XTT 315Di

Service Manual

Issue 2

parweld

WELDING THE FUTURE

Safety Warning

Before working on this machine ensure the power supply is switched off

Only trained competent persons should work on this machine

Warning HEAT SINK and parts of the Circuit board are over 300V when the machine is powered up.

PARTS AND REPAIR BOOK XTT 315Di

Removing the covers

Loosen and remove the top black screws in each of the front and rear end panels. Ease the end panels apart to release the machine cover. Remove the screws on each side of the cover to lift off.

WORKING PRINCIPLE

The working principle of XTT 315Di welding machine is illustrated in Figure 1. Three-phase 380V AC at the working frequency is rectified into DC (approximately 530V), and three-phase 220V AC at the working frequency is rectified into DC (approximately 310V). This DC is then converted to medium-frequency AC (approximately 20kHz) by an inverter device (IGBT module). After voltage reduction by a medium-frequency transformer (the main transformer) and rectification by a medium-frequency rectifier (fast recovery diodes), the output is either DC or AC, depending on the selected IGBT module. The circuit utilizes current feedback control technology to ensure stable current output. Furthermore, the welding current parameter can be adjusted continuously and steplessly to meet welding process requirements.

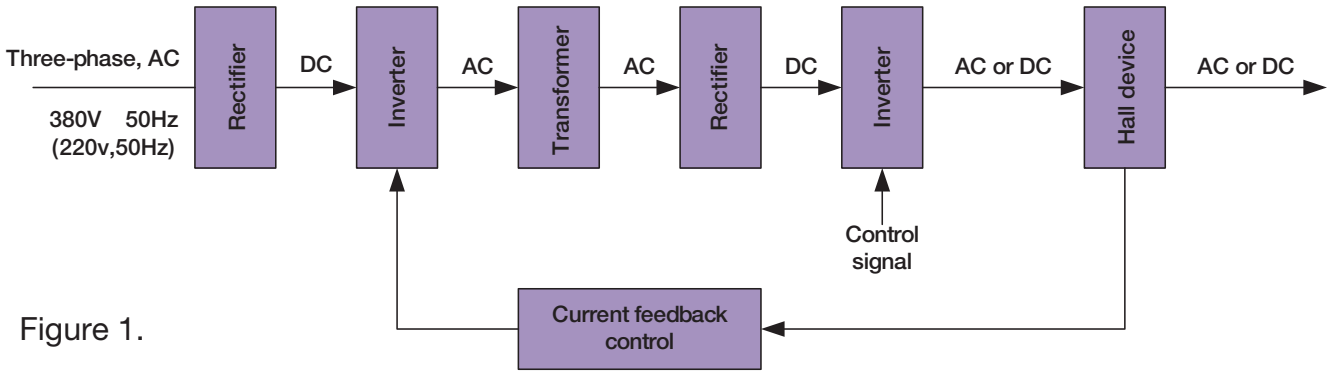
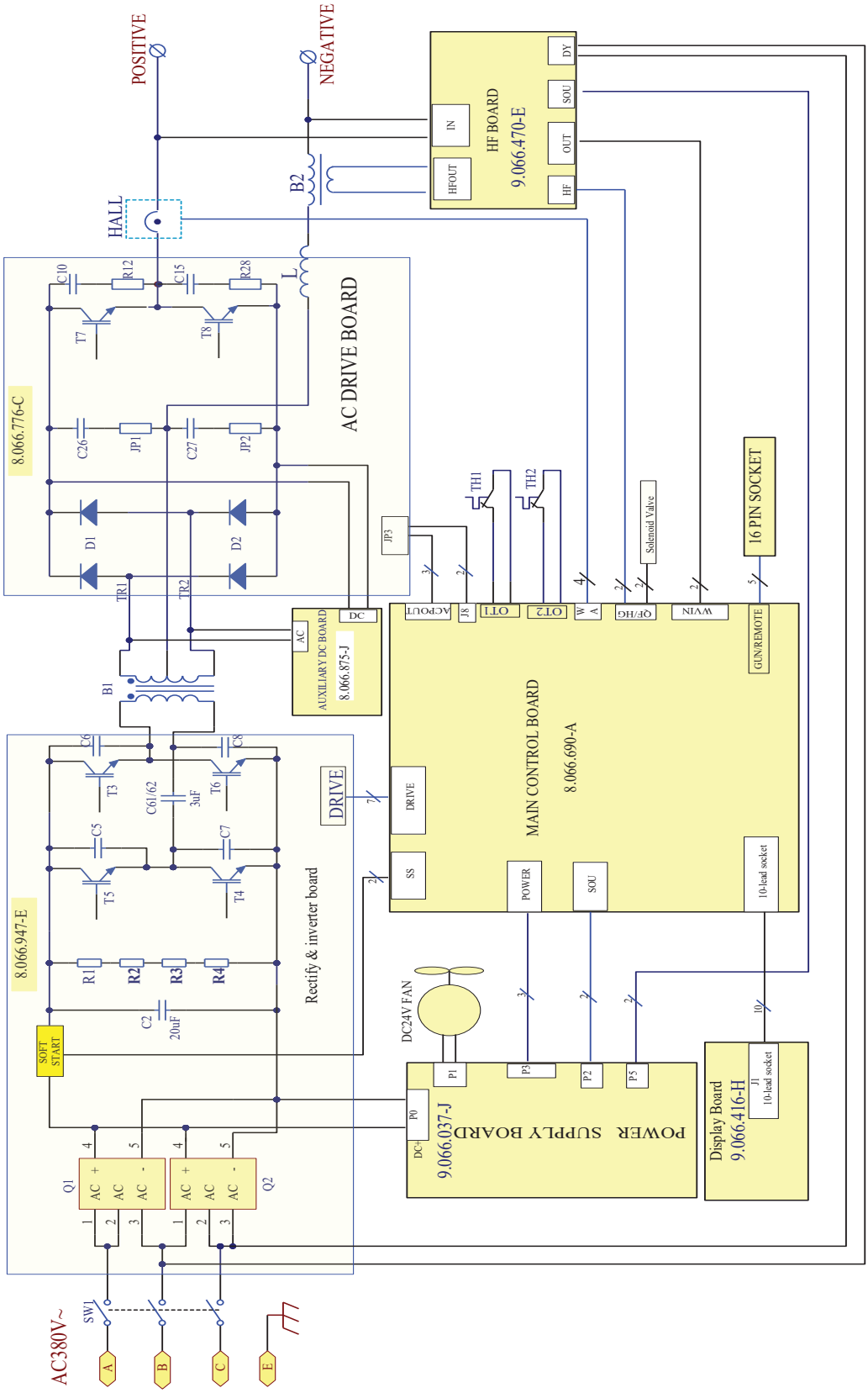


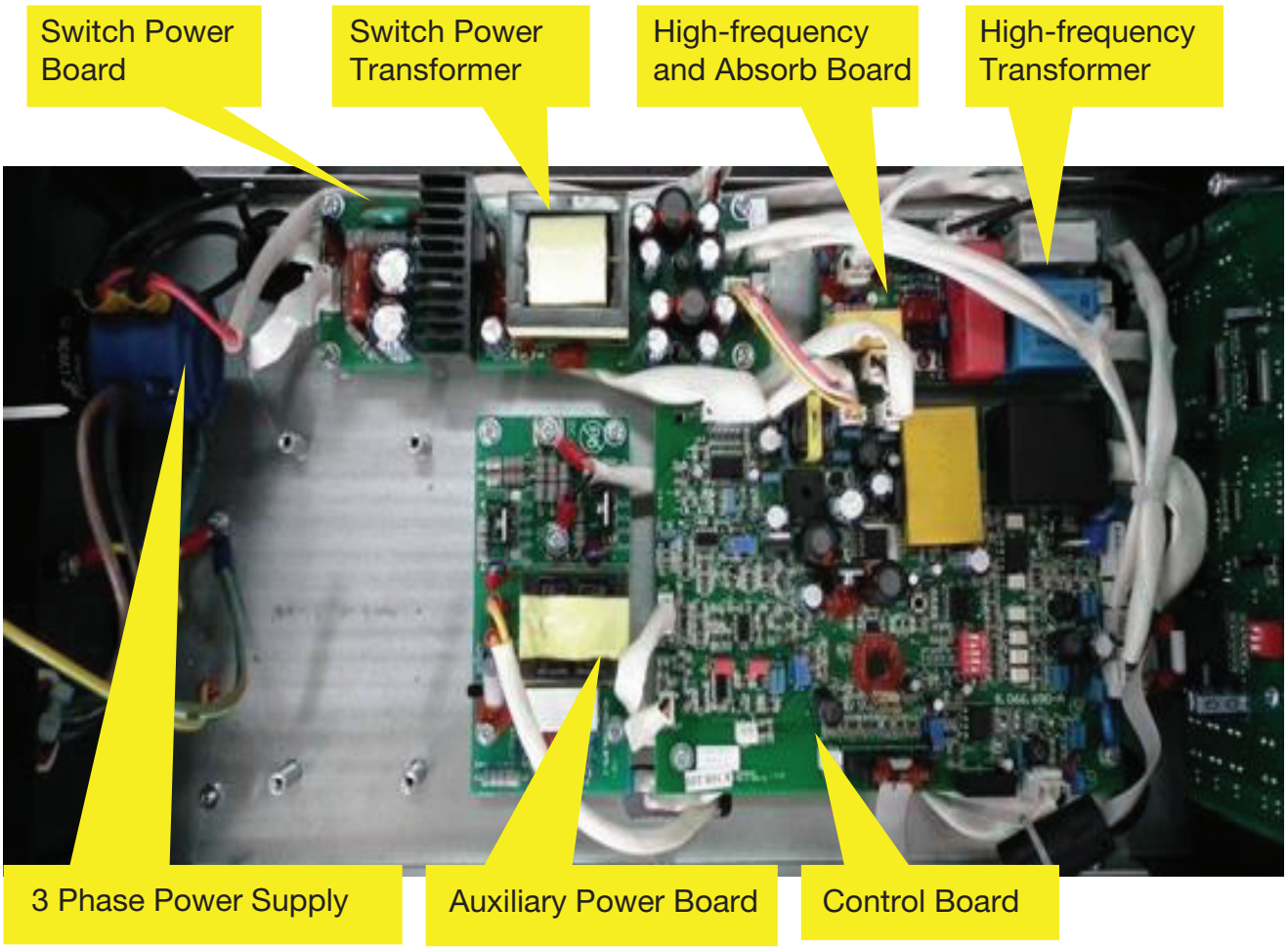
Figure 1.

Note: Please refer to the nameplate about the right power supply connection (three phase 220v or three phase 380v). The wrong power connection may cause machine failure!

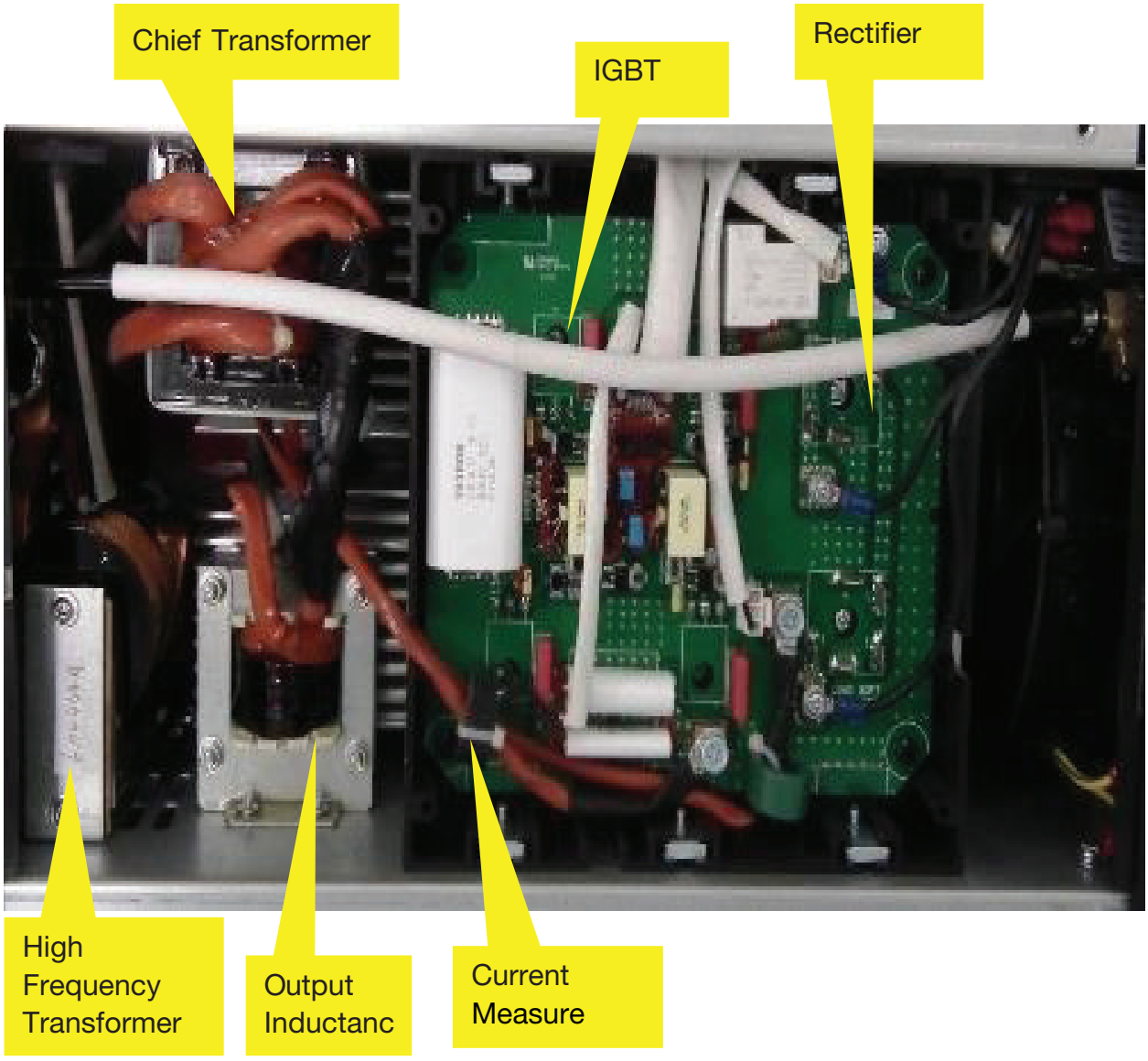
ELECTRICAL PRINCIPAL DRAWING



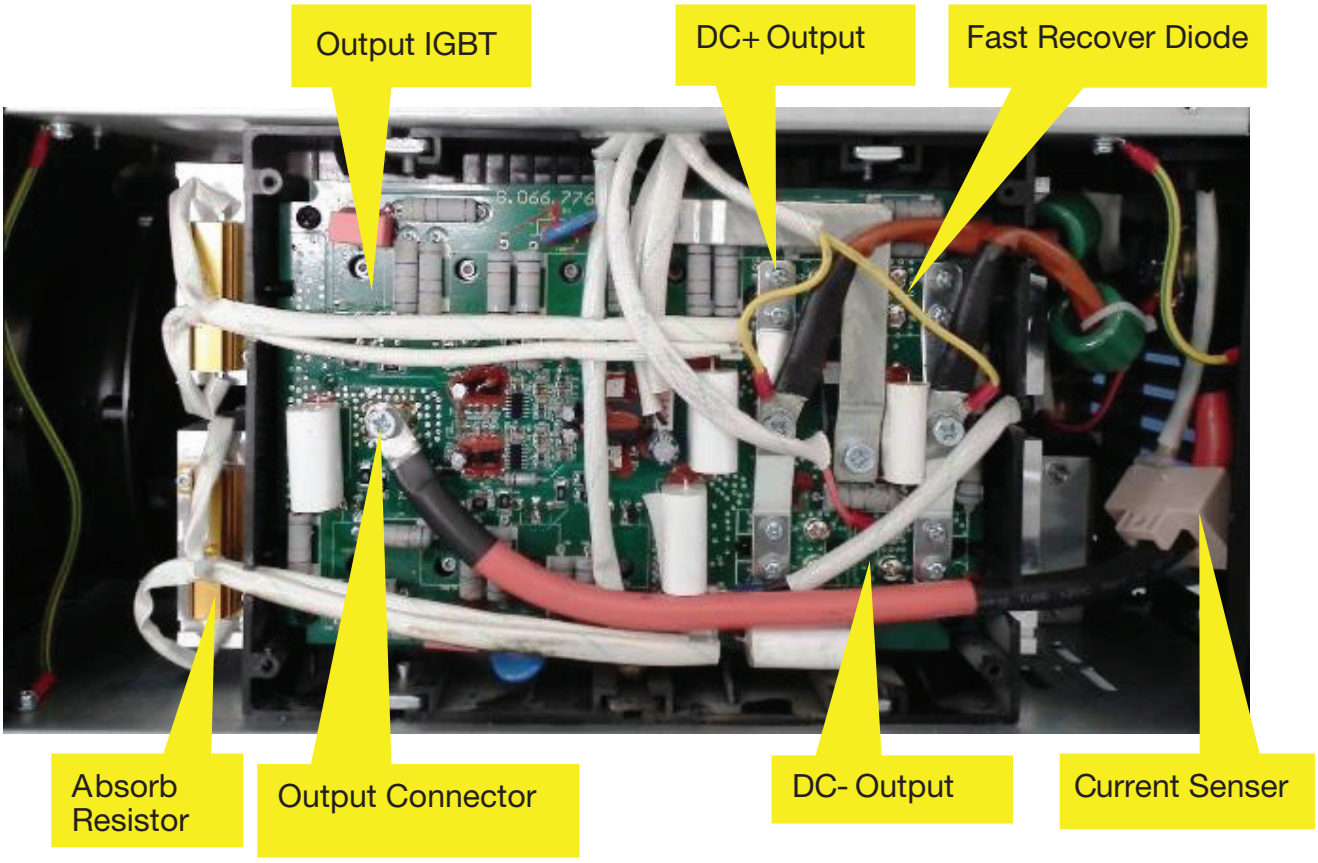
MAIN CIRCUIT



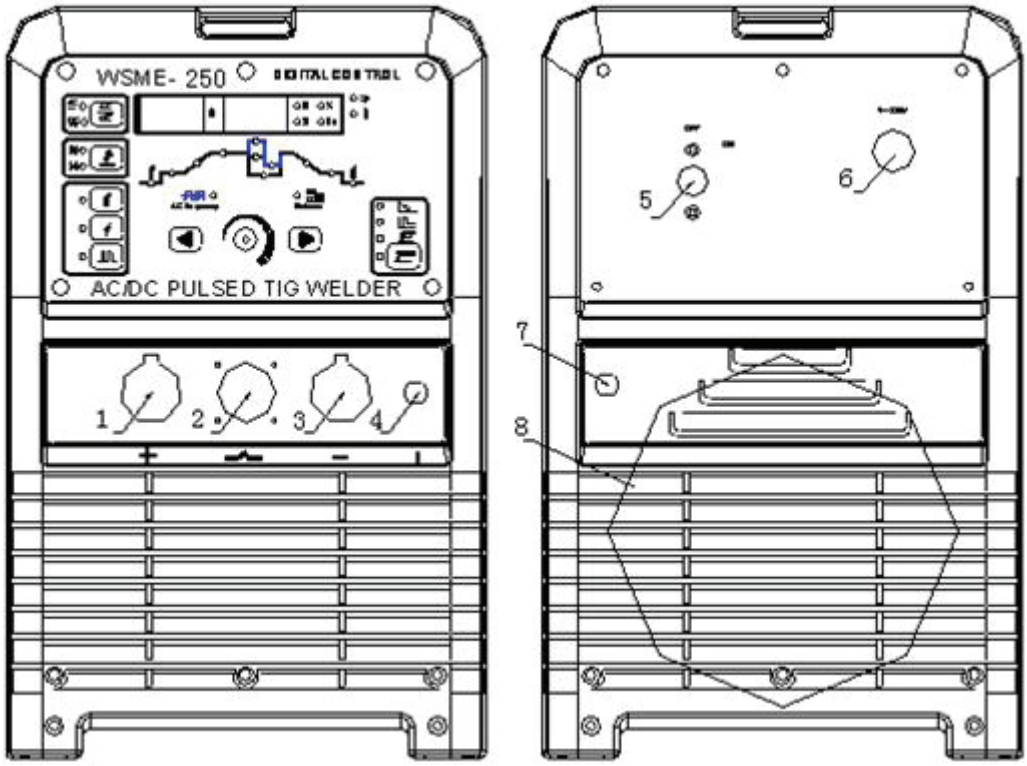
MAIN CIRCUIT



MAIN CIRCUIT

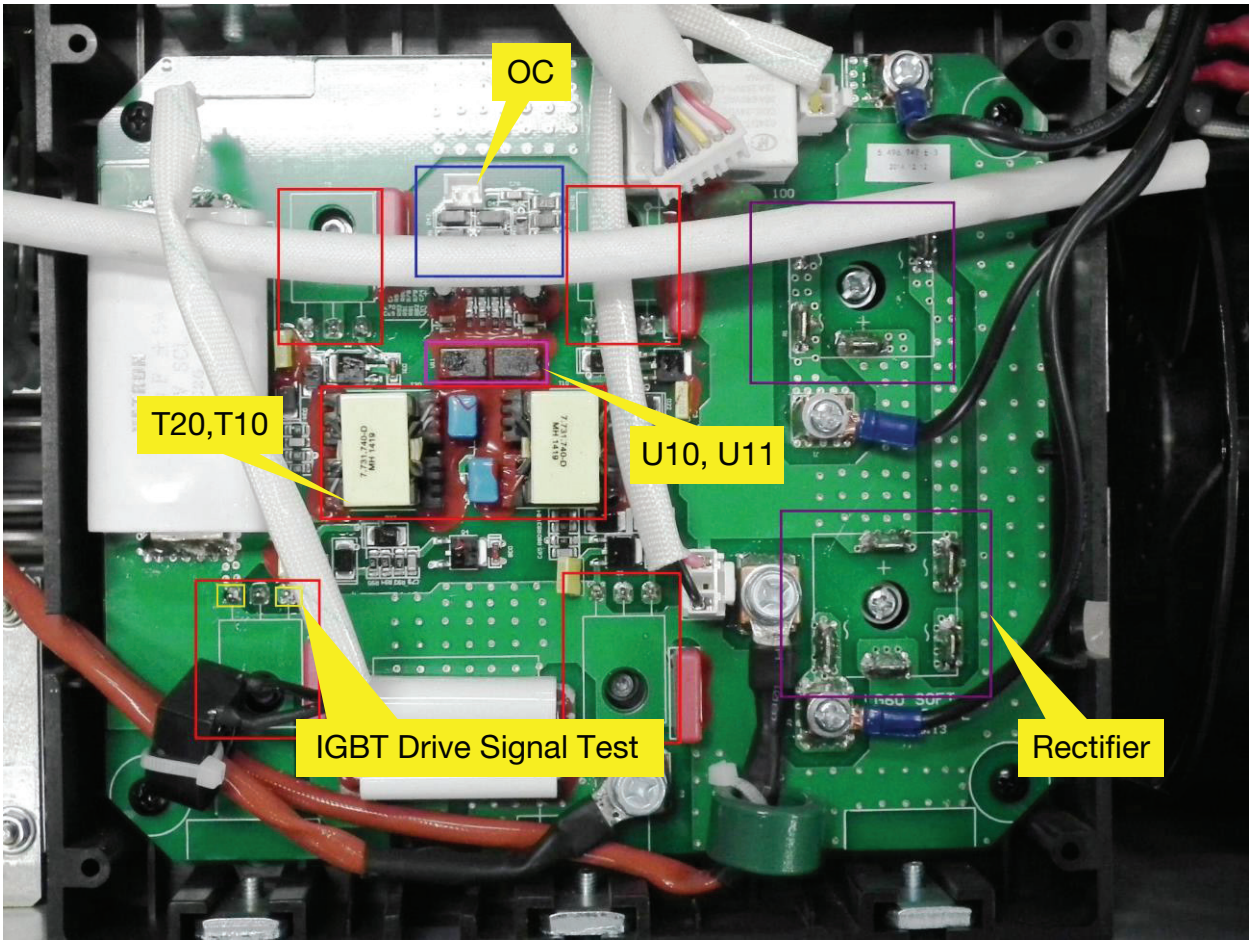


LAYOUT FOR THE PANEL



1. **Positive output.** The welder's positive polarity output.
2. **Aero socket.** Is connected to the torch switch control wire. (It has 14 leads and lead 8 - lead 9 are connected to the torch switch control wire).
3. **Negative output.** The welder's negative polarity output.
4. **Shield gas connector.** Is connected to the gas input pipe of the torch.
5. **Power source switch.** Switch to "ON", the welding machine is turned on, while switch to "OFF", the welding machine is turned off.
6. **Power source input.** To connect power source.
7. **Shield gas input joint.** To connect one head of the gas hose, while the other head of which is connected to argon gas cylinder.
8. **Fan.** It is used for cooling the components and parts inside the welder.

INPUT RECTIFIER PCB 9.066.947-E

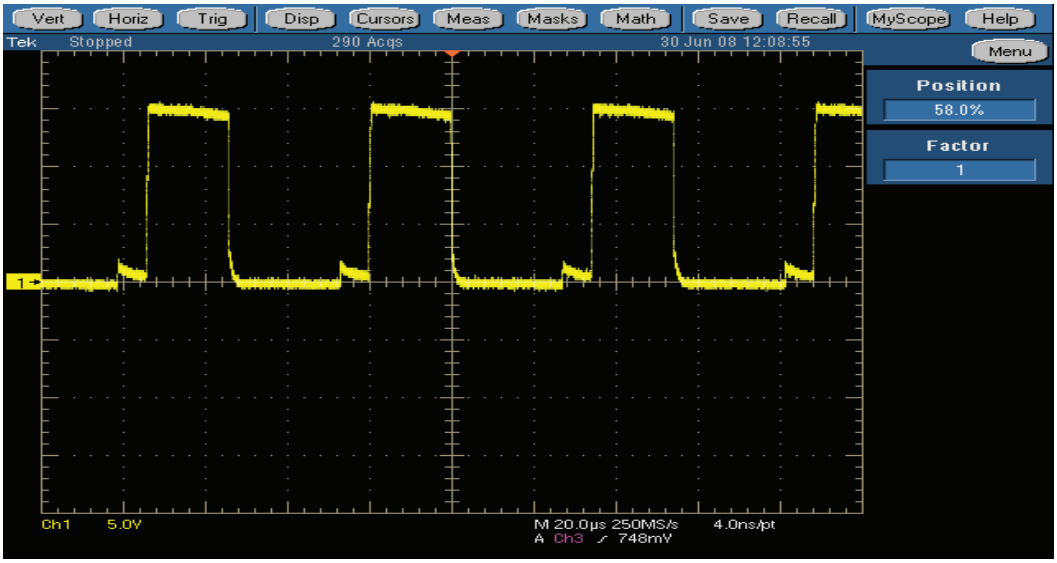


1. The main purpose of this PCB is rectifier, filter and inverter;
2. The function of R1 and R2 is rectifier. The function of C2 is filter, the function of T3…T6 is inverter;
3. The resistance R3 marked by red loop in the Fig is used to electricize the capacitor while turning on the machine, and then it is short-circuited by the relay after a few seconds, which can prevent the current surge to breaking R1, R2.
4. The CMOS chips U10 and U11 are used to drive the transformer T10, T20.
5. Full-bridge inverter circuit, and two group IGBT module work with switch methods.
6. There is the over-current detection circuit as the Figure 3.
7. The pulses from the UCC3895 in the power board are amplified by amplifiers. The drive transformer insulate the strong circuit and weak circuit.

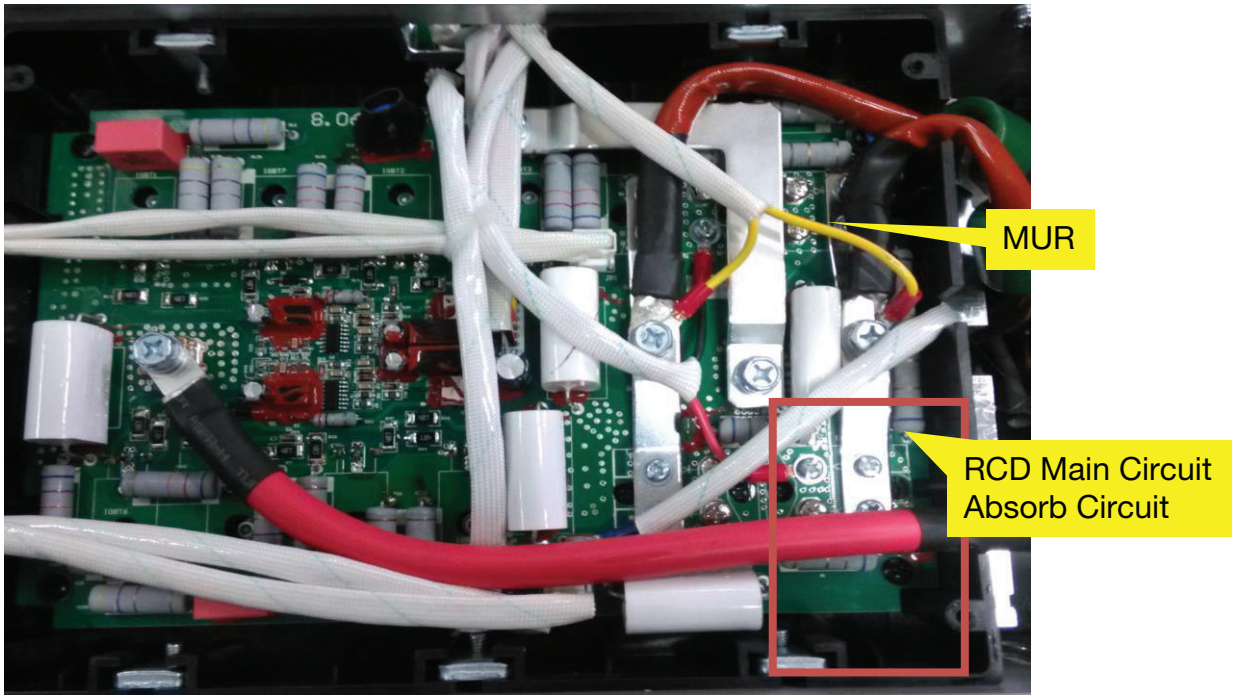
When the board doesn't work normally:

1. Replace this board if you find it doesn't work normally.
2. Before replace this board, please make sure that ether the MUR on the unit 8.066.776-C and the main transformer are well.
3. Please take off the 380V power supply and choice the MMA function and turn on the current potentiometer before measuring the driver waveform to IGBT.

Drive waveform is measured as the Figure below:

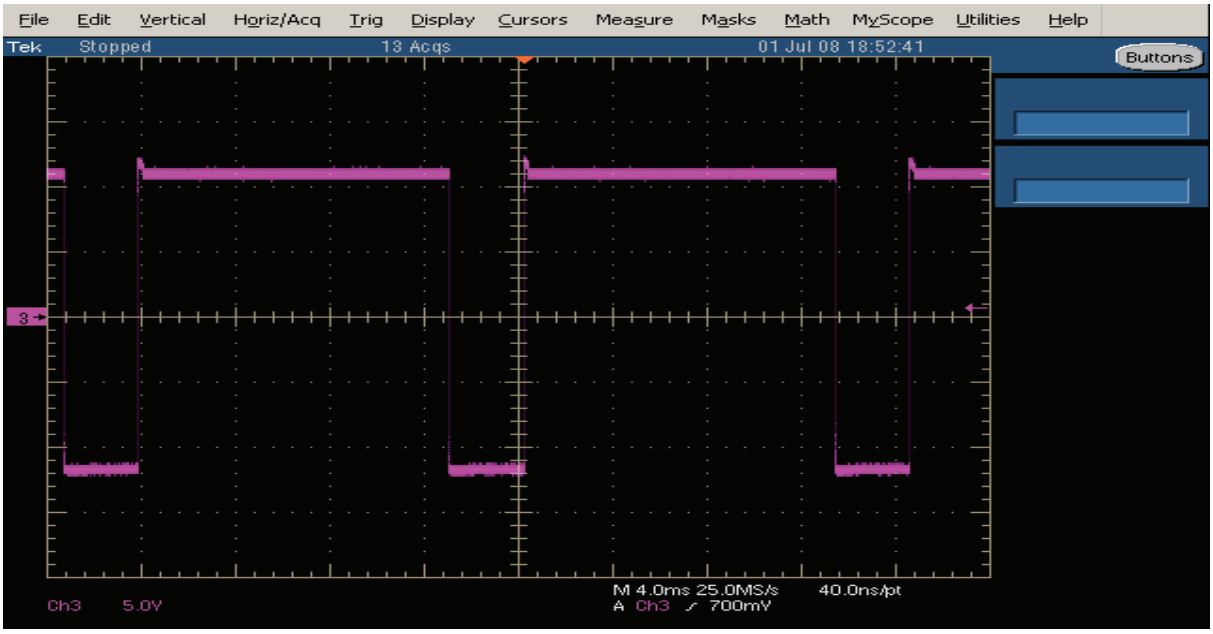


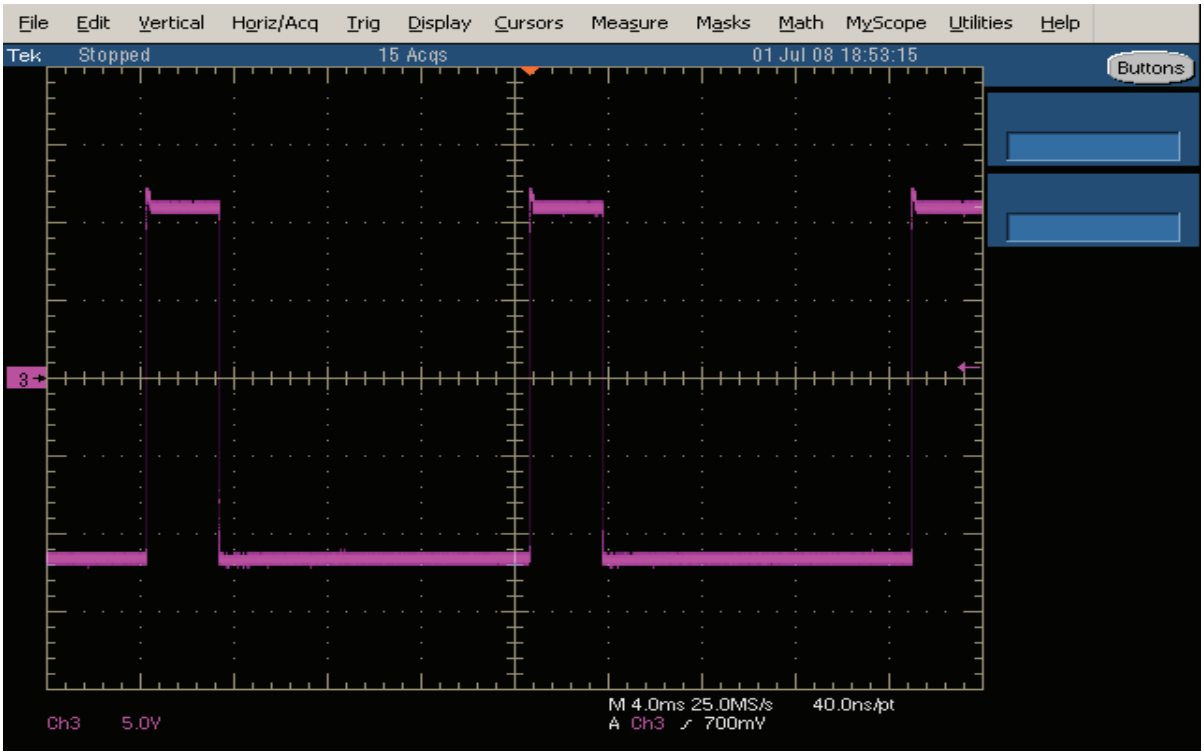
OUTPUT RECTIFIER BOARD 8.066.776-C



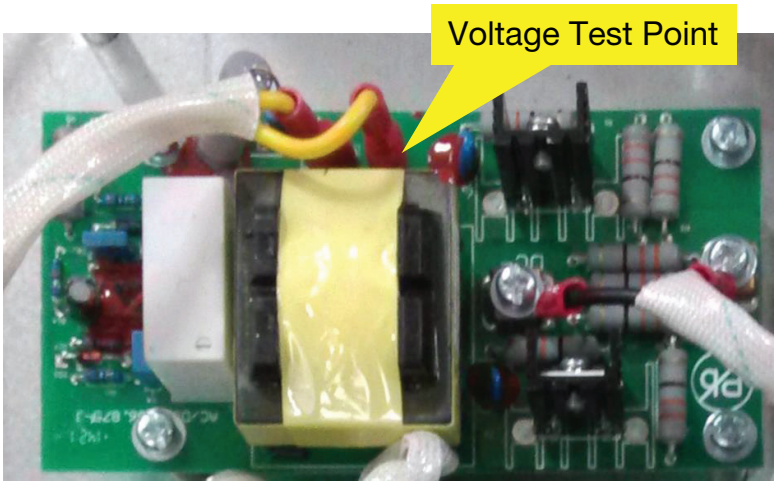
1. The module of the output rectify is the full-bridge rectifier, please refer to the main circuit schematics.
2. RC Filter circuit can reduce the over-voltage of diode.
3. The function of the auxiliary power circuit 8.066.875-J is used to improve the load ability and keep the stability of arc.
4. The DC+, DC- output after secondary rectifier are connected to the AC IGBT groups. The two IGBT groups in the secondary circuit on and off alternately, which could inverter the DC to AC.
5. When you choice DC out (use the DC&AC switch), the IGBT DC+ is open, but DC- is not.
6. According the connective way between the terminal of the output and the torch, you can select DC or AC. When you select AC, the IGBT DC+ and the IGBT DC- on and off alternately.
7. Attention: the control cable of the IGBT can not be forgotten to connect.
8. Each of the drive waveform from DC+, DC- as the follow Fig, when you select the AC level. The open time of for on and off and clean-up effect are relating with the clean-up potentiometer.
9. The waveforms are shown in the follow Figure.

Follow Figure



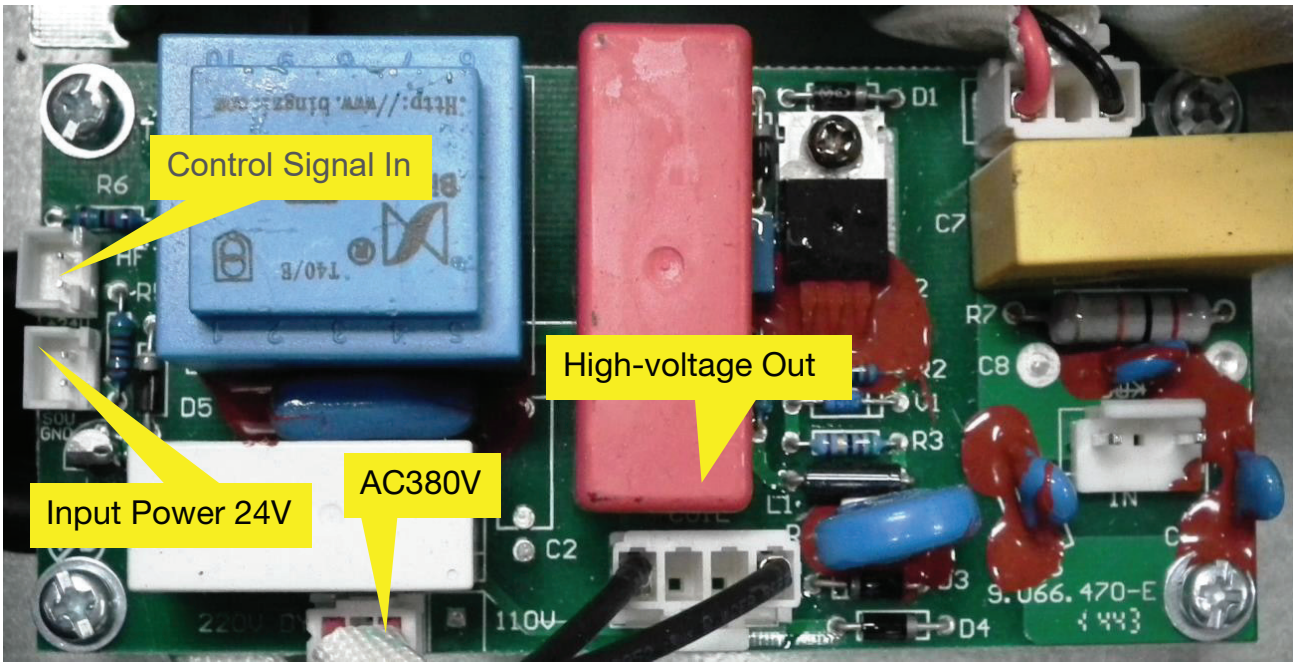


AUXILIARY POWER BOARD 8.066.875-J



1. TR1 and TR2 is connected to transformer secondary wire, when the output is no load, there is not assistant voltage.
2. DC- and DC+ are the assistant voltage output.

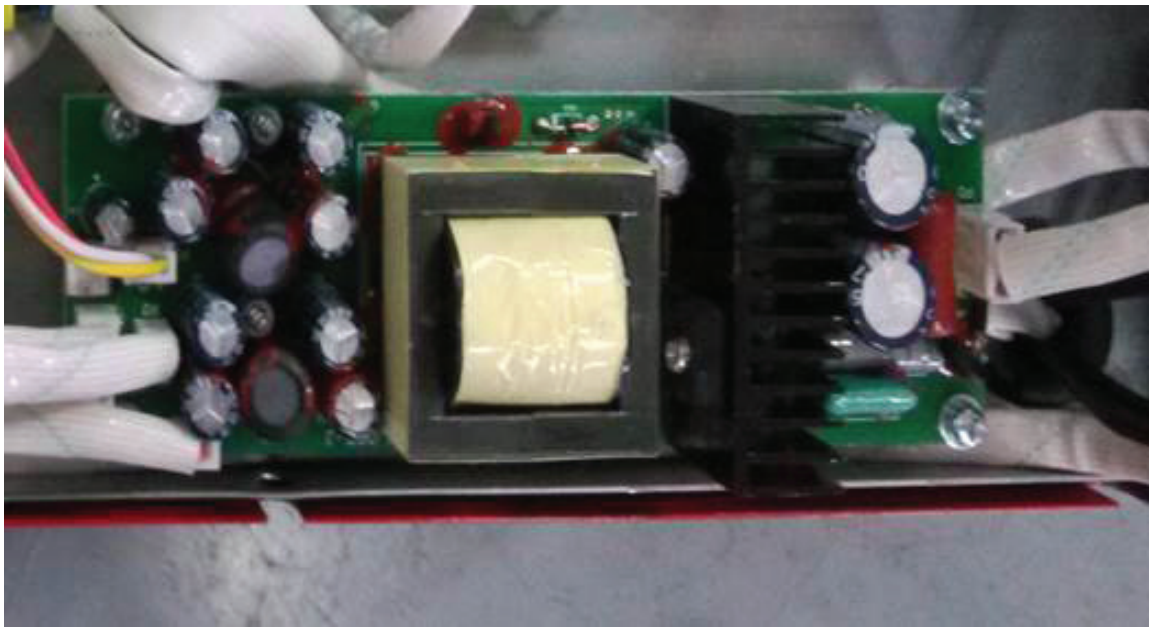
HIGH-FREQUENCY AND HIGH-FREQUENCY ABSORB BOARD 9.066.470-E



When there is no High-voltage out:

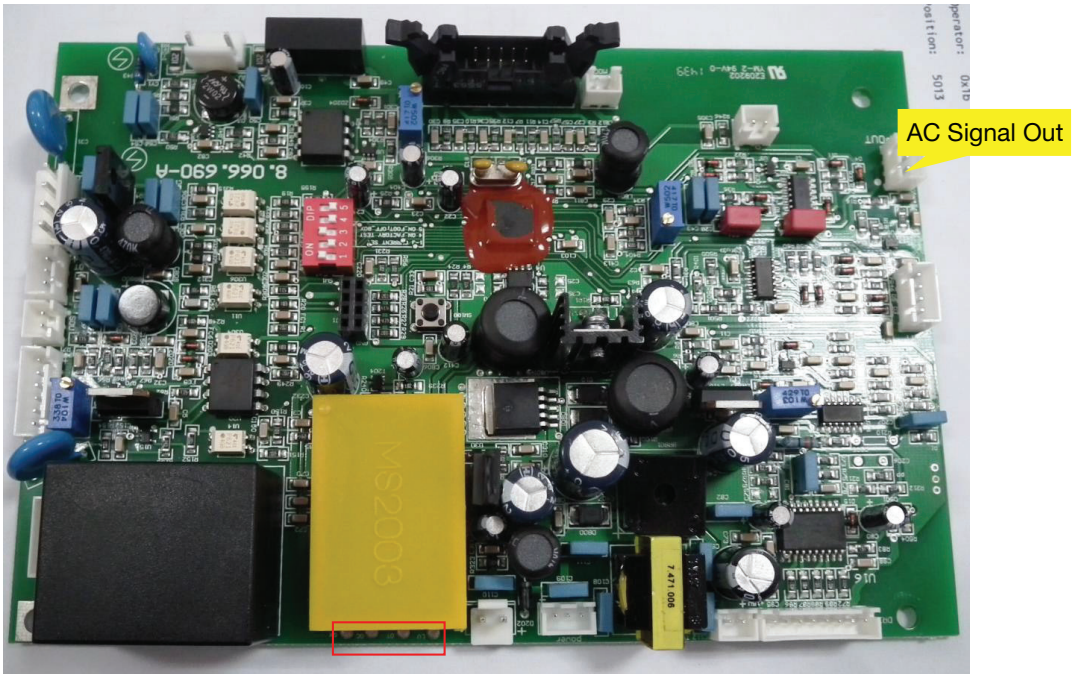
1. Check the control signal in and DC24v, V3 2N5551 is not damaged.
2. AC380V input correctly.
3. The Varistor and Capacitors are used to reduce RF interference, and to protect power from TIG fire sparks.

SWITCH POWER BOARD 8.066.875-J



1. There are five DC outputs, DY1 is +24V, DY2 is +24V, POWER/FJ is ±24V, NTCS is +15V;
2. When there isn't output, please check the DC 310V input first.

CONTROL BOARD 8.066.690-C



1. When alarm lamp is light, do not turn off the machine in order to find the fault.
2. **Over Current** When you test there is the voltage from the 7th pin of the yellow chip as the figure.
3. **Over Voltage** When you test there is the voltage from the 8th pin of the yellow chip as the figure.
4. **Low Voltage** When you test there is the voltage from the 9th pin of the yellow chip as the figure.
5. **Over Hot** When you test there is the voltage from the 10th pin of the yellow chip as the figure.
6. **The chip is broken**, when you test there is the voltage from two or more pins on it.

Over Current

The secondary invert module may be broken, or the MUR on the 8.066.776-c board was broken, or the main transformer or the 9.066.947-E board was broken.

Over Voltage

Maybe the power supply is too high; you need to keep the power supply around 380v (220v).

Low Voltage

Maybe the power supply is too low, or the power connection is not good, or the rectifier bridge marked QL1 has the same problems.

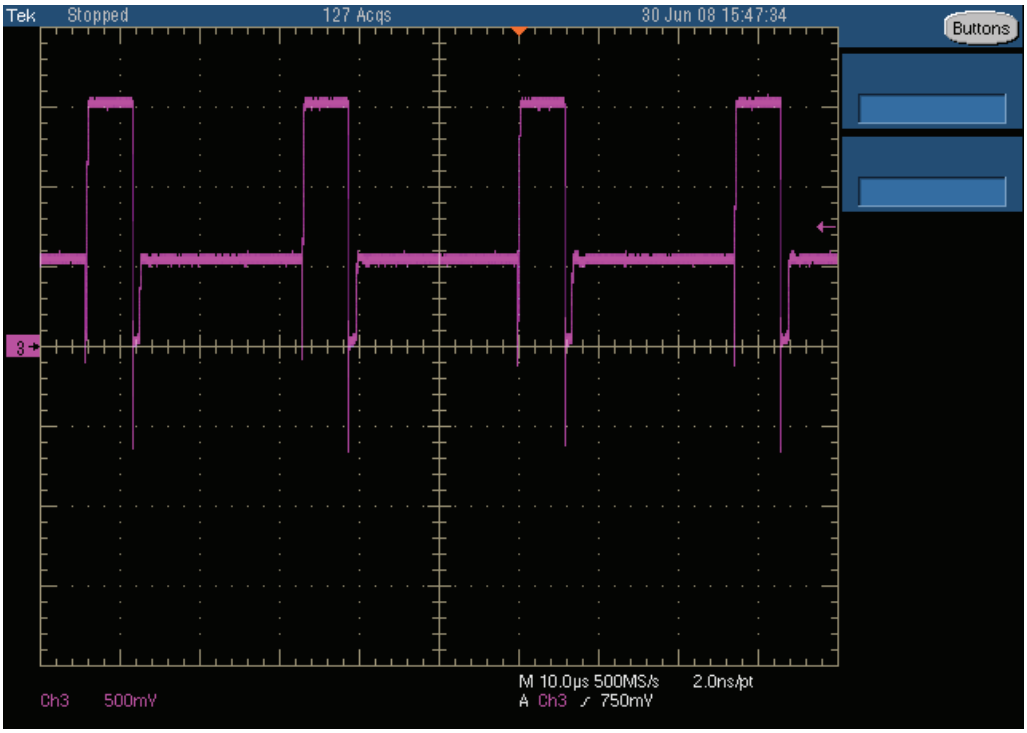
Over Hot

Because of the machine working with over loading, or cooling fan was broken or poor ventilation.

7. When alarm lamp is off, the output pulse-signal is normal, and the 19th pin of U1 on power board is also normal, but no overload output.

Remove the 380V voltage; please test the 13th, 14th, 17th, 18th pin of 3895, the Correct Waveform is figure 11.

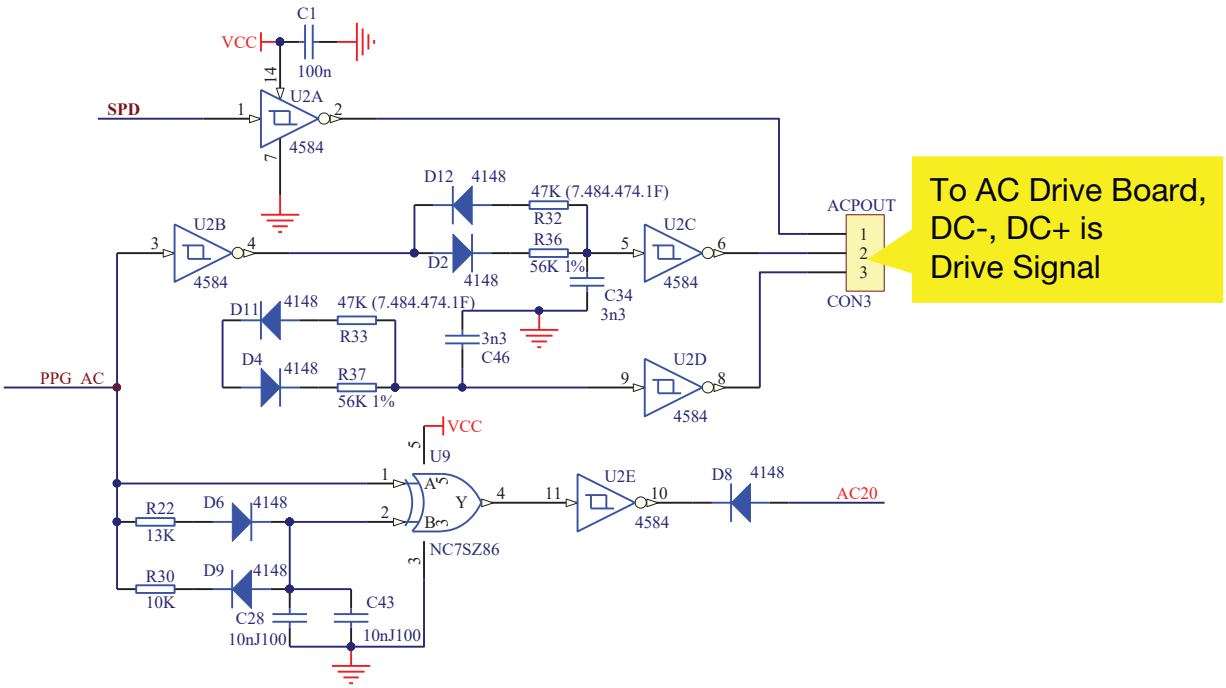
CONTROL BOARD



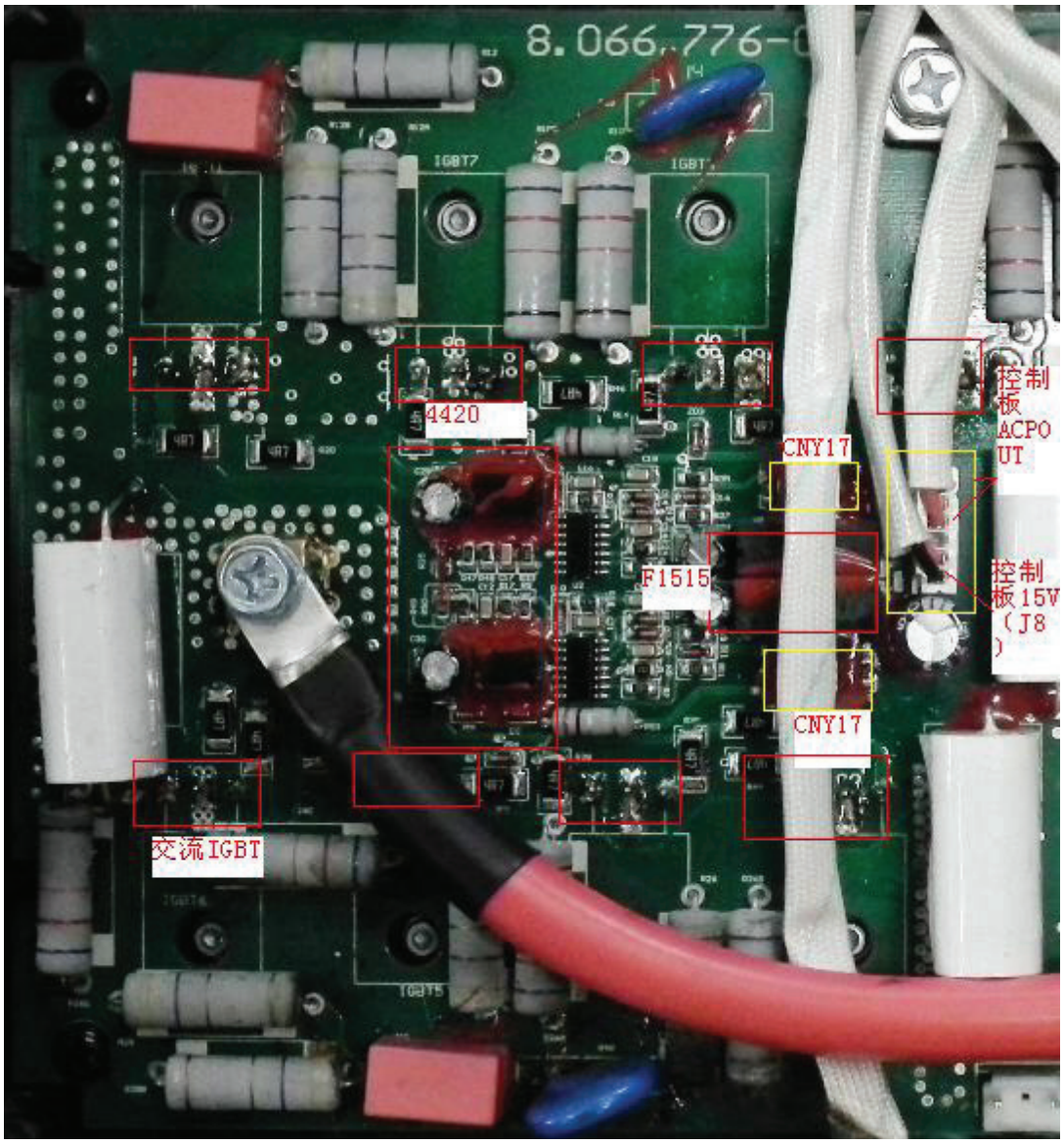
In the normal service, maybe you can find problem following ways:

1. When the machine can not weld in the AC way, you can test whether the DC- or DC+ is right. If DC+ is right, but DC- isn't output, we can know that the DC+ IGBT is well, maybe the DC- IGBT have some problems or adjust the clean up potentiometer. Contrariwise, like this principle as well. Please refer to the Fig 12.

2. When the DC-, DC+ isn't output, if the four pin of PWM chip UCC3895 output waveform is correct, may be the DC IGBT was broken.



AC IGBT DRIVE BOARD 8.066.776-C



Two AC drive signals are amplified by the U3.U4 TC4420

1. When you replace AC modules, please clean the heat sink and smear a little thermal silica gel and screw down the modules.
2. DC-, DC+ Outlet drive the module, the 4.7Ω is the grid resistance which is connected to the grid of IGBT.
3. Each of the drive waveform from DC+, DC- as the following figure, when you select the AC level. The open time for on / off and clean-up effect are related to the clean-up potentiometer.

The waveforms are shown in the following Fig 15.

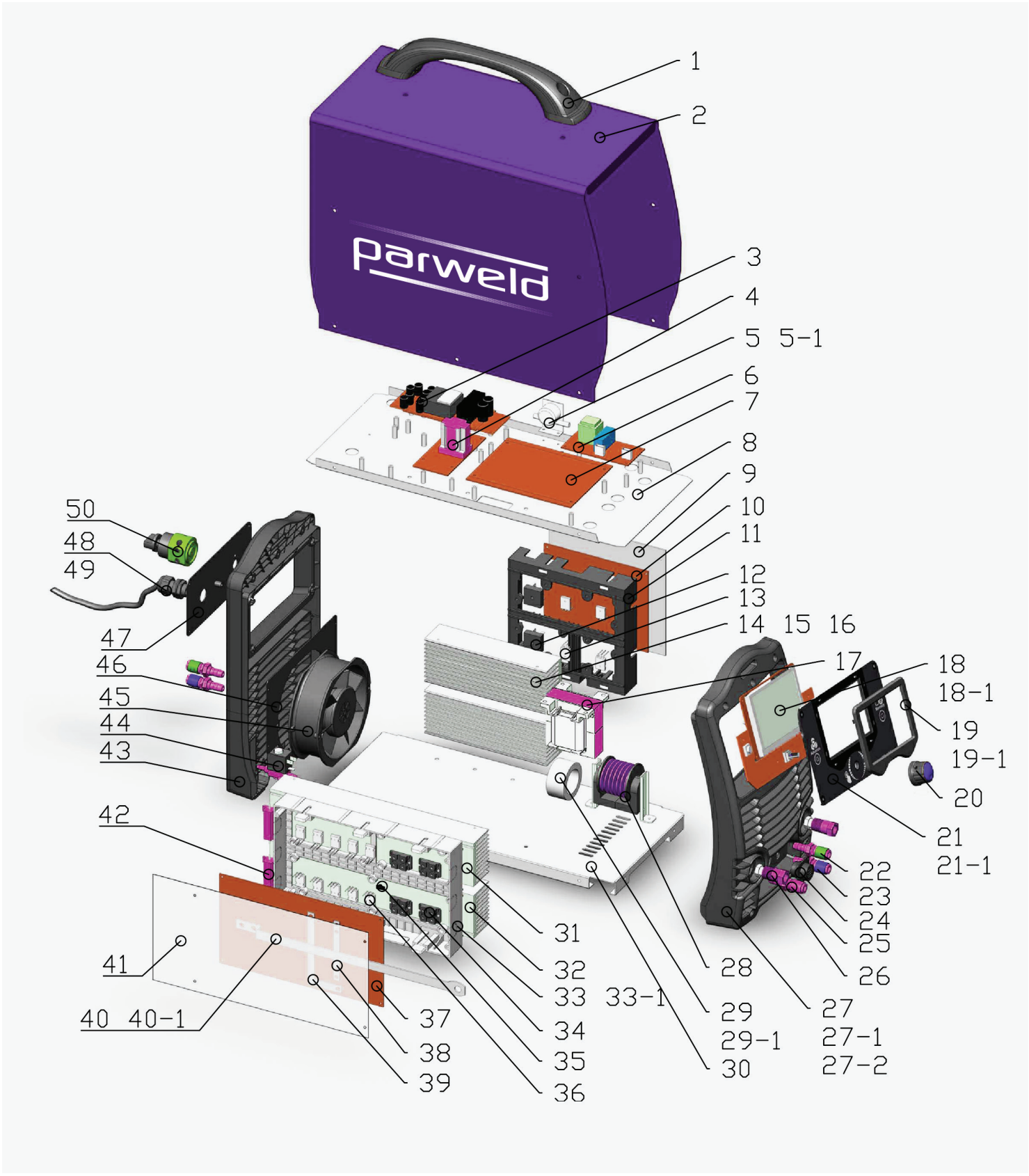
FAULT FINDING

S/N	Troubles		Reasons	Solution
1	Turn on the power source, and fan works, but the power pilot lamp is not on.		The power light damaged, or connection is not good.	Check and repair Pr7.
			The transformer of power is broken.	Repair or change the transformer.
			Control PCB failures.	Repair or change the control Pr4.
2	Turn on the power source, and the power pilot lamp is on, but fan doesn't work.		There is something in the fan.	Clear out.
			The start capacitor of fan damaged.	Change capacitor.
			The fan motor damaged.	Change fan.
3	Turn on the power source, the power pilot lamp is not on, and fan doesn't work.		No power supply input.	Check whether there is power supply.
			The fuse inside the machine damaged.	Change it (3A).
4	The number on the display is not intact.		The LED in the display is broken.	Change the LED.
5	The max and min value displayed doesn't accord with the set value.		The max value is not accordant (refer to §3.1).	Adjust potentiometer Imaxin the current meter.
6	No no-load voltage output (MMA).		The machine is damaged.	Check the main circuit and the Pr4.
7	Arc can not be ignited (TIG).	There is spark on the HF igniting board.	The welding cable is not connected with the two outputs of the welder.	Connect the welding cable to the welder's output.
			The welding cable damaged.	Repair or change it.
			The earth cable connected unstably.	Check the earth cable.
			The welding cable is too long.	Use an appropriate welding cable.
			There is oil or dust on the workpiece.	Check and remove it.
		There is not spark on the HF igniting board.	The distance between tungsten electrode and workpiece is too long.	Reduce the distance (about 3mm).
			The HF igniting board does not work.	Repair or change Pr8.
			The distance between the discharger is too short.	Adjust this distance (about 0.7mm).
			The malfunction of the welding gun switch.	Check the welding gun switch, control cable and aero socket.
8	No gas flow (TIG).		Gas cylinder is close, or gas pressure is low.	Open or change the gas cylinder.
			Something in the valve.	Remove it.
			Electromagnetic valve is damaged.	Change it.

FAULT FINDING

S/N	Troubles	Reasons		Solution
9	Gas always flows.	The gas-test on the front panel is on.		The gas-test on the front panel is off.
		Something in the valve.		Remove it.
		Electromagnetic valve is damaged.		Change it.
		The adjustment knob of pre-gas time on the front panel is damaged.		Repair or change it.
10	The welding current can not be adjusted.	The welding current potentiometer on the front panel connection is not good or damaged.		Repair or change the potentiometer.
11	No AC output while selecting “AC”.	The power PCB is in trouble.		Repair or change it.
		The AC drive PCB damaged.		Change it.
		The AC IGBT module damaged.		Change it.
12	The welding current displayed isn’t accordant with the actual value.	The min value displayed isn’t accordant with the actual value. (Please refer to §3.1)		Adjust potentiometer Imin on the power board.
		The max value displayed isn’t accordant with the actual value. (Please refer to §3.1).		Adjust potentiometer Imax on the power board.
13	The penetration of molten pool is not enough.	The welding current is adjusted too low.		Increase the welding current.
		The arc is too long in the welding process.		Use 2T operation.
14	The alarm light on the front panel is on.	Overheat protection.	Two much welding current.	Reduce the welding current output.
			Working time too long.	Reduce the duty cycle (work intermittently).
		Over-voltage protection.	Power supply fluctuates.	Using the stable power supply.
		Low-voltage protection.	Power supply fluctuates.	Using the stable power supply.
			Too many machines using power supply in the same time.	Reduce the machines using power supply at the same time.
		Over-current protection.	Unusual current in the main circuit.	Check and repair the main circuit and drive Pr6.

EXPLODED VIEW AND SPARE PART LISTS



EXPLODED VIEW AND SPARE PART LISTS

Item No.	Part No.	Description	QTY
1	8253040	Handle	1.00
2	8301581	Cover	1.00
3	5496570-C	Power supply PCB	1.00
4	5496875-L	Output rectifier PCB	1.00
5	7251007	Water Valve	1.00
5-1	8123071	Water Valve Mounting Panel	1.00
6	5496470-M-4	HF Ignition PCB	1.00
7	5496828-Z	Control PCB	1.00
8	8062581	PCB Mounting Panel	1.00
9	8306262-C	Sealing plate	1.00
10	5496947-G	Main PCB	1.00
11	8746029	Heat Sink Mounting Box	1.00
12	7411350	Rectifier Bridge	2.00
13	7425620	IGBT	4.00
14	8422653-A	Heat Sink (I)	1.00
15	8422654	Heat Sink (II)	1.00
16	8422655-A	Heat Sink (III)	1.00
17	6185700	Main Transformer	1.00
18	7122500	LCD	1.00
18-1	5496641-B	Front PCB	1.00
19	8303572	Protection Cover for LCD	1.00
19-1	8303080	Protection Panel	1.00
20	7458043	Knob	1.00
21	8306572	Front Panel Sealing Plate	1.00
21-1	8103572	Front label	1.00
22	8462451	Quick Connector	2.00
23	8462450	Quick Connector	2.00
24	7132114-A	14 Pin Aero-socket	1.00
25	8462124	Femal Quick Connector	1.00
26	7152315-A	Euro connector	2.00
27	8069998	Plastic Front Panel	1.00
27-1	8104572	Model Type Label	1.00
27-2	8104582	Output Label	1.00
28	6174451-A	HF Coupler	1.00
29	6271260	Inductance	1.00
29-1	8751366	Inductance Insulation Plate	1.00
30	8055581	Base Panel	1.00
31	8422261	Heat Sink (I)	1.00
32	8422262	Heat Sink (II)	1.00
33	8746040	Heat Sink Mounting Box	1.00
33-1	8123040	Mounting Block	11.00
34	7421681	Fast Recovery Diode	4.00
35	7231280	Thermostat	1.00
36	7425617	IGBT	10.00
37	5496720-B	AC/DC mounting PCB	1.00
38	8511420	Copper Connector	1.00
39	8511421	Copper Connector	1.00
40	8511430-A	Output Copper	1.00
40-1	7321103-A	Hall Current Sensor	1.00
41	8306270	Sealing plate	1.00
42	7445311	Resistance	2.00
43	8068998	Plastic Rear Panel	1.00
44	7253018	Solenoid Valve	1.00
45	7720008	Fan	1.00
46	8122581	Fan Mounting Plate	1.00
47	8307450	Rear Panel Sealing Plate	1.00
48	7155022	Power Cable Clamp	1.00
49	7555311	Power Cable	3.20
50	7232011	Switch	1.00

parweld
WELDING THE FUTURE

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