Smootharc

TIG 185 DC
Service manual

BOC
A Member of The Linde Group

Recommended Safety Precautions

Electrical Shock

- Never touch 'live' electrical parts.
- Always repair or replace worn or damaged parts.
- Disconnect power source before performing any maintenance or service.
- Earth all work materials.
- Never work in moist or damp areas.

Avoid electric shock by:

- Wearing dry insulated boots.
- Wearing dry leather gloves.
- Working on a dry insulated floor where possible.

Warranty Information

Terms of Warranty

BOC provides a warranty for the Smootharc TIG 185 DC machine sold against defects in manufacture and materials.

- Valid for 18 months from date of purchase.
- An authorised BOC Service Agent must carry out warranty repairs.
- Freight, packaging and insurance costs are to be paid for by the claimant.
- No additional express warranty is given unless in writing signed by an authorised manager of BOC.
- This warranty is in addition to any other legal rights you may have.

Limitations on warranty

The following conditions are not covered:

- Non compliance with operating and maintenance instructions such as connection to incorrect faulty voltage supply including voltage surges outside equipment specs, and incorrect overloading.
- Natural wear and tear, and accidental damage.
- Transport or storage damage.

The Warranty is void if:

- Changes are made to the product without the approval of the manufacturer.
- Repairs are carried out using non-approved spare parts.
- A non-authorised agent carries out repairs.

Warranty repairs

BOC or their Authorised Service Agent must be informed of the warranty defects, and the product returned within the warranty period.

- Before any warranty work is undertaken, the customer must provide proof of purchase and serial number of the equipment in order to validate the warranty.

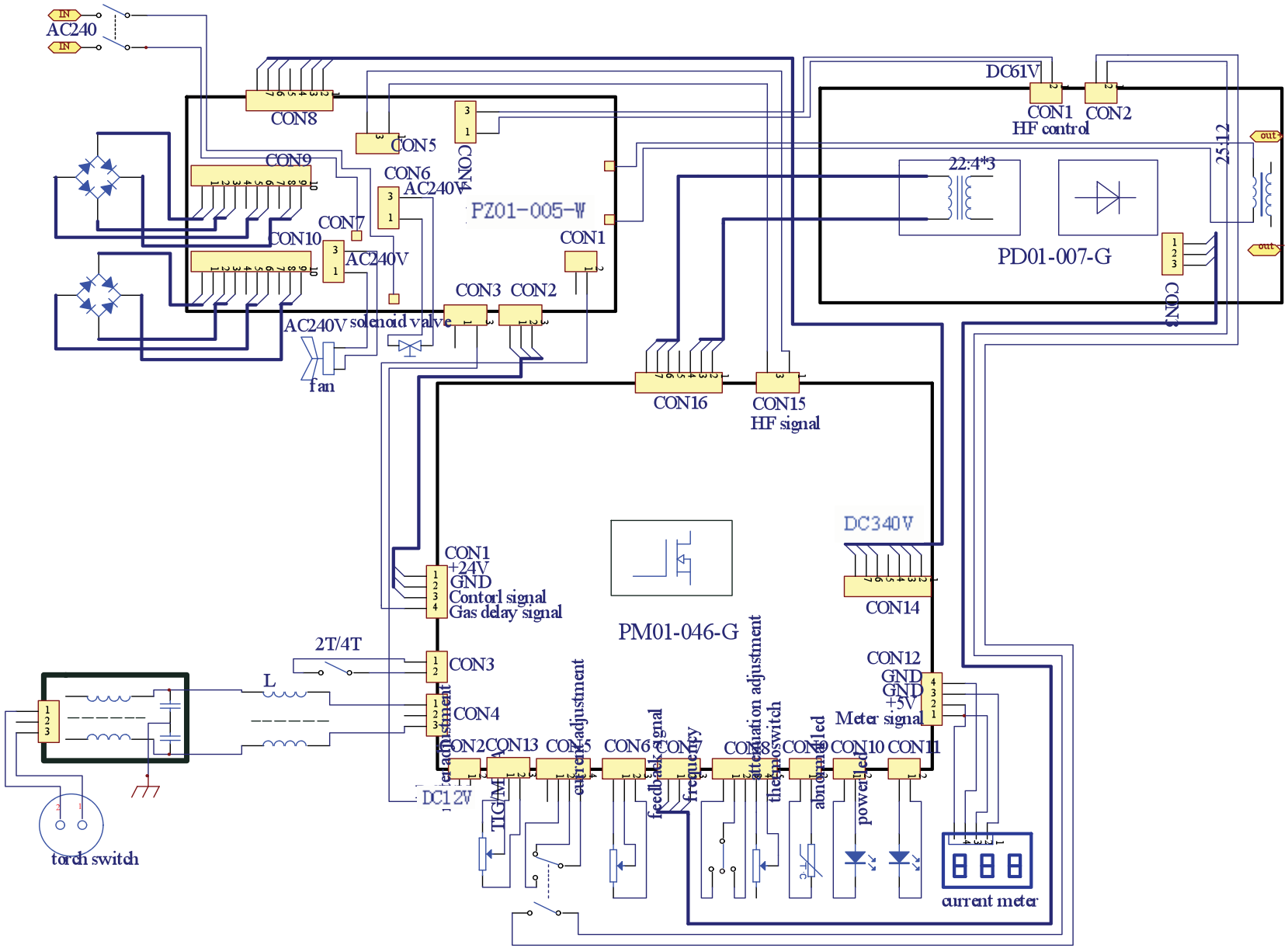
The parts replaced under the terms of the warranty remain the property of BOC.

Modification of the 15A primary input plug or fitment of a lower rated primary input plug will render the warranty null and void.

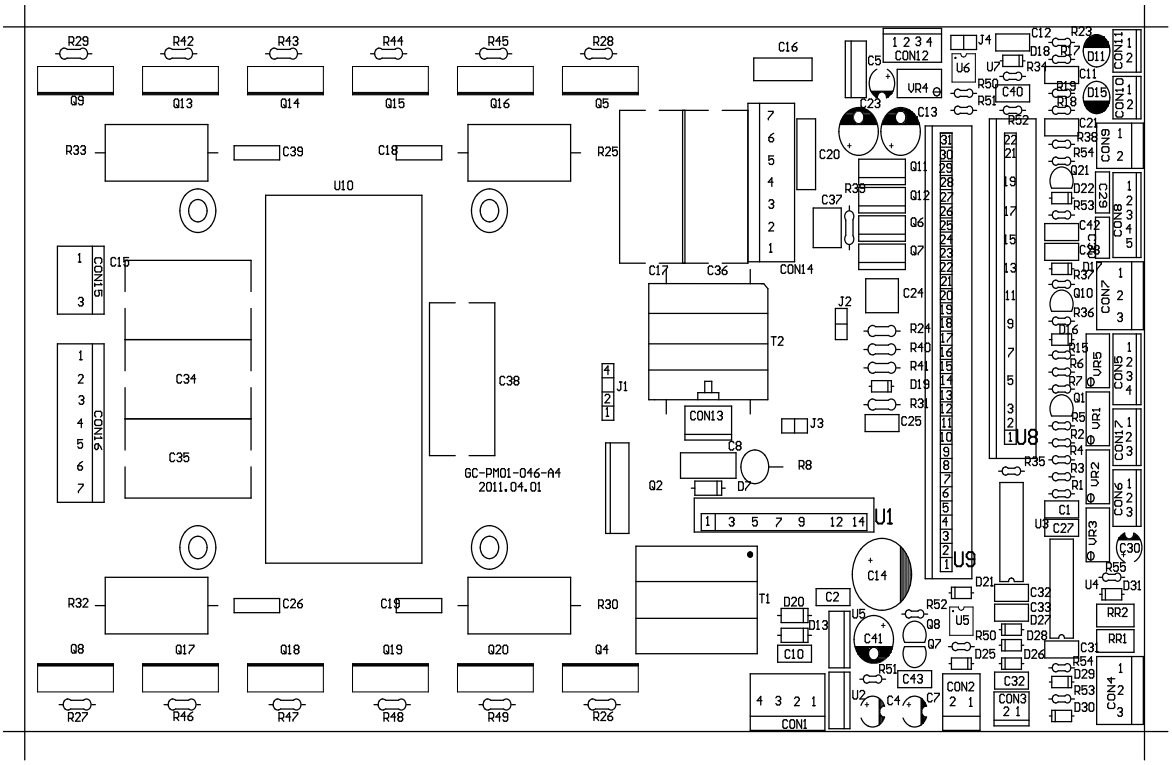
Contents.

1.0 Fundamental schematic and circuit diagrams

1.1 General wiring diagram



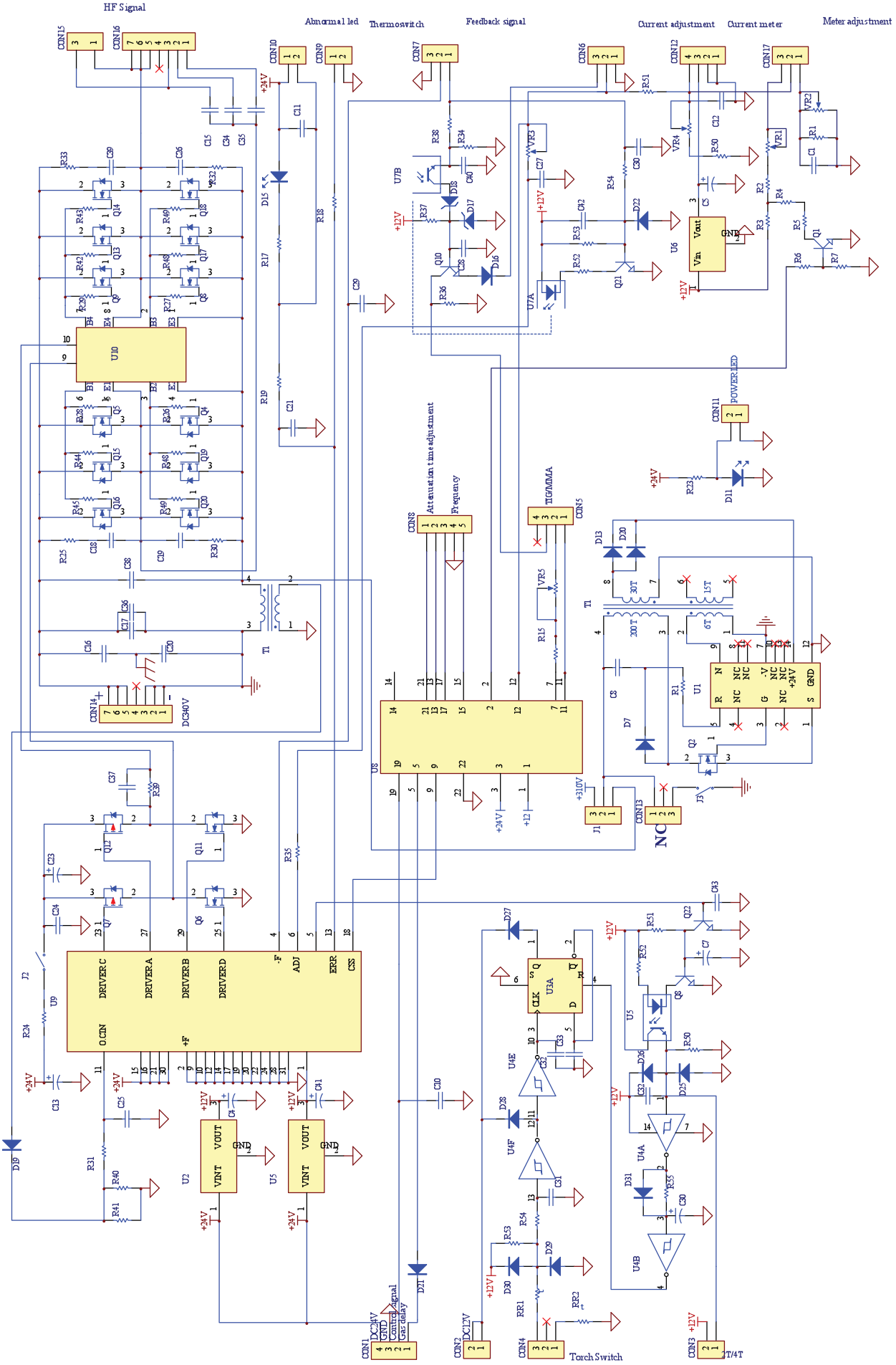
1.2 First rectifier board schematic



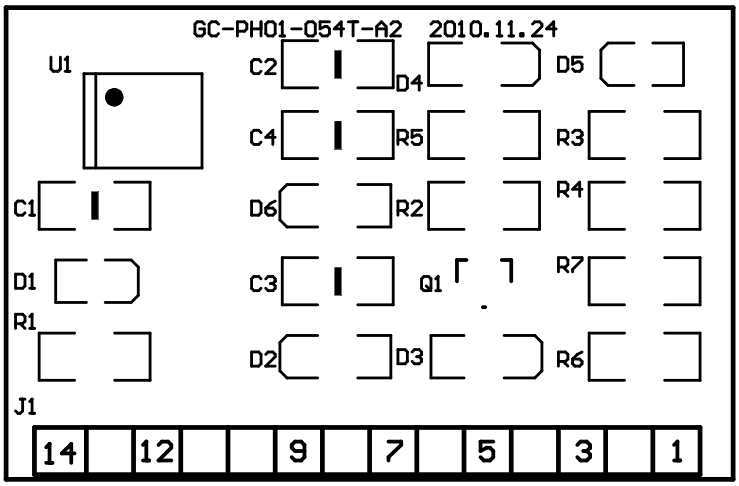
Ser. No.	Pin	Description
CON1	1	Under gas delay, the output is 24V when TIG works
	2	Control works the signal, output the high frequency when TIG
	3	GND
	4	DC24V
CON2	1	Pin 1 and Pin 2 is short frequency when TIG
	2	works circuit, output high
CON3	1	2T°XHigh frequency 12V°A4T---Low frequency 0V
	2	DC12V
CON4	1	Connect to ground by PTC-12
	2	NC
	3	High frequency
CON5	1	Pin 1 and Pin 3 connect to the TIG torch, Pin 2
	2	and Pin 3 connect to the MMA torch
	3	
	4	NC
CON6	1	GND
	2	The rated voltage is adjustable
	3	Provide power supply to the potentiometer
CON7	1	GND
	2	Current feedback
	3	Voltage feedback
CON8	1	Connect to the attenuation potentiometer
	2	
	3	When connect to Pin4, It is low voltage
	4	GND
	5	When connect to Pin4, it is middle voltage
CON9	1	Connect to the thermal switch, connect to the ground when over-heat works
	2	GND

Ser. No.	Pin	Description
CON10	1	DC24V
	2	This port connect to the over-heat indicator
CON11	1	GND
	2	Connect to the power indicator, this pin is high voltage
CON12	1	GND
	2	GND
	3	DC5V
	4	The signal terminal of the digital meter
CON13		NC
CON14	1	GND
	2	GND
	3	GND
	4	NC
	5	DC340V
	6	DC340V
	7	DC340V
CON15	1	Pin 1 and Pin 3 output AC wave(+340V and -340V)
	2	NC
	3	Pin 1 and Pin 3 output AC wave(+340V and -340V)
CON16	1	Inverter AC output
	2	Inverter AC output
	3	Inverter AC output
	4	NC
	5	Inverter AC output
	6	Inverter AC output
	7	Inverter AC output
CON17	1	Low voltage
	2	The signal terminal of the digital meter
	3	The power terminal of the digital meter

1.3 First rectifier board circuit diagram

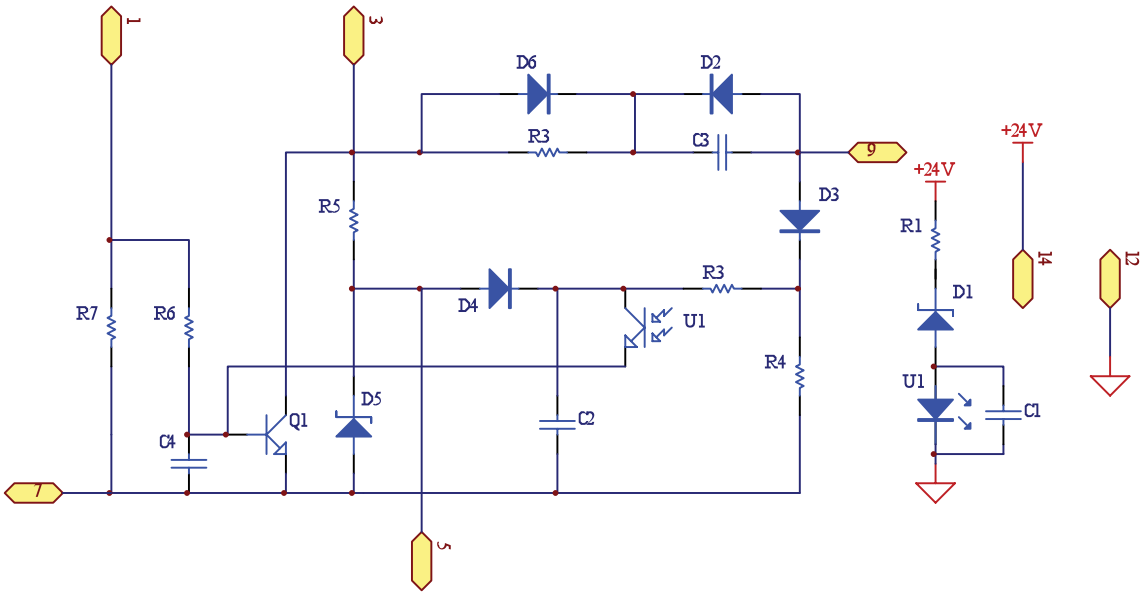


1.4 Aux. module board schematic

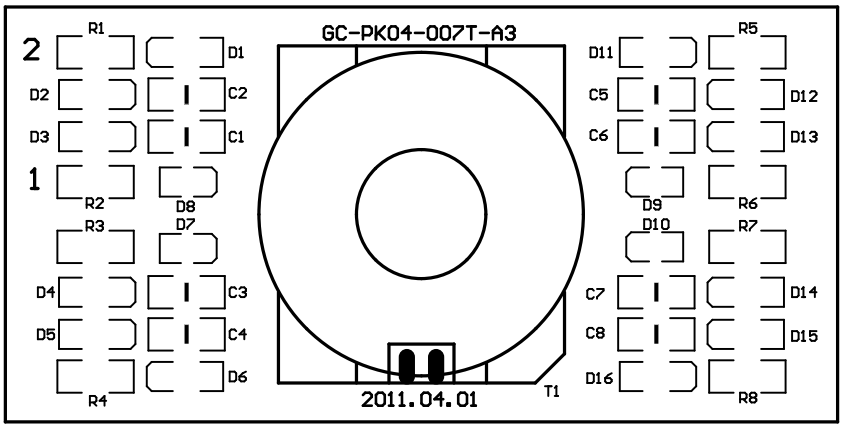


Pin	Description
1	Connect to the MOS “S”
3	DC24V turn on/off
5	DC24V Start
7	GND
9	DC24V and Shut off
12	GND
14	Output DC24V

1.5 Aux. module board circuit diagram

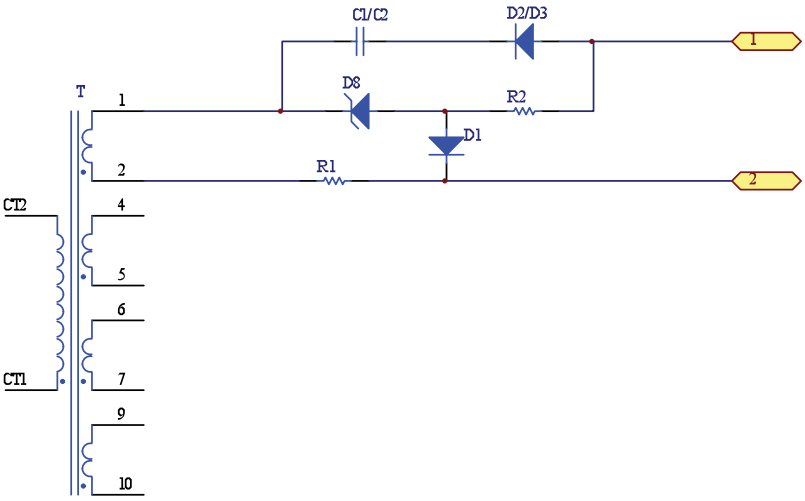


1.6 U10 drive module board schematic

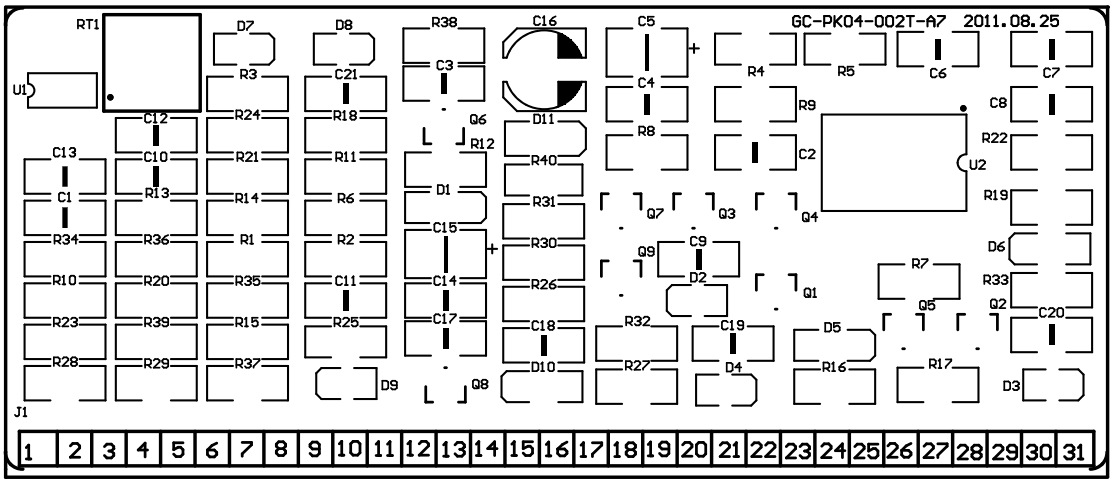


Pin	Description
1	MOS output
2	

1.7 U10 drive module board circuit diagram

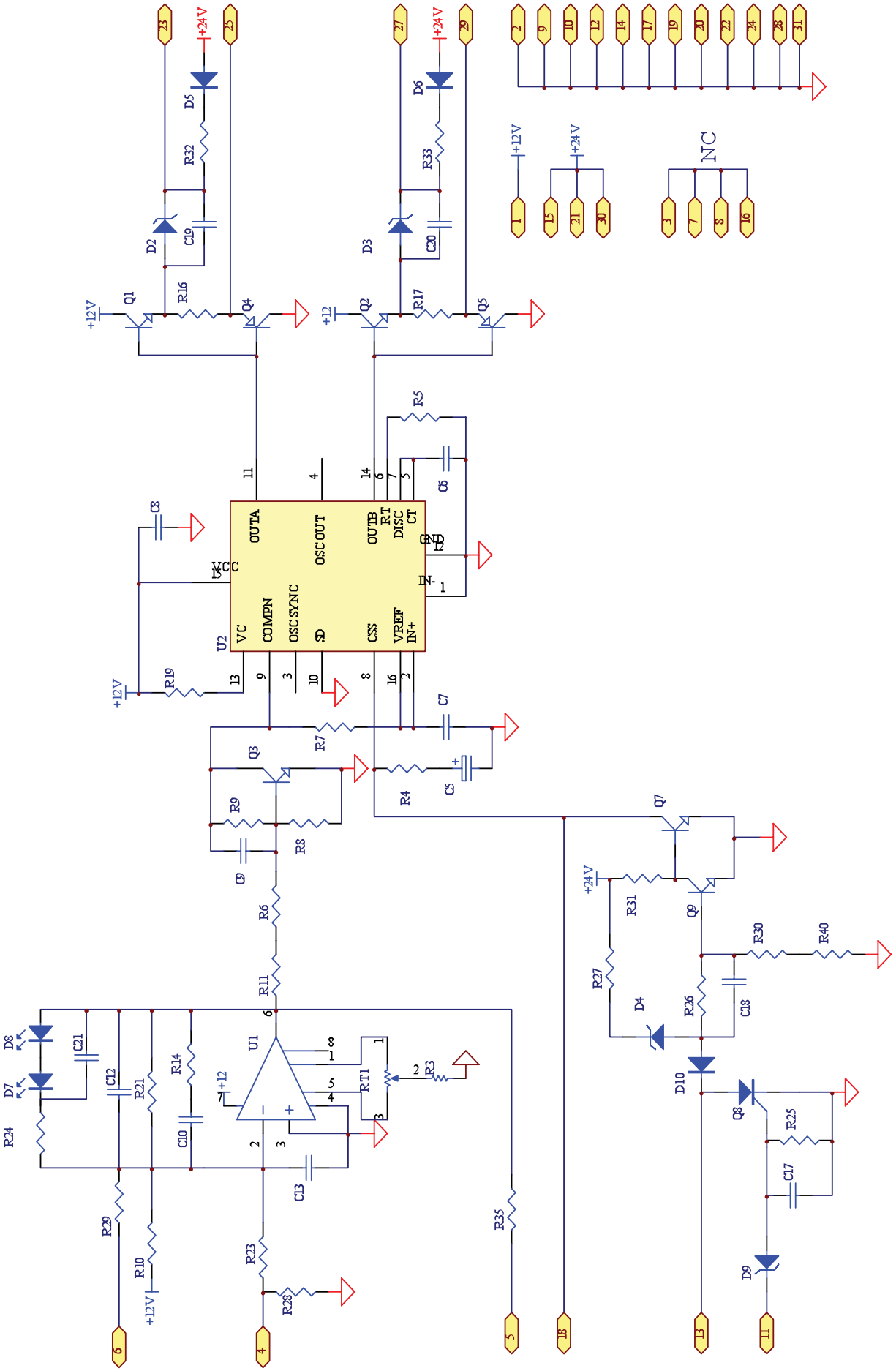


1.8 U9 control module board schematic

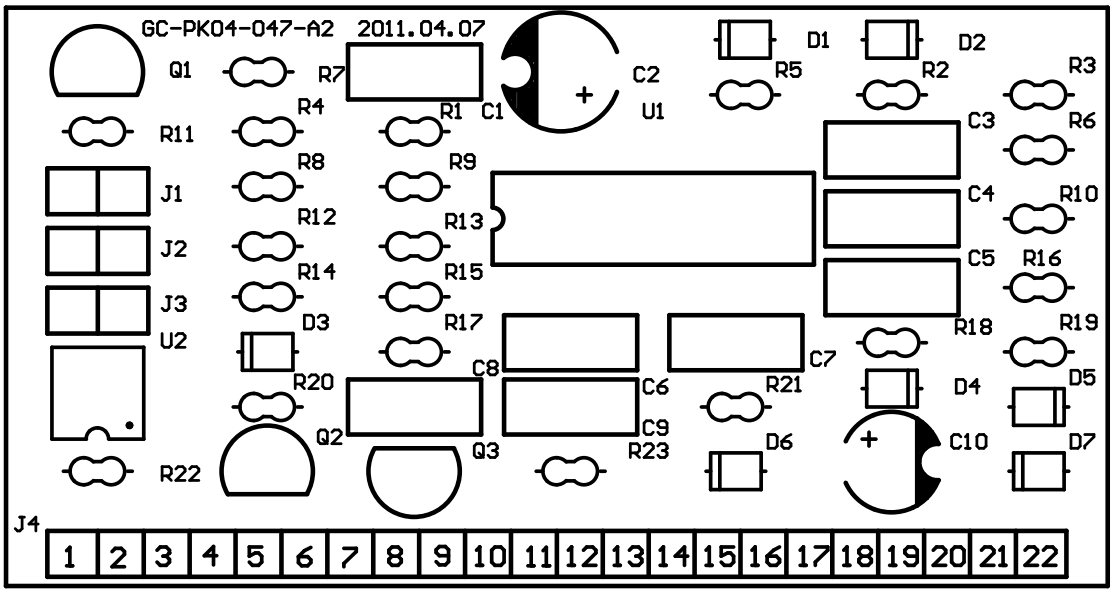


Pin	Description
1	DC+12V
2	GND
3	Not used
4	Voltage Feedback
5	2T/4T Preset Control
6	Given Control
7	Not used
8	Not used
9	GND
10	GND
11	Over-current Protection Monitoring
12	GND
13	Over-heat Protection Monitoring
14	GND
15	DC+24V
16	Not used
17	GND
18	SG3525 Shutdown Control
19	GND
20	GND
21	DC+24V
22	GND
23	SPWM Output
24	GND
25	SPWM Output
26	Not used
27	SPWM Output
28	GND
29	SPWM Output
30	DC+24V
31	GND

1.9 U9 control module board circuit diagram

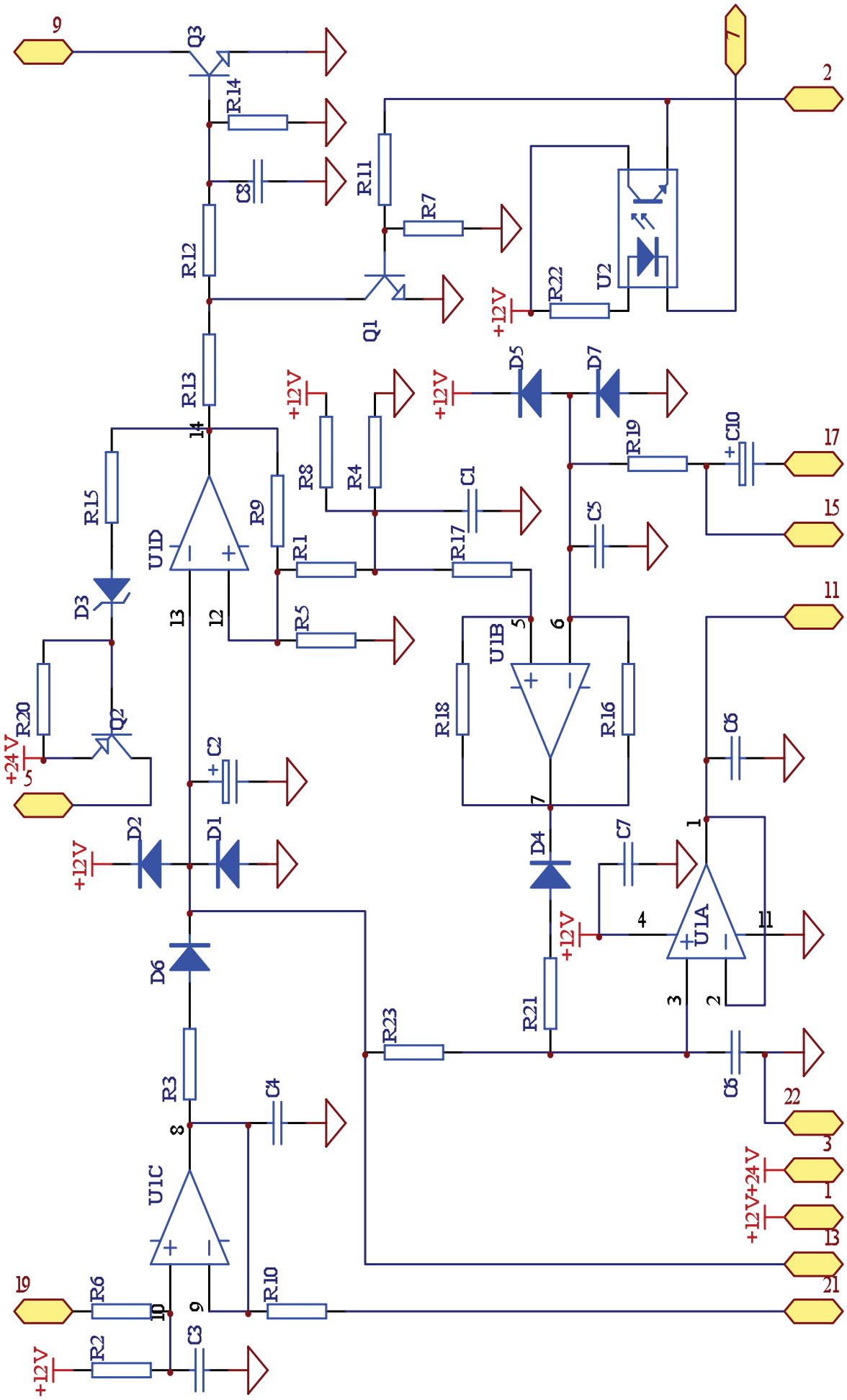


1.10 U8 pulse control module schematic

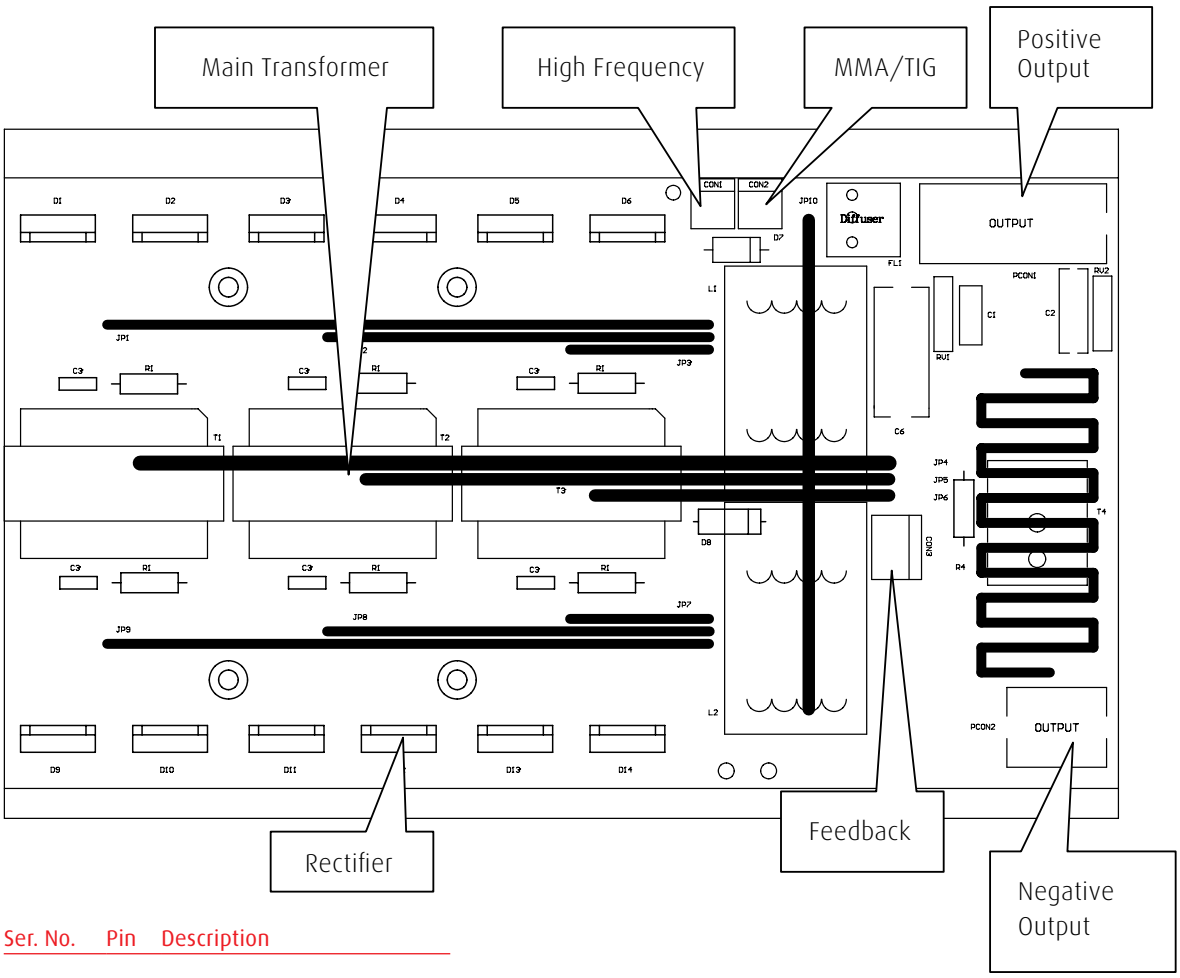


Pin	Description
1	DC+12V
2	MMA/TIG Meter control
3	DC+24V
4	Not used
5	Gas Delay Control
6	Not used
7	(MMA)Supply voltage of current adjustment
8	Not used
9	SG3525 Shutdown Control
10	Not used
11	(TIG)Supply voltage of current adjustment
12	Not used
13	Attenuation time adjustment terminal
14	Not used
15	Frequency switch terminal
16	Not used
17	Frequency switch terminal
18	Not used
19	Control Signal
20	Not used
21	Attenuation time adjustment terminal
22	GND

1.11 U8 pulse control module board circuit diagram

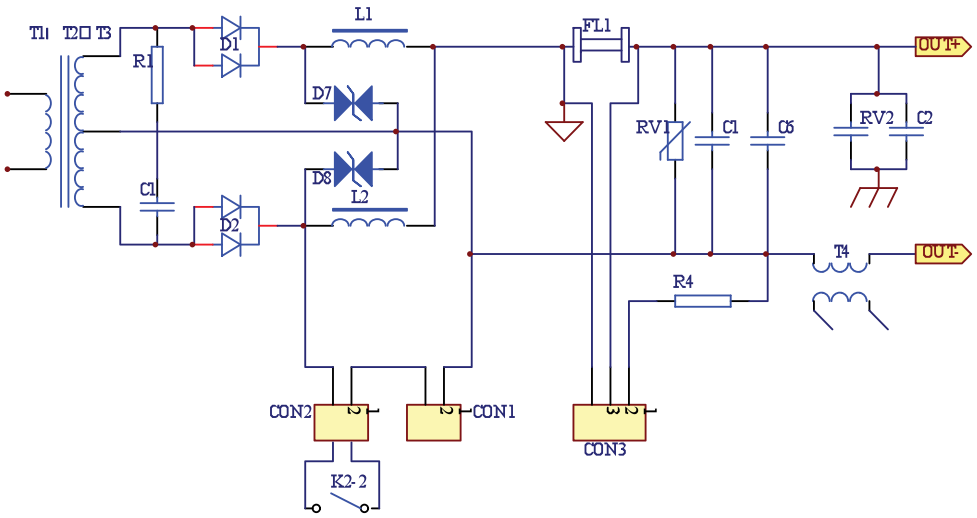


1.12 Second rectifier board schematic

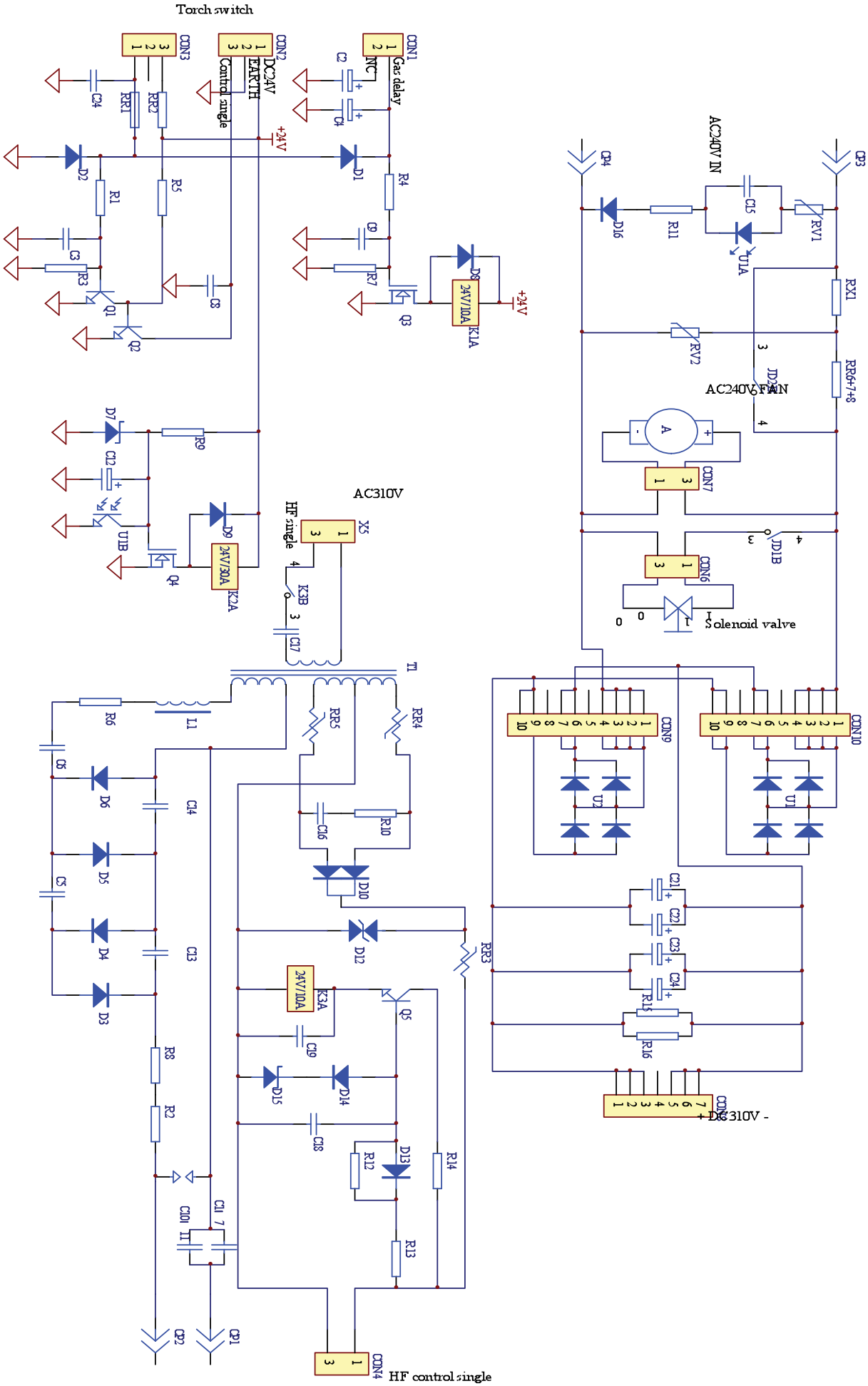


Ser. No.	Pin	Description
CON3	1	Given control
	2	Voltage feedback
	3	GND

1.13 Second rectifier board circuit diagram



1.14 Filtering, high frequency board circuit diagram



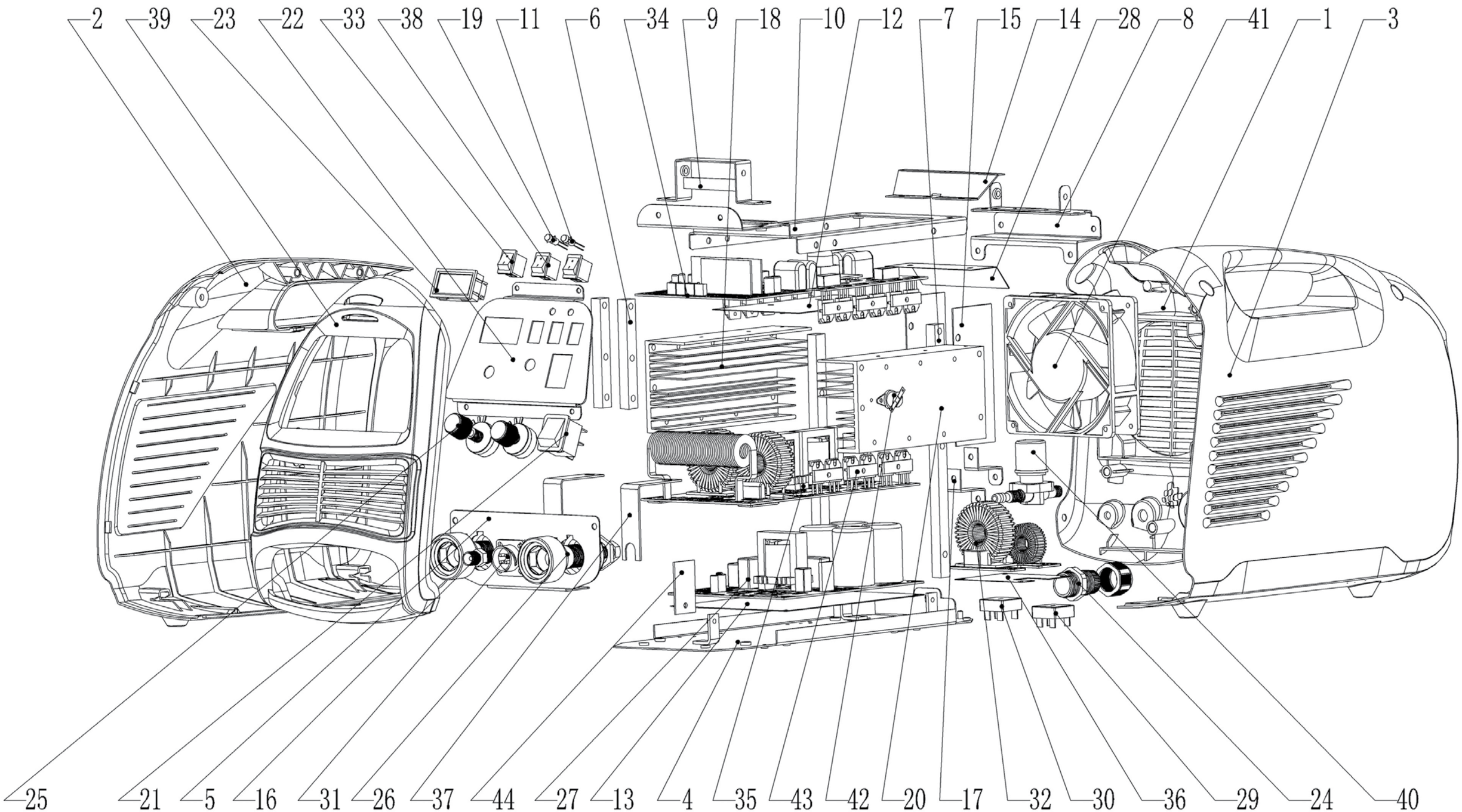
Ser. No.	Pin	Description
CON1	1	NC
	2	Fixed gas delay time (2.5S) when press the switch Pin 2 is 24V voltage on the Q3 is 10V, Q3 open K1 cling, the gas starts to flow
CON2	1	When press the switch, the voltage is 12V; When the switch is shut off, the voltage is 0V
	2	Connect to the ground
	3	DC+24V
CON3	switch	Press the switch, Pin1 and Pin3 is 12V; When the switch is shut off, Pin1 and Pin3 is 0V, Pin2 is NC.
K2	Delay time start relay	When there is 24V relay shuts off
K1	Solenoid valve relay	When the voltage Q3 is over 3V, Q3 is open, the relay cling, the gas flows.
RX1	Resistance	After continuous switching on and off, the resistance is over-heat and shuts off, the machine could work normally only after the resistance cools down for a few minutes
K3	High frequency relay	Under TIG, press the switch, there is no-load voltage, Q5 is open, the relay K3 cling, high frequency initiates, and starts arc.
CON4	Rise voltage, start arc by high frequency	Under TIG, press the switch, there is no-load voltage, Q5 is open, the relay K3 cling, high frequency initiates, and starts arc.

2.0 Troubleshooting and maintenance

	Problem	Possible Reasons	Solution
1	Press the power switch, power indicator, meter, and fans with no data, press the torch without response.	1 Check the circuit is normal, and external power supply (AC240) is OK. 2 Check the power cable, switch, and connector is tightly connected, use a multi-meter to test the plug (PZ01-005-O1 CON10) for DC340V±5V.	1 Check the external power supply. 2 Check the connector.
2	Press the power switch, the power indicator and meter is ok, the fan is abnormal, the machine has no response when pressing the switch.	1 Check the inverter board has DC24V output, use a multi-meter to test the CON4's PM01-001-E12 pin 1 and 2. If it has 24V output, test other areas. 2 Start relay K1 on bottom board does not respond properly (it can be indicated by the solenoid valve jumping). 3 Start relay K2 in power circuit does not respond properly, check optical U1, MOSFET Z24 (Q4) resistor RV1, and whether the relay is damaged or not. 4 Pressing the power button continuously in a short time, results in the field-discharge resistance becoming overheated Power off the machine for several minutes.	1 Check and remove. 2 Check and remove. 3 Check and remove. 4 Turn off the machine for several minutes.
3	Press the power switch, power indicator, meter, and fan works normally. Press the switch of the torch without response.	1 Switch of the torch or the cable is loose. 2 Gas socket is loose or the cable is broken.	1 Check and remove. 2 Check and remove.
4	Turn on the machine normally, without high frequency	1 Pull off the high frequency cable(PM01-001-E12 CON2), use a multi-meter to test the output for DC230. If yes and could start arc, check the starting arc under high frequency. a) Check whether the high frequency cable connection to the bottom board (PZ01-005-O1 CON4) and cable for arc start is not loose. b) Check if the high voltage discharge nozzle is connected correctly, or the surface is oxidized. c) Check if the high voltage components (D3-D6), high voltage output capacitors (C7, C10, C11) are not damaged. d) Check the high frequency relay on the bottom board is responding properly. 2 Check for the DC230 output, possibly the inverter circuit is abnormal. a) Check if the control module, has output for the drive signal or works normally. b) Check if the inverter and main current cable is not loose PM01-001-E12 CON1 .	1 Check and replace. 2 Check and replace.
5	Turn on the machine normally, the abnormal indicator is on.	1 The over-heat protection is activated, turn off the machine, and could restart the machine successfully while the power indicator is off. 2 The over-heat protection works, the machine will be ok after 2-3 minutes. 3 The inverter circuit and start arc is abnormal, turn off the machine and pull off the plug of the high frequency start arc power in PM01-001-E12, then turn on the machine and press the switch. a) If the abnormal indicator does not go on, the transformer T1 on the PZ01-005-O1 or D3-D6 is damaged. b) If the abnormal indicator is on, then pull off the plug CON1 for power supply in the PM01-001-E12 If the light is still on, some of the MOSFET components are damaged. If the light goes off, the rectifier pipe on PZ01-005-O1 or the transformer is damaged. c) Check if the feedback circuit is open-circuit, check the feedback cable is properly connected.	1 The machine will be ok after turning off the machine for five minutes. 2 Stop the machine for a while. 3 Check and remove.
6	Turn on the machine normally, could start arc, but the weld appears black.	1 Check if the solenoid valve is jammed or damaged. 2 The solenoid valve relay (PZ01-005-W K1) is damaged. 3 Check the torch for wear or damage. 4 Tungsten electrode is in poor condition, or the shielding gas is incorrect.	1 Clean. 2 Check and replace if necessary. 3 Check and replace if necessary. 4 Replace.
7	The welding current is unstable, uncontrollable.	1 The potentiometer is loose or damaged. 2 Filtering capacitor PZ01-005-O1 in the bottom board is leaking or damaged. 3 The welding cable is too long and thin resulting in the unstable current.	1 Check and remove. 2 Check and remove. 3 Increase the cross section of the cable.
8	Skip after turning on the machine.	1 The rectifier silicon bridge is damaged. 2 The power cable is short-circuited.	1 Check and replace. 2 Replace.
9	The high frequency could not stop.	1 High frequency relay (PZ01-005-W K3) is damaged. 2 The output voltage disturbs the voltage.	1 Check and remove. 2 Add capacitor between output and ground.

3.0 Exploded view and component parts list

3.1 Exploded view



3.2 Component parts list for Smootharc TIG 185 DC

Item	Description	Qty	Material Part No.	BOC Part No.
1	BOC rear panel plastic	1	R-16-910220-01-A0	R-16-910220-01-A0
2	Left cover plastic	1	R-17-995299-02-A0	R-17-995299-02-A0
3	Right cover plastic	1	R-17-996299-02-A0	R-17-996299-02-A0
4	BOC bottom case	1	R-18-261880-01-A0	R-18-261880-01-A0
5	Output board	1	R-18-259000-01-A0	Available on request
6	Upright girder	2	R-22-010003-01-A0	Available on request
7	Upright girder	2	R-22-010003-02-A0	Available on request
8	Rear beam fix holder	1	R-25-020101-80-A0	Available on request
9	Front case fix holder	1	R-25-020101-79-A0	Available on request
10	Top sustain	1	R-25-020101-77-A0	Available on request
11	LED	1	R-04-010700-19-00	04-010700-19-00
12	Top panel insulation	1	R-23-010100-15-A0	23-010100-15-A0
13	Bottom panel insulation	1	R-23-010300-16-A0	Available on request
14	Top windbreak board	1	R-23-020102-02-A0	Available on request
15	Side windbreak board	2	R-23-020502-04-A0	Available on request
16	Gas switch connector	1	R-24-031200-11-A0	24-031200-11-A0
17	Fan sustain	2	R-25-020101-78-A0	Available on request
18	Radiator/heatsink	1	R-26-010171-01-A0	GM-02A
19	LED	1	R-04-010700-19-01	04-010700-19-01
20	Radiator/heatsink	1	R-26-010172-01-A0	GM-02B
21	Switch	1	R-07-020000-12-00	R-07-020000-12-00
22	Front panel	1	R-15-030490-01-A0	R-15-030490-01-A0
23	Digital meter	1	R-37-110160-05-01	AB-05 / 37-110160-05-01
24	Cable grommit	1	R-37-190400-07-00	R37-190400-07-00
25	Knob	2	R-37-231220-01-01	37-231220-01-01
26	35mm female socket	2	R-40-160810-01-00	R-40-160810-01-00
27	Bottom panel	1	R-51-PZ01-005-W-RL	Available on request
28	Bottom windbreak board	1	R-52-GT-50-B-RL	Available on request
29	Silicon bridge 10	1	R-52-QL-01-F-RL	Available on request
30	Silicon bridge 13	1	R-52-QL-01-H-RL	Available on request
31	Aviation socket	1	R-52-ZH-02-B-RL	Available on request
32	EMC board	1	R-51-PH02-112-A	R-51-PH02-112-A
33	Boat shaped switch	1	R-07-020000-03-00	07-020000-03-00
34	Top board	1	R-51-PM01-046-G1	PMB-46-D
35	Middle board	1	R-51-PD01-065-A	PDB-07-G
36	EMC insulation	1	R-23-010800-52-A0	Available on request
37	Mounting bracket	2	R-24-020700-48-A0	Available on request
38	Boat shaped switch	2	R-07-020000-05-00	07-020000-05-00
39	Front case plastic	1	R-15-901492-02-A0	R-15-901492-02-A0
40	Solenoid valve	1	R-37-140420-04-00	37-140420-04-00
41	Fan	1	R-37-120112-01-00	37-120112-01-00
42	Thermal switch	1	R-06-030000-15-01	Available on request
43	Spring	12	R-23-040000-63-A0	Available on request
44	Absorb board	1	R-23-050000-19-A0	23-050000-19-A0

For more information contact the BOC warranty department at warranty@boc.com

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