File of Breakdown Service of the Welding machine INVERTER 2500 TOP DC

SYNOPSYS

	File of breakdown procedure of welding machine of INVERTER 2500 TOP DC
Version Indication:1	Creation 17/03/04

1) Preliminary analyse and advice on the INVERTER 2500 TOP DC

1.1) Reminder about safety

- The interventions made on the welding machine must be entrusted to qualified people.
- The welding machine must be disconnected and you will have to wait at least 30 minutes to intervene with the welding machine, or discharge high voltage capacitor.

1.2) The general advice on the intervention (internet page)

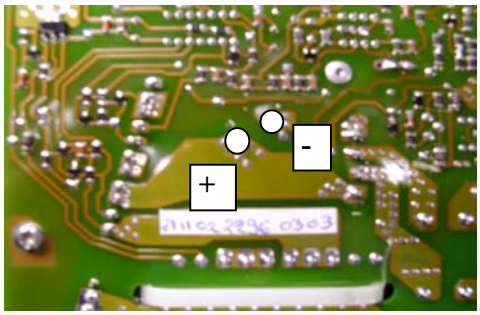
- Read the general information on Inverters TOP DC
- Before all interventions on the INVERTER 2500 TOP DC, check with the customer if it handles with a "diagnostic of external breakdown " **on the model Inverter** , (See Internet Page).
- Read the clause of un-warranty on the Inverter models**, (See Internet page)**.
- Carry out a visual monitoring to detect the obvious breakdowns (Zones of overheating, badly crimped thimble, browned diode, burnt transformer, mechanical breakage, modulate power (destroyed component, browned zone).
- Refer to the categories of not-reparable breakdowns on the Internet page.

1.3) The useful advice for the continuation of the diagnosis of the breakdowns.

- Don't charge the welding machine immediately.
- Components CMS can be put in short-circuit or open circuit. The checking of resistors is done in "ohmmeter", the Zener diode and other diode are measured in position "Diode" on the Multimeter. For all connections on the chart, weld legs onto the indicated points of contacts (the card is varnished, attention with the risks of bad contacts due to the dielectric isolation that occurred with varnish, use test probes with a pointed end in order to break the layer of varnish).
- Provide a resistor(1KΩ 7 W) to discharge the capacitors of high capacity.
- Check the chapter of usual breakdowns on present procedure.
  - **Take the page 12 (Summary of the sensitive components on the PCB)**
  - Control points by points this file and carry out repairs if necessary

2) Diagnoses of the most usual breakdowns on the INVERTER 2500 TOP DC

- Disconnect the welding mi from the power supply
- Unscrew the 8 Screws of welding machine on the higher cap
- Reassembly in opposite order.
- Provide a Multimeter
- Discharge the capacitors of high capacity with a resistor 1KΩ 7W (to see photo opposite) between the points –HT and +HT, and check the voltage =0-



2.1 The welding machine does not start:

2.1.a) Control of the transil Diodes:

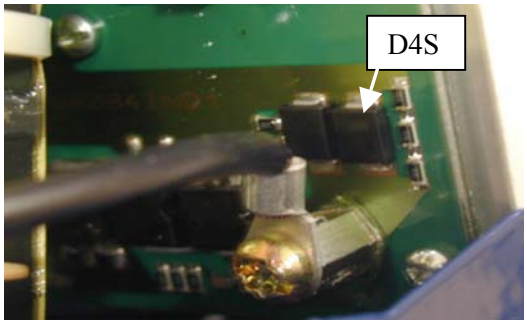
Check with a Multimeter in position ''Diode'' on the output of welding machine if the Diode D4S et D5S are not in short- circuit (See the picture)

Put it + Multimeter on Texas - and - on the Texas +,
Read the value that must be around 0,33 V".

If you read "0,00 V", You can delicately unsolder the Transil Diode on the SMI.

These components are a nonessential protection.

You can delicately unsolder them with cutting pin's (Attention on the surface of the SMI)



2.1.*b) Control of the surge garde:*

Check with a Multimeter in position ‘‘ohmmeter’’ on the pin’s,
the value of surge garde is 2Ω at the cold state

If you read a open circuit,
Change the Surge garde SG1P.

SG1P = SG110 (18A)

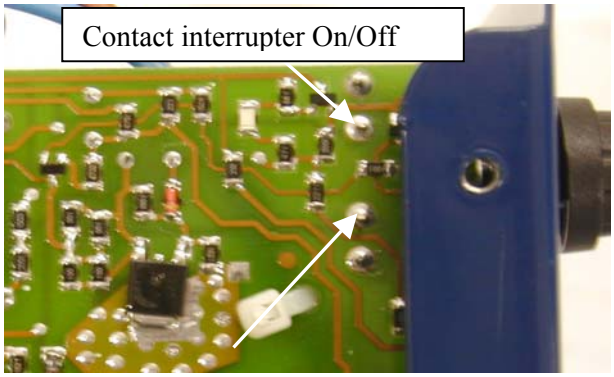
2.1.*c) Control of the contact On/off potentiometer:*

Check with a Multimeter in position ‘‘ohmmeter’’ on the pin’s,

The reading on the multimeter must be a short circuit in the case or the potentiometer is in the position On

If you read a open circuit,
Change the potentiometer.

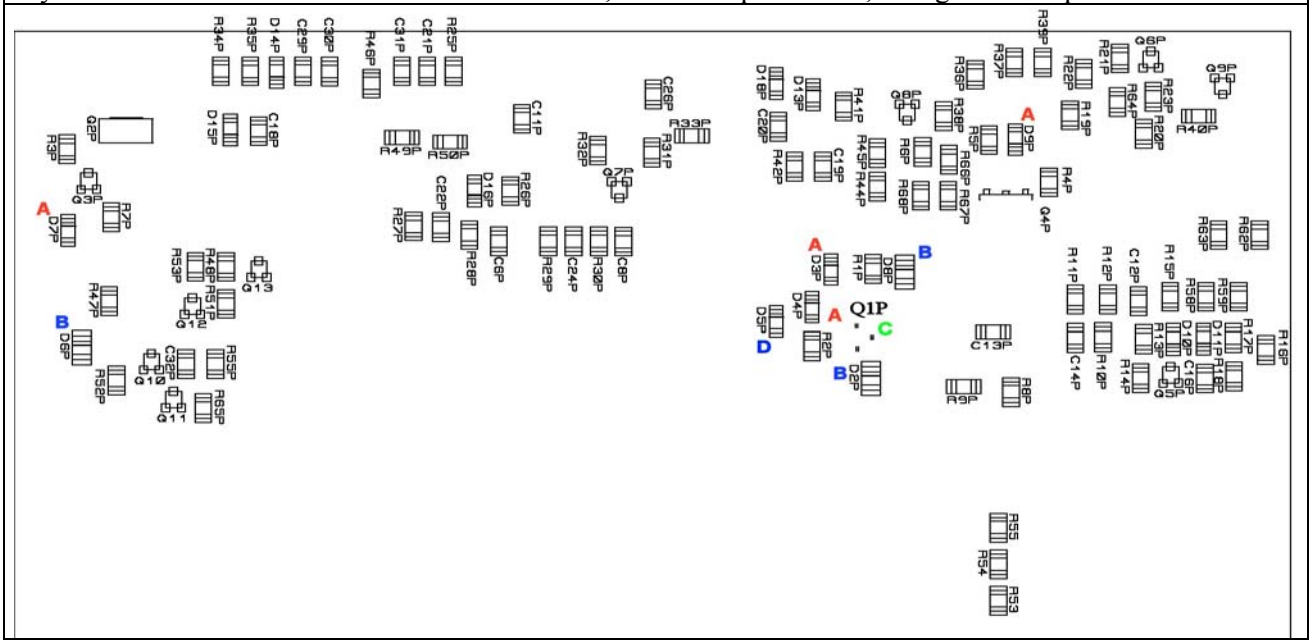
P1P = Pot On/off 10K



2.1.*d) Check the passive components, Zener diodes and transistors:*

Check with a MultiMate in position ‘‘diode’’, Zener Diodes and other Diodes

Check the components A, B, C if there is no breakdown in position ‘‘Diode’’:
The – of MultiMate on the pin’s colour and the + on the other pin’s.
A: Zener Diode BZVxxx this value is approximately “0,70 V”,
B: Diode BYD77D this value is approximately “0,48 V”,
C: Transistor TIP122 threshold > ‘‘0.46V’’, **D**: Diode 1N4148 this value is approximately ‘‘0.53V’’
If you see “0,00 V”, the components is in short circuit, changed this components
If you have not value at the time of the connection, one is in open circuit, change the component



2.2) the welding machine trip the main supply :

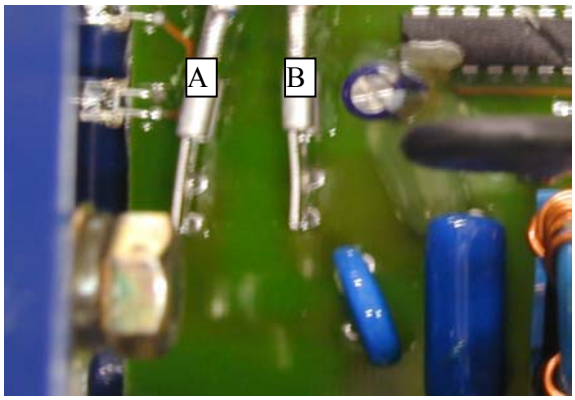
2.2.a) Checking of the Input varistor (VDR):

Check with a Multimeter in position ‘‘Diode’’

Check between the pins of the power supply cable Blue and brown, if the varistor is not in short-circuit (See A and B on the picture).

If you read “0,00 V”, change the varistor

VAR1P = SK14k320



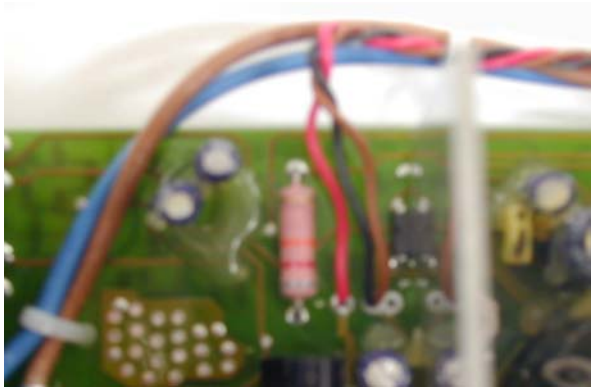
2.3) The welding machine is starting :

2.3.a) the fan doesn’t start:

Check the solder of the fan’s wires on the PCB

Control if the fan is not blocked or broken
Check the solder of wire on the PCB with the multimeter.

Change the fan if it is broken.
Fan 12V

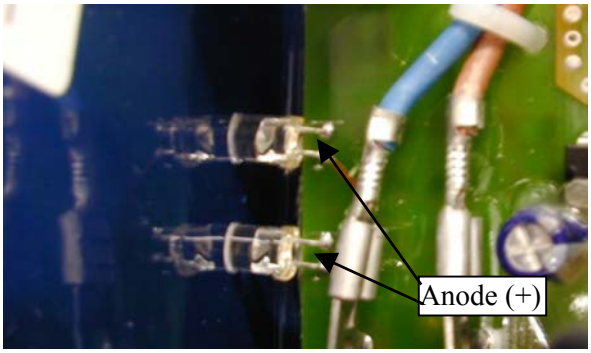


2.3.b) the welding machine starts and the indicators are broken:

Change the green and orange indicators according to their references if necessary

Del orange D12P
Del Green D17P

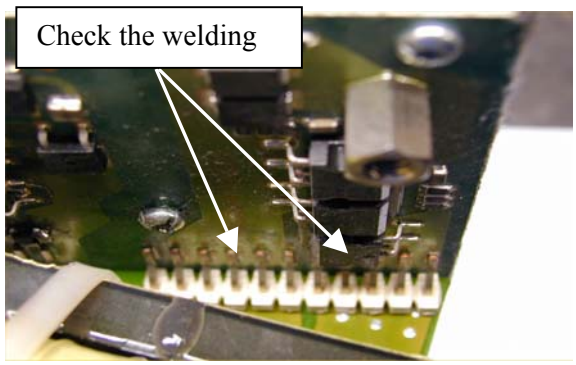
Attention within the cathode and anode of Del on the assembly.



2.3.c) The welding machine starts but don’t welding:

The output of connector on the SMI is dissolver. Control visually if the solder on the connector onto the SMI. If the connector is unsoldered to return the welding machine to SAV

In the contrary case if this one is correctly welded: Check the connection of output to the SMI towards Texas and the cables of welding.



3) Procedure of breakdown service of the INVERTER 2500 TOP DC

One voltmeter or Multimeter ,One oscilloscope + one voltage probes *10
Two DC Isolated power supplies (30 Volts minimum: 40V max.), limit of Current 1 Amp.
Electrics Cables and wires
For the following operations, take the page 10 and 11 (Test points and components).
For the reference of components, take the page 12 and 13

For the next test, the measures are checked **under low voltage** :

Check the function of a part of the electronic card with the external power supply. In the absence of the oscilloscope, you could use a voltmeter with the medium voltage "CH1 average" the measure indicated on the chronogram .
Regulate the power supply according to the points to be controlled and current limited to 0.5 Amps.

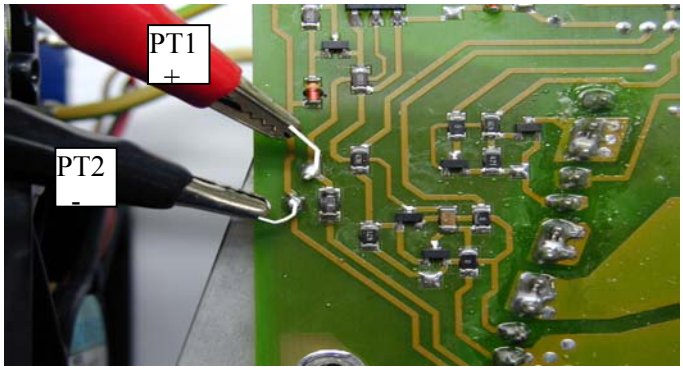
3.1) Checking of the high power supply 15V:

Connect to the power supply 30V between PT1 and PT2 (+ and - like the opposite picture.)

If **I_Alim = 0.01A** go to the next point
If **I_Alim = 0.A** Check the diode D7P and the transistor Q2P. (see page 12)

Measure **PT8 = V_15H** = 15V around;

Regulation by the Zener diode D7P and Q2P



3.2) Checking of the power supply Fan +the thermal Protection:

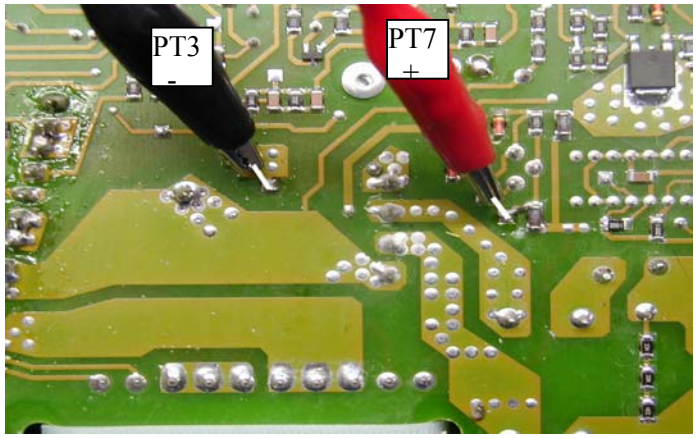
Check the power supply 30 volts between the Test points PT7 and PT3: **I_Alim = 0.30A**

The fan is turning
The Del green is switched on in the front face

If **I_Alim = 0.30A** go to the next point
If **I_Alim = 0A** Checking the diodes D3P, D4P, D5P and the transistor Q1P (see page 12)

V_FAN+ = 13.5V around;

Regulation by the Zener diodes D3P, D4P and Q1P

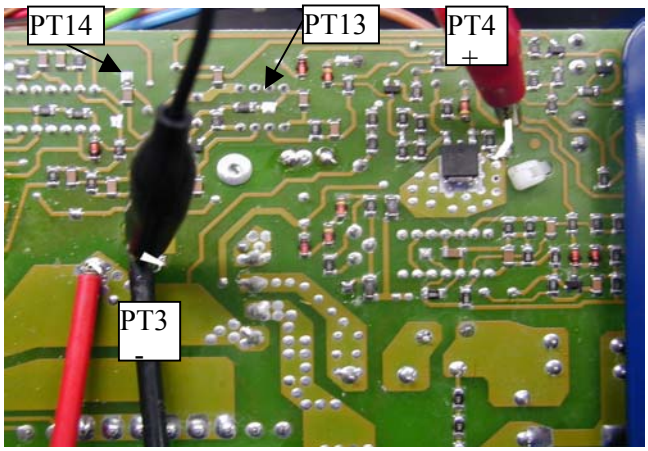


3.3) Checking of the low power supply 15V:

Connect the Power Supply 30 volts between the test points PT4 and PT3 : **I_Alim = 0.05A**

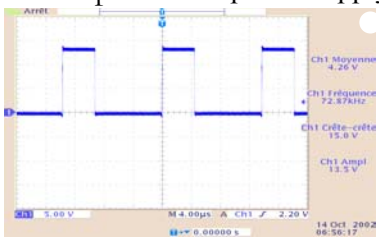
If **I_Alim = 0.05A** go to the chapter 3.4
If **I_Alim = 0A** Check the diode D9P and the transistor Q4P (see page 12)

Regulation by the Zener diode D9P and Q4P:
Measure the point **PT14** ≈ 15V
Reference Tension of UC3845:
Measure the point **PT13** ≈ 5V

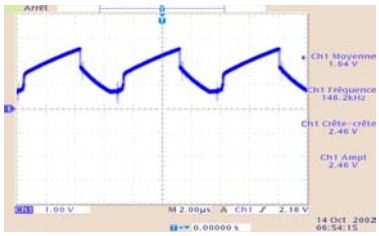


3.3.a) Checking of the PWM generator

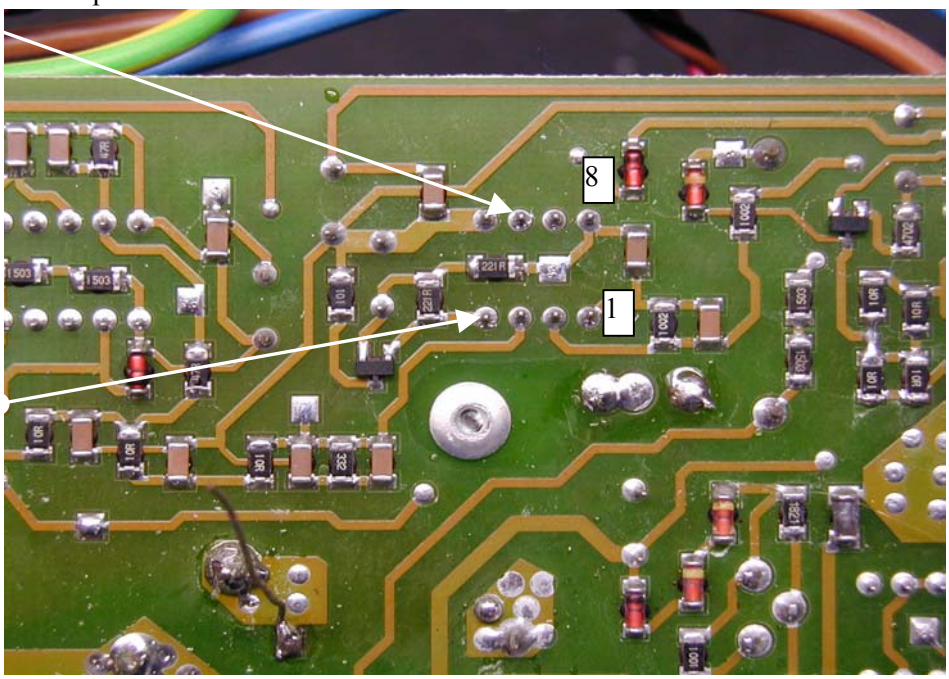
➢ Keep the same power supply for the point 3.3



Between Earth (PT3) and pin's (6) UC3845.



Between earth (PT3) and Pin's (4) UC3845.



3.3.b) Checking of the current limitation

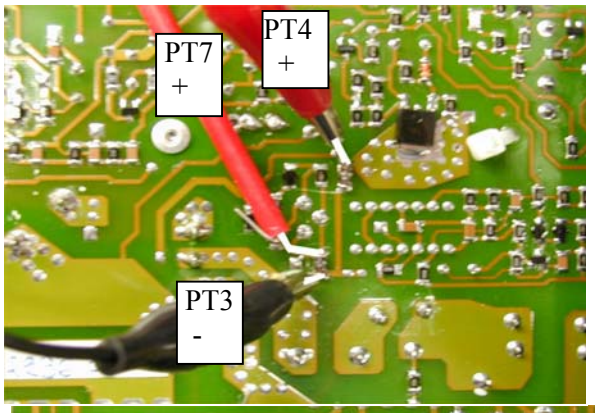
➢ Keep the same power supply that the precedent point 3.3, report to the page 11 for the Test of point PT15

➢ Check the test point **PT15**, you could measure 2.2V to Max and 3.1 Volt to Min, according to the position of the adjustment potentiometer current in the front

The components may be faulty are transistor Q6P and the potentiometer

3.3.c) Checking of the thermal protection

Connect the power supply 30 Volts on the Test point PT4 et PT7 (+) and the earth on the point PT3 (-)
I_Alim = 0.35A



Control the next points:

The Power supply at the fan and power supply low V_15Bas are present
PT14 = 15V, **PT15**= XX volts according to the position of potentiometer adjustment

Put a resistor in the pin Mes_Temp (inferior to 1KΩ) and earth you will see the pin 1 and 2 on the connector SMI.

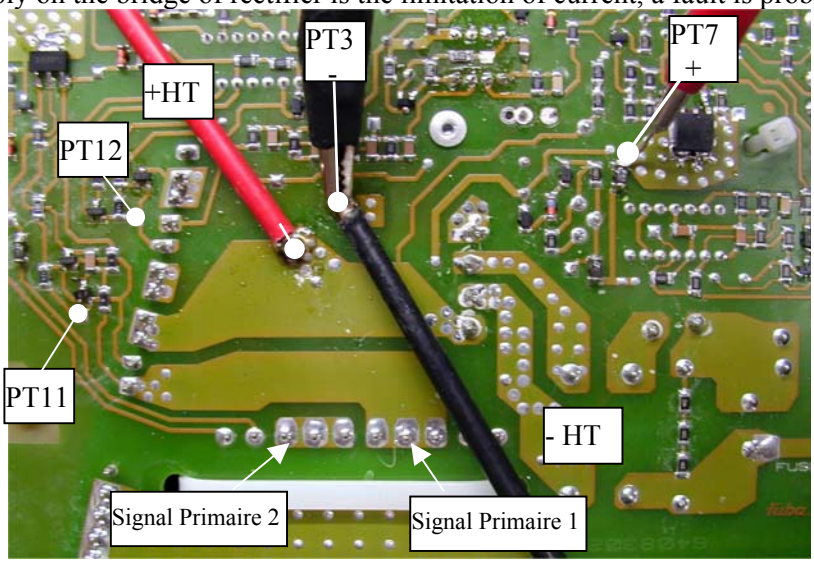
⇨ The signal adjustment on **PT15** changes to the min value of 3.1Volts.
⇨ The orange Led is switched on.
⇨ The Signal V_alarme is changing from 13 Volts to 0V

3.4) Checking of the functionality of the SMI

After having checked the previous points:

- Connect the power supply 30 Volts on points V_15_B as a chapter 3.3
- Connect one other power supply 30V isolated over power supply (current limited 0.5 A) on the pins (+) and (-) of bridge of Diode

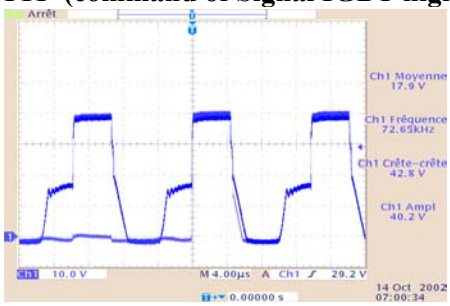
- If the power supply on the bridge of rectifier is the limitation of current, a fault is probable on the SMI.



- Check the next signal on the card with the earth of the probe on the earth of capacitor (-HT) .

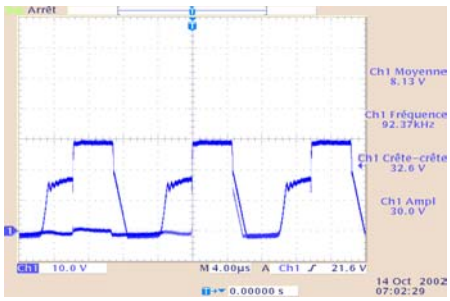
(See next page).

PT11 (command of Signal IGBT high)

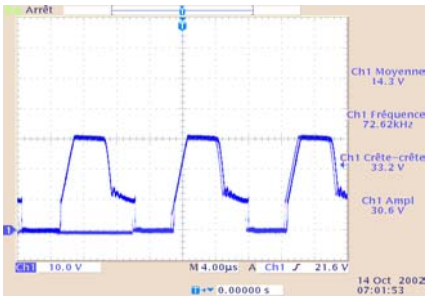


PT12 (command of signal IGBT low)

Signal PRIMARY 1 (Input of Transfo)

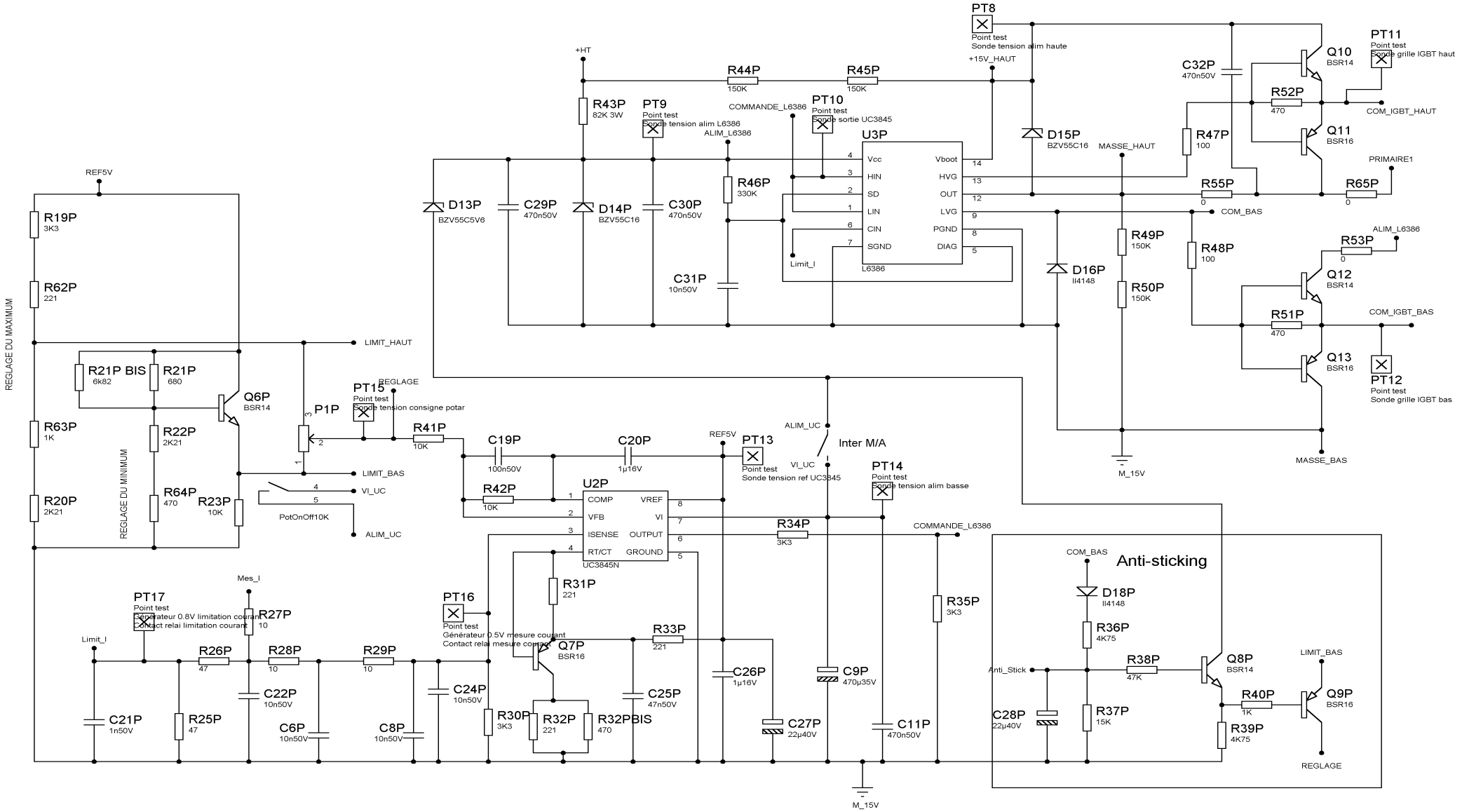


Signal PRIMARY 2 (Input of Transfo)

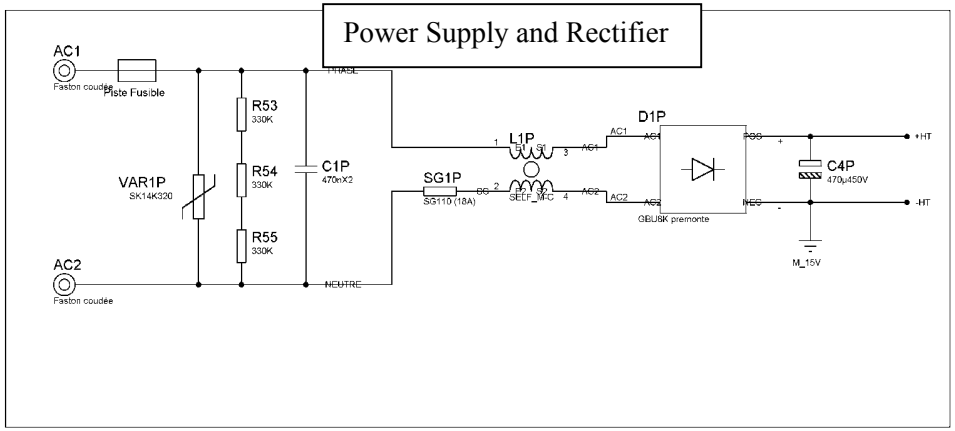


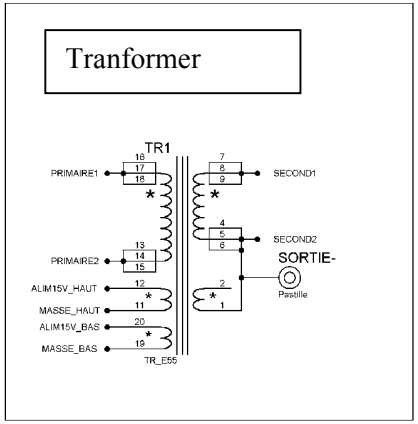
4) Electrical Schematics:

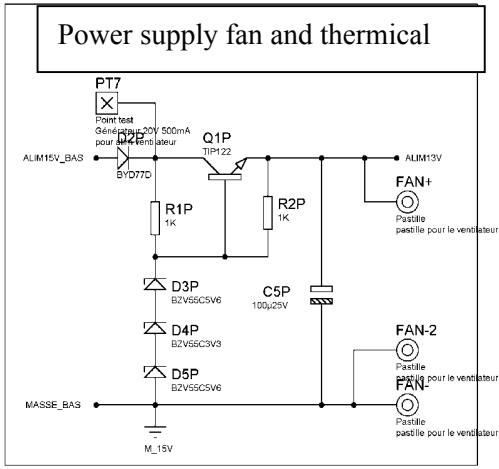
Schema 1: Part Command and PWM Generator

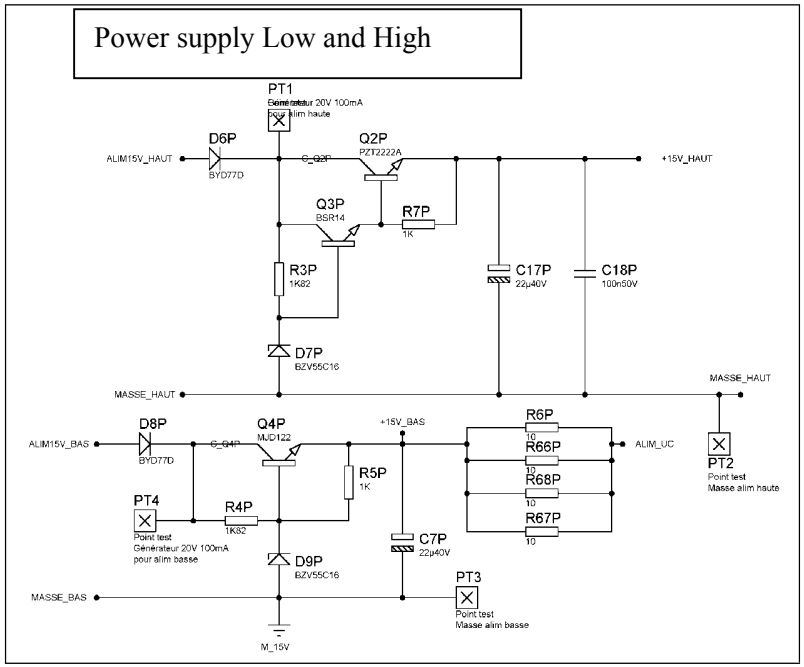


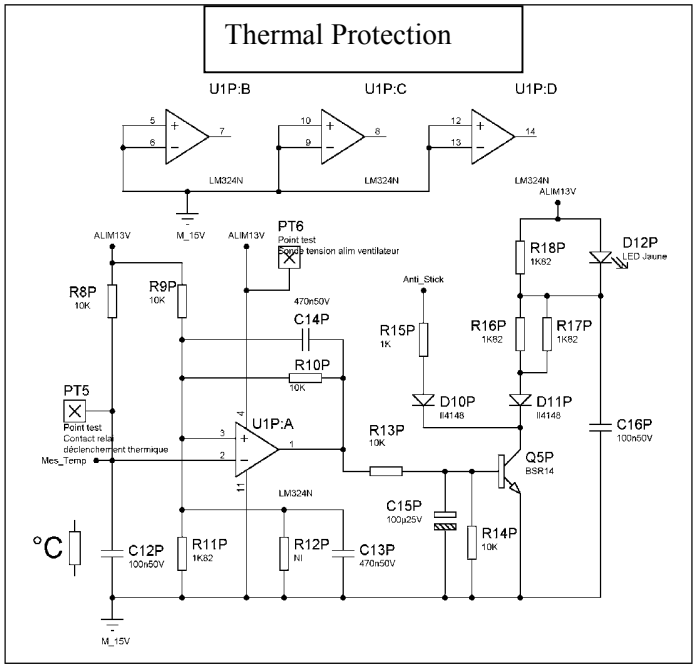
Schema 2: Power supply+ transformer.+ Thermal protection

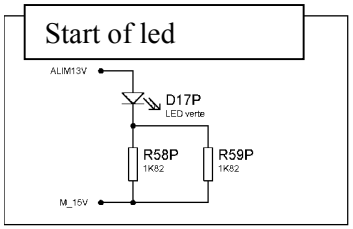


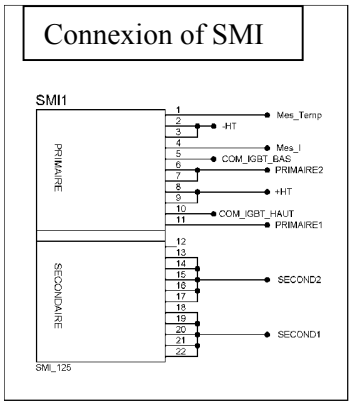




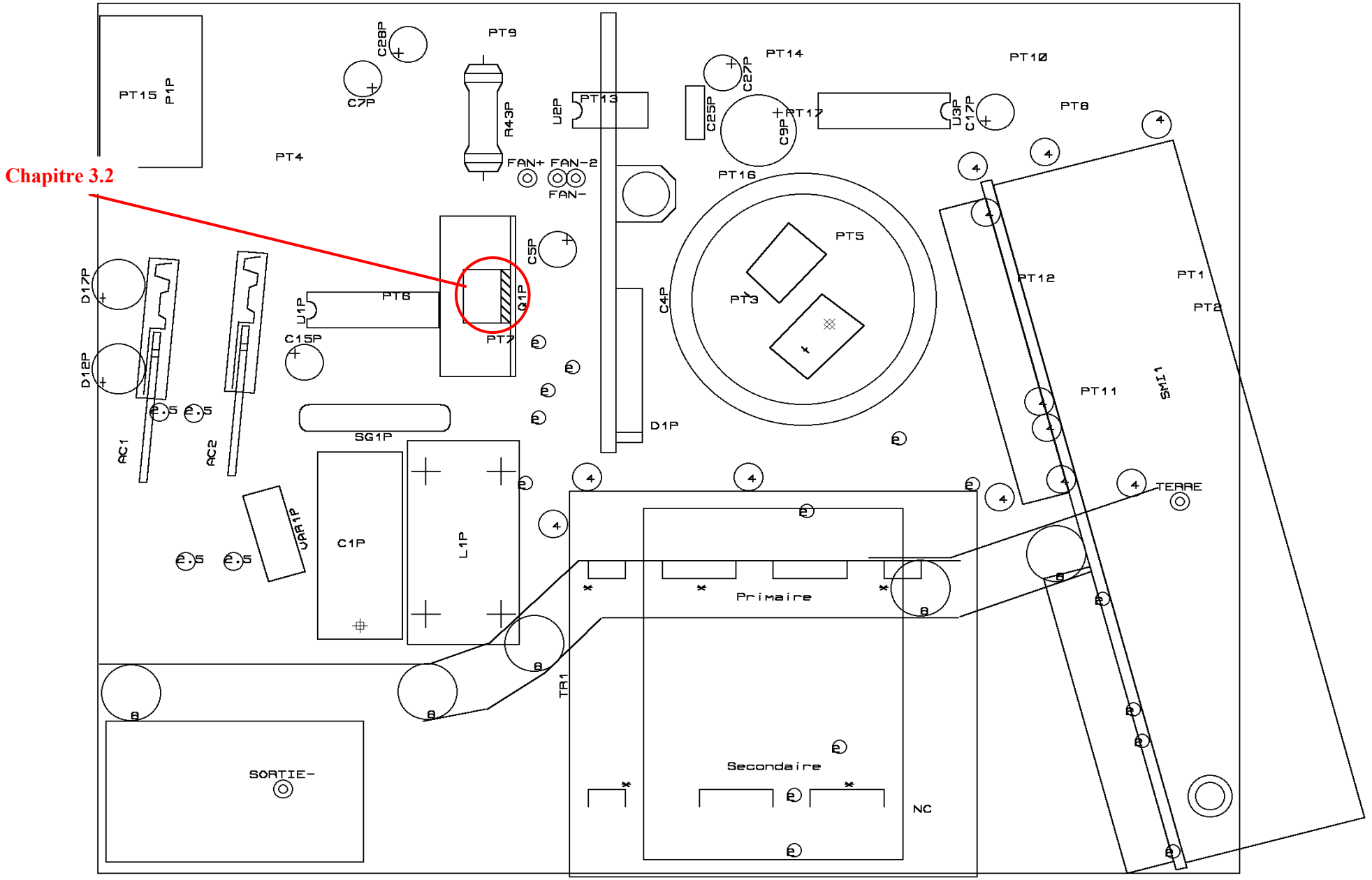




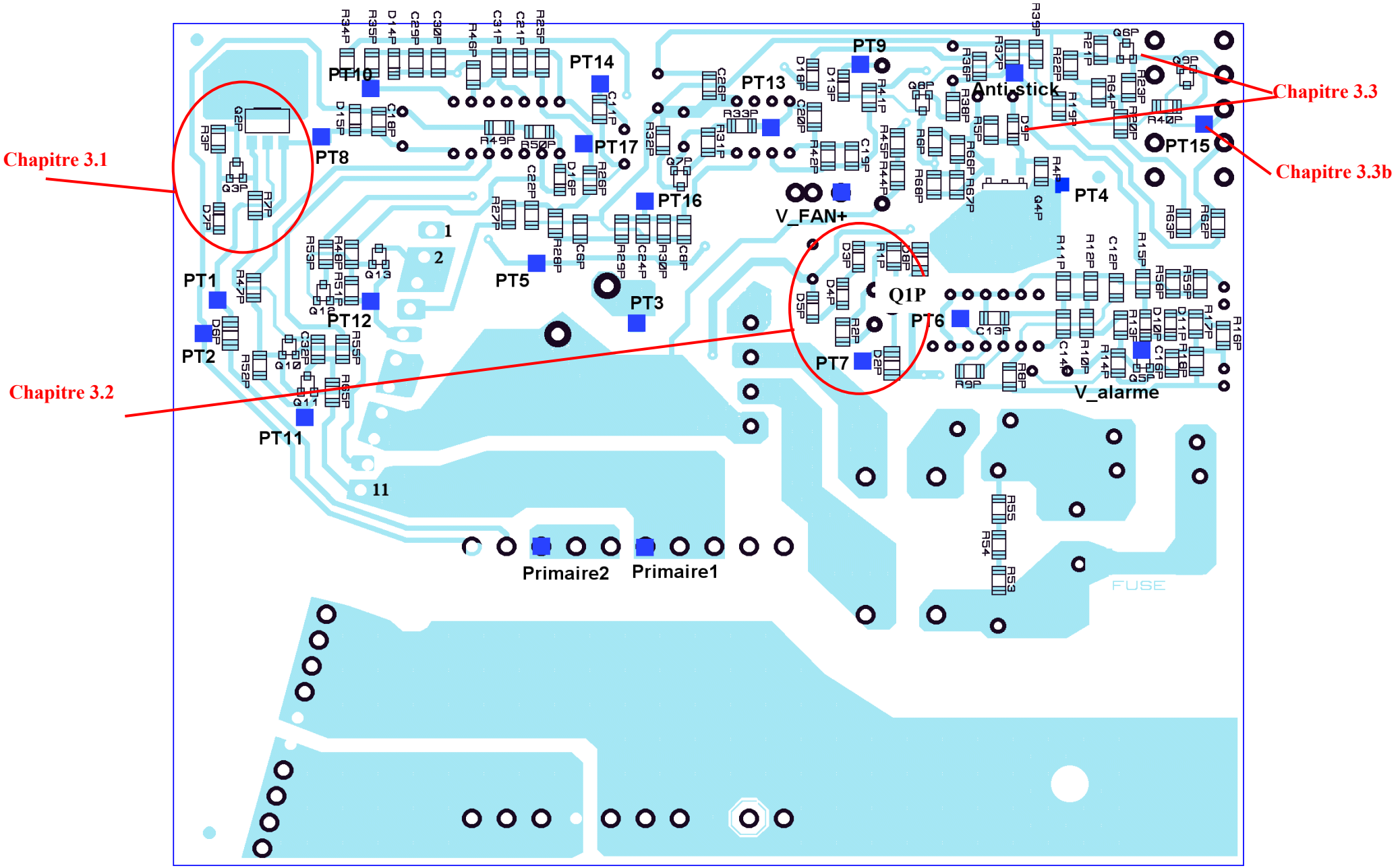




5) Designation components on the main Board (Upper side on the main board).



6) Test Points and designation components on the main Board (Under side)



7) Bill of materials of the PCB.

QTY	PART-REFS	VALUE	TYPE COMP
Resistors			
7	R1P,R2P,R5P,R7P,R15P,R40P, R63P	1K	CMS
8	R3P,R4P,R11P,R16P,R17P,R18P, R58P,R59P	1K82	CMS
7	R6P,R27P,R28P,R29P,R66P,R67P, R68P	10	CMS
8	R8P,R9P,R10P,R13P,R14P,R23P, R41P,R42P	10K	CMS
1	R12P	NI	
4	R19P,R30P,R34P,R35P	3K3	CMS
2	R20P,R22P	2K21	CMS
1	R21P	680	CMS
1	R21P BIS	6k82	CMS
2	R25P,R26P	47	CMS
4	R31P,R32P,R33P,R62P	221	CMS
4	R32PBIS,R51P,R52P,R64P	470	CMS
2	R36P,R39P	4K75	CMS
1	R37P	15K	CMS
1	R38P	47K	CMS
1	R43P	82K 3W	TRAV
4	R44P,R45P,R49P,R50P	150K	CMS
4	R46P,R53,R54,R55	330K	CMS
2	R47P,R48P	100	CMS
3	R53P,R55P,R65P	0	CMS
Capacité			
1	C1P	470nX2	TRAV
1	C4P	470µ450V	TRAV
2	C5P,C15P	100µ25V	TRAV
5	C6P,C8P,C22P,C24P,C31P	10n50V	CMS
4	C7P,C17P,C27P,C28P	22µ40V	TRAV
1	C9P	470µ35V	TRAV
6	C11P,C13P,C14P,C29P,C30P, C32P	470n50V	CMS
4	C12P,C16P,C18P,C19P	100n50V	CMS
2	C20P,C26P	1µ16V	CMS
1	C21P	1n50V	CMS
1	C25P	47n50V	TRAV
Integrated Circuits			
1	U1P	LM324N	TRAV
1	U2P	UC3845N	TRAV
1	U3P	L6386	TRAV
Transistors			
1	Q1P	TIP122	TRAV
1	Q2P	PZT2222A	CMS
6	Q3P,Q5P,Q6P,Q8P,Q10,Q12	BSR14	CMS
1	Q4P	MJD122	CMS
4	Q7P,Q9P,Q11,Q13	BSR16	CMS
Diodes			

1	D1P	GBU8K	TRAV
3	D2P,D6P,D8P	BYD77D	CMS
3	D3P,D5P,D13P	BZV55C5V6	CMS
1	D4P	BZV55C3V3	CMS
4	D7P,D9P,D14P,D15P	BZV55C16	CMS
4	D10P,D11P,D16P,D18P	ll4148	CMS
1	D12P	LED Jaune	TRAV
1	D17P	LED verte	TRAV

Others

1	P1P	PotOnOff10K	TRAV
1	SG1P	SG110 (18A)	TRAV
1	TR1	TR_E55	TRAV
1	VAR1P	SK14K320	TRAV
1	Fan	12V 92*92*25	TRAV