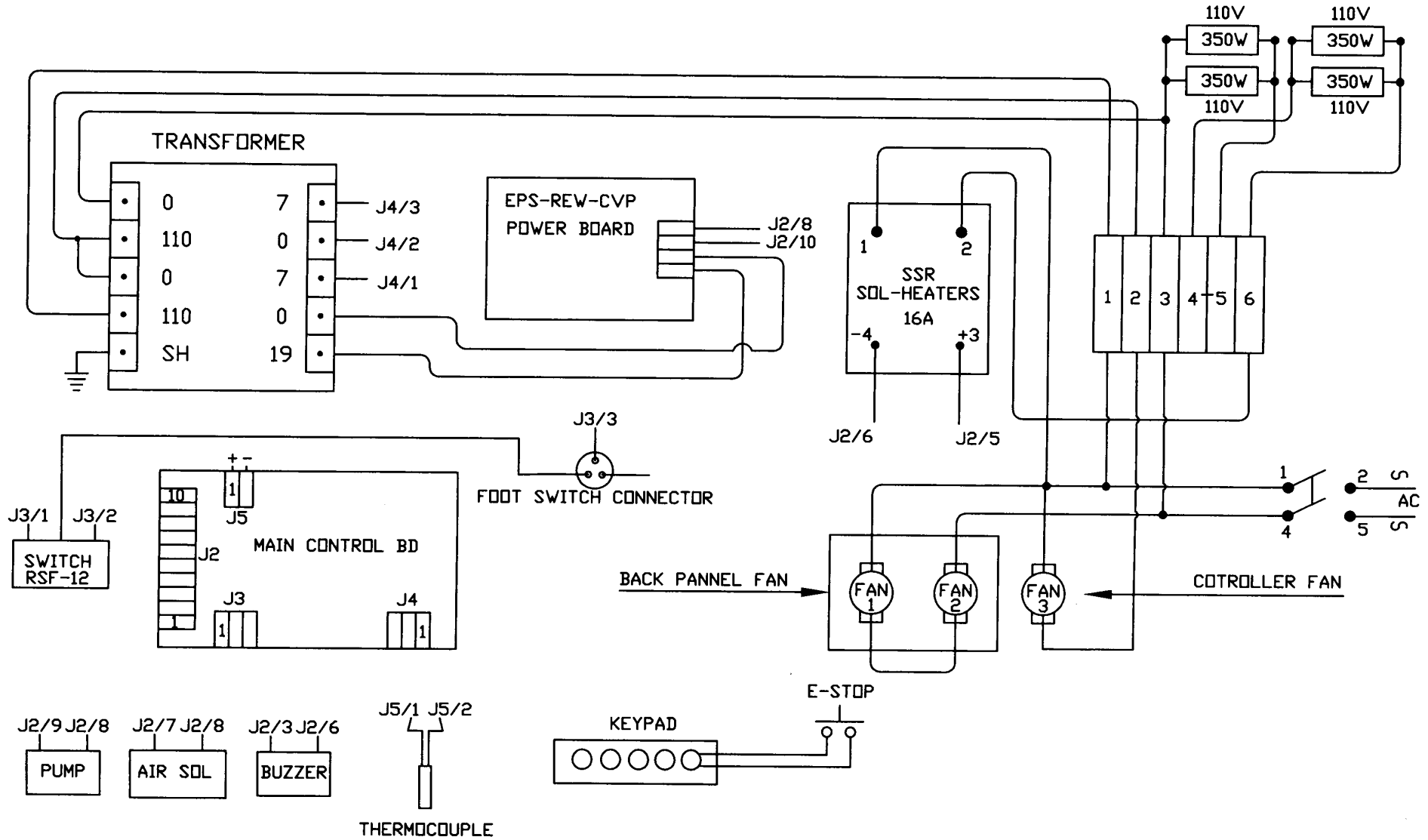
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AN-80	4.00" x 0.75" (102 x 19 mm)

ELECTRICAL WIRING DIAGRAM OF REWORK





ELECTRICAL WIRING DIAGRAM OF MINI WAVE FOR 220VAC.



APG AUTOMATED PRODUCTION SYSTEMS, INC.

TOLERANCES UNLESS OTHERWISE SPECIFIED:
 FRACTIONAL ± 1/64
 DECIMAL ± .005
 ANGULAR ± 1/2°
 BREAK ALL SHARP EDGES

GOLDWAVE 220

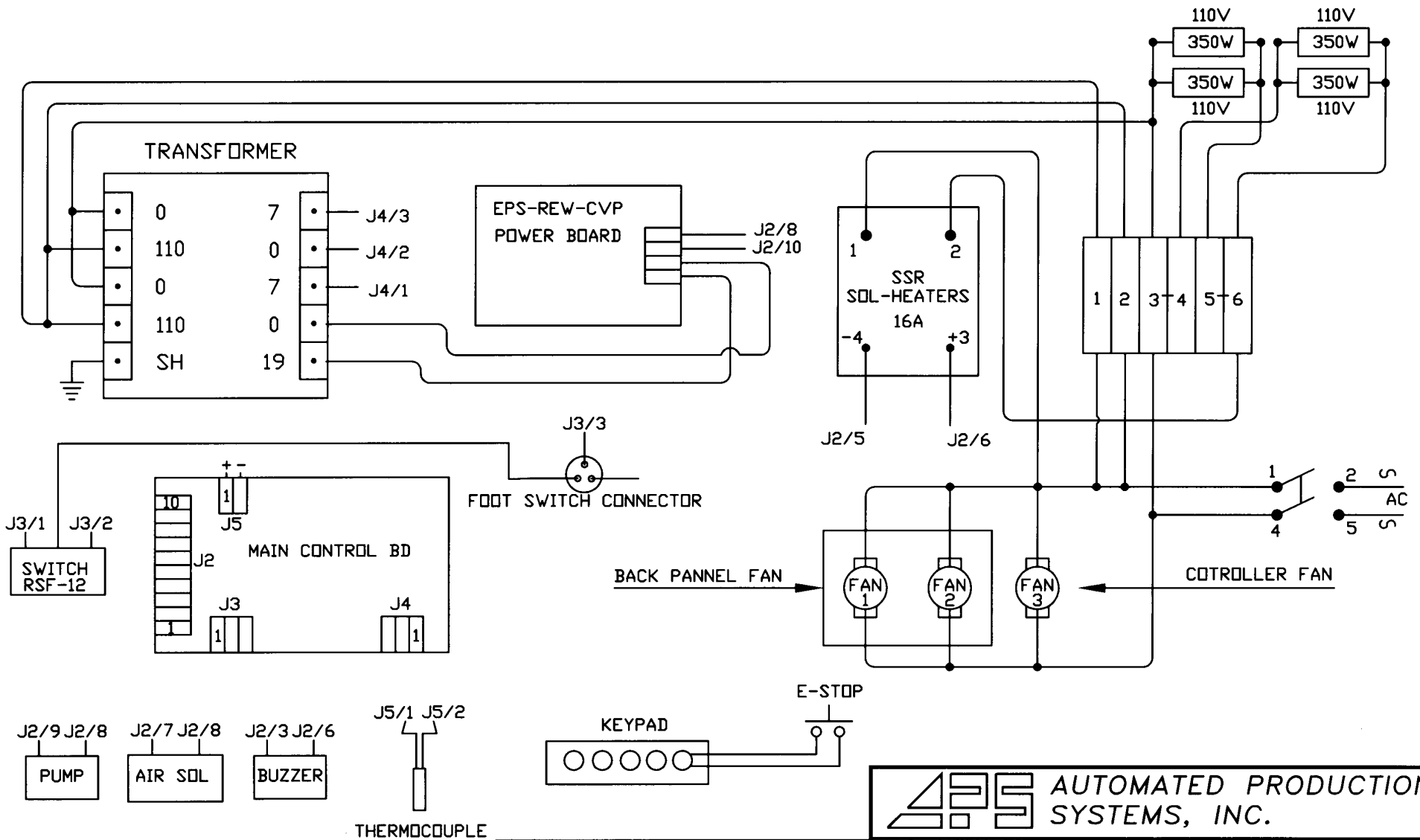
MATERIAL:	DWG.No.	REV.
	GW220	2
SCALE: 1=1	SHEET 1 OF 1	

REV	DESCRIPTION	DATE	BY
2	ADDED MAIN CONTORL BD WIRING	11-10-04	JSW/JG
1	MODIFIED FAN#3 WIRING FOR 110VAC	10-07-04	JSW/JG
-	INITIAL RELEASE	02-06-04	JSW/JG

R E V I S I O N S

MODEL No.	ASSY No.	P/L PARTS LIST No.	ITEM No.	PCS./ /ASSY.

ELECTRICAL WIRING DIAGRAM OF MINI WAVE FOR 110VAC.

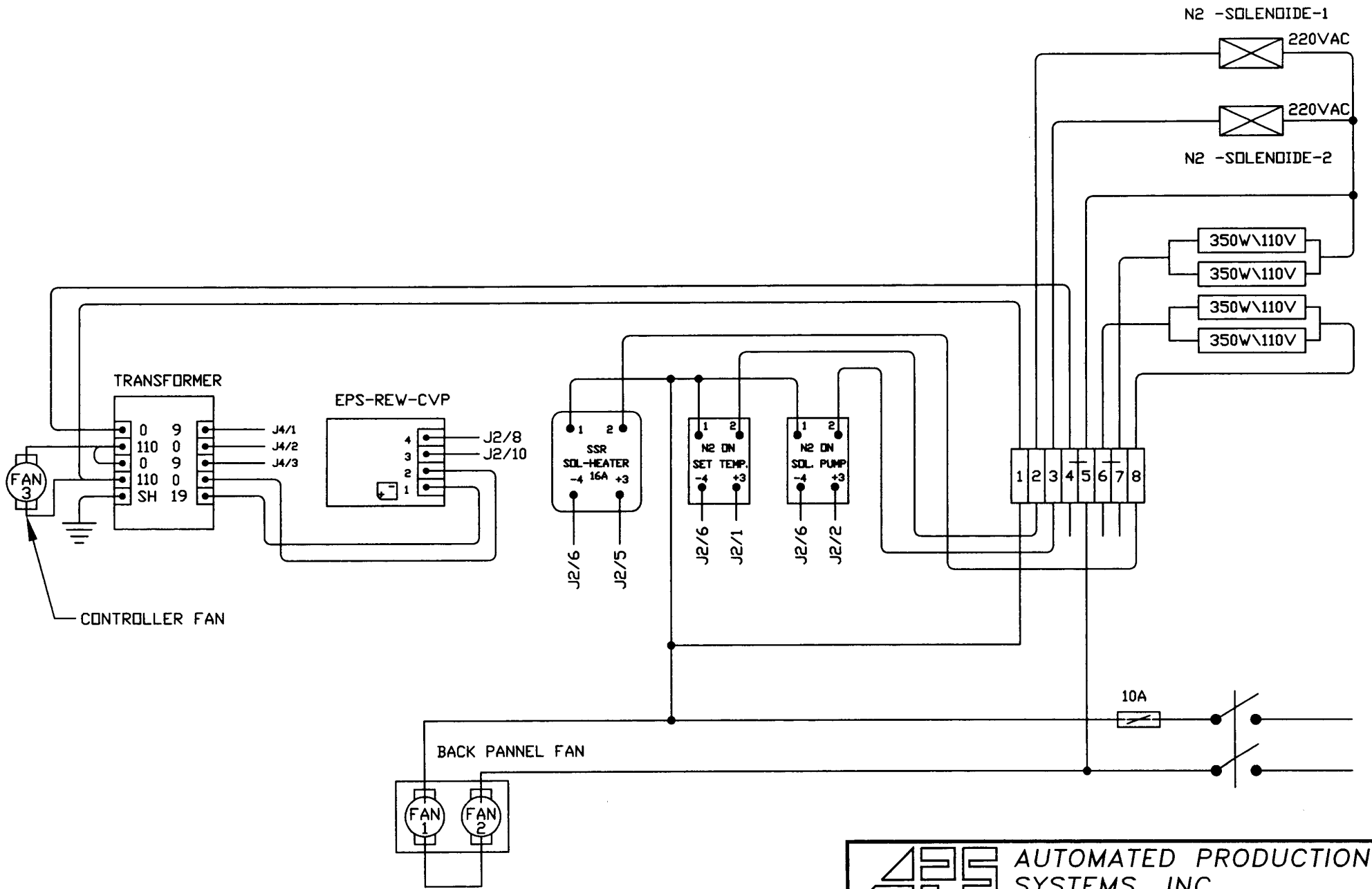


AS AUTOMATED PRODUCTION SYSTEMS, INC.

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONAL ± 1/64 DECIMAL ± .005 ANGULAR ± 1/2° BREAK ALL SHARP EDGES					GOLDWAVE 110		
DRAWN: JW 02-05-04 CHECKED: JG 02-05-04					MATERIAL:	DWG.No. GW110	REV. 1
					SCALE: 1=1	SHEET 1 OF 1	

1	MODIFIED MAIN CONTROL BD	10-11-04	JSW/JG
-	INITIAL RELEASE	02-06-04	JW/JG
REV	DESCRIPTION	DATE	BY
R E V I S I O N S			

MODEL	ASSY	P/L	ITEM	PCS
MODEL No.	ASSEMBLY No.	PARTS LIST No.	ITEM No.	PCS./ASSY.



AP AUTOMATED PRODUCTION SYSTEMS, INC.

TOLERANCES UNLESS OTHERWISE SPECIFIED:
 FRACTIONAL ± 1/64
 DECIMAL ± .005
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 BREAK ALL SHARP EDGES

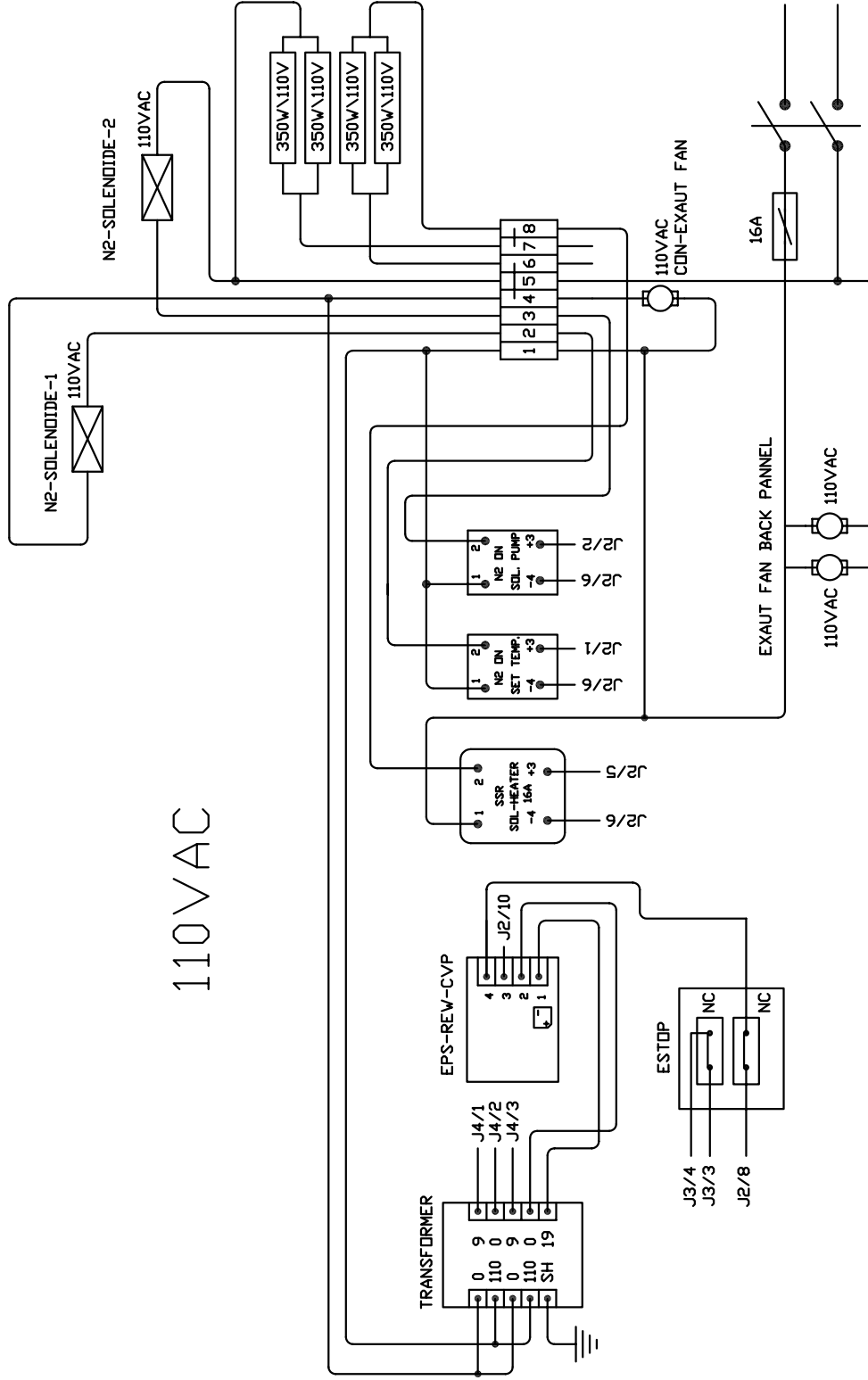
GOLDWAVE 220

MATERIAL:	DWG.No.	REV.
	GW220N2	-
SCALE: 1=1	SHEET 1 OF 1	

-	INITIAL RELEASE	5-13-05	JWK
REV	DESCRIPTION	DATE	BY
R E V I S I O N S			

MODEL No.	ASSY No.	P/L PARTS LIST No.	ITEM No.	PCS./ASSY.

DRAWN: JWK 5-13-05
 CHECKED: JG 5-13-05



110VAC

AS AUTOMATED PRODUCTION SYSTEMS, INC.

TOLERANCES UNLESS OTHERWISE SPECIFIED:
 FRACTIONAL ± 1/64
 DECIMAL ± .005
 ANGULAR ± 1/2°
 BREAK ALL SHARP EDGES

WIRING DIAG. OF GW10 WITH N2 M/C 110VAC

DWG.No. A-4782 REV. -

SCALE: - SHEET 1 OF 1

REV	INITIAL RELEASE DESCRIPTION	DATE	JWK	BY
-		9-01-06	JWK	

MODEL No.	ASSY No.	ASSY	P/L	ITEM No.	PCS./ASSY.
GW10					PCS

REV	INITIAL RELEASE DESCRIPTION	DATE	JWK	BY
-		9-01-06	JWK	

R E V I S I O N S

