File of Breakdown Service of the welding machine GYSMI TIG 160 HF

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	08/06/2004 : Creation of file

1) Preliminary analyse and advice on the GYSMI TIG 160HF

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 Gysmi
- Before all interventions on the GYSMI TIG160 HF, check with the customer if it handles with a "diagnostic of external breakdown " **on the model Inverter Gys**, (See Internet Page). and chapter 1.4 for the breakdowns specific to Gysmi TIG 160 HF
- Read the clause of un-warranty on all 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 diodes are measured in position "Diode" on the MultiMate. 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 the present procedure.
  - Control point by point this file and carry out repairs if necessary

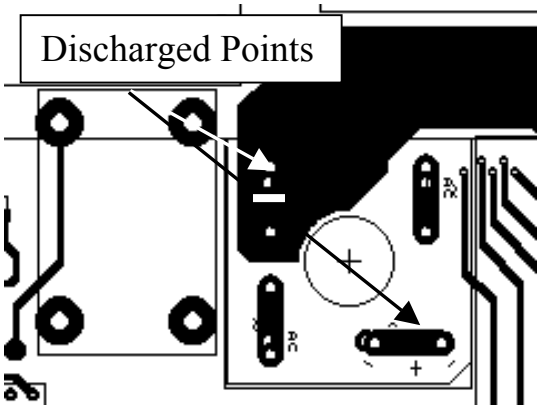
- See the **list of components SAV and their distributor's reference** (see Internet page)

1.4) List of external breakdowns specific at Gysmi TIG 160 HF of external causes.

Failures	Origin	Solution
Orange Del on the back face not lit	- No mains supply plug 230V	- Check the electric installation and the mains plug voltage
Orange Del on the back face is lit and orange warning light is lit	- The thermal protection is engaged, the fan is turning	- Wait for a cooling of the welding, the Fan is starting, Wait for restarting the welding (about 2 minutes)
	- Power Group Protection The fan is turning	- Check the output voltage of the power group lower to 265V
	- Cooling time more than two minutes Insufficient air for cooling	- Make sure there is enough air
		- Clean the filter
	- Failure of the circuit SMI, the orange warning is lighted continually	- Wait for a cooling of the welding, the fan is starting , wait for restarting the welding (about 2 minutes) If orange del is still lit (check the welding machine).
MMA: no welding	- Selection switch	- Check middle position MMA.
	- Connections of welding cables are incorrect	- Check the connections of the connections
	- Putting incorrect earth	- Set the earth cable on the work piece
MMA: welding current too weak	- The potentiometer "I" current is adjusted too low	- Increase the current adjustment in order to equal the electrode size.
TIG : HF absent	- Selection switch	- Check switch position on TIG (HF)
	- Switch on the torch	- Check the connections of the torch
	- Connections of welding cables incorrect	- Check the cable's connections
	- Electrode of the torch Polluted or damaged	- Clean your tungsten electrode and bevelled
	- No more gas or end of the bottle of gas	- Check the pressure of the bottle
	- HF generator	- Check the HF element in the welder
TIG: no Gas	- Gas bottle is imperfect	- Check the pressure of the bottle of gas - Adjustment gas output of the bottle between 4 and 8 Litre / Min.
	- Electromagnetic sluice value is imperfect	- Hear if electromagnetic sluice value commutate without gas
	- Connections of gas circuit are blocked	- Check the connections of the bottle
	- Auxiliary power supply	- Check the welder
TIG: Oxidation of the electrode and not remain bright after the welding	- Insufficient gas	- Check the pressure of the gas bottle and the diffusion of gas
	- The gas stops before the end of the welding process	- Increase the time of "post gas"
TIG: Electrode is melting	- Bad polarity of the electrode	- Connect the TIG welding torch to negative connector
	- Bad protector Gas, Not protector Gas	- Use a protector Gas « Argon »

2) Diagnoses of the most usual breakdowns on the GYSMI TIG 160 HF

- Disconnect the welding Gysmi from the mains supply
- Unscrew the 12 screws of welding machine on the higher cap
- Put the upper side card of PCB on the table.
- Reassembly in opposite order.
- 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 with a MultiMate =0V.



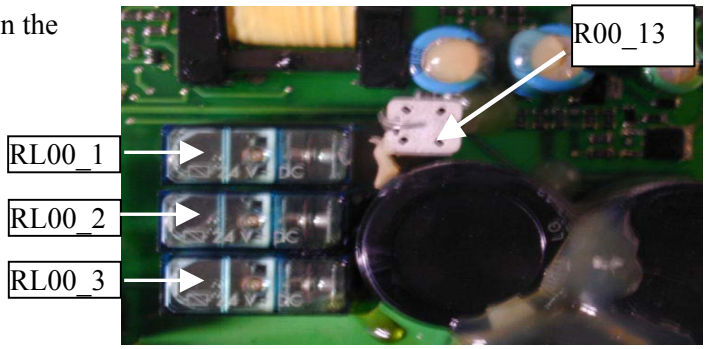
2.1) the welding machine does not start:

2.1.a) Control the resistor of charge R00_13

If the welding machine start under mains supply (lit green indicator, the fan turns), but the voltage of the capacitors high Voltages is not present. The relay of load RL00_1 topple but the Relays RL00_2 and RL00_3 no topple.

Check with a MultiMate in position ‘‘ohmmeter’’ on the pin’s R00_13 Value= 4.7Ω ref: 63146

If the resistor is faulty, change the resistor.
Value 4.7Ω 11W Ref: 63146

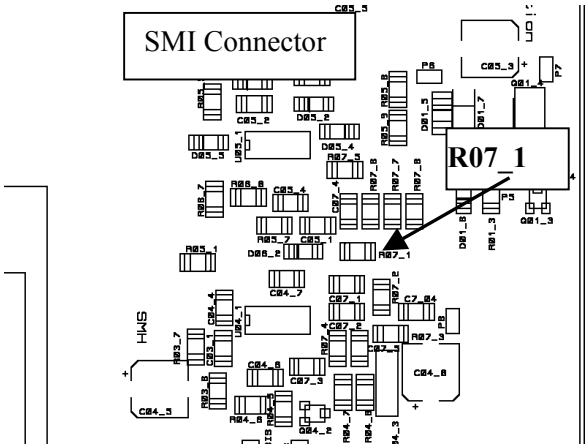


2.1.b) Control of SMI power module

Check with a MultiMate in position ‘‘ohmmeter’’ on the pin’s R07_1 Value= 10Ω

If this one is in open circuit,
Check the SMI Module in visual.

The power circuits are probably destroyed
Return the welding machine in SAV GYS



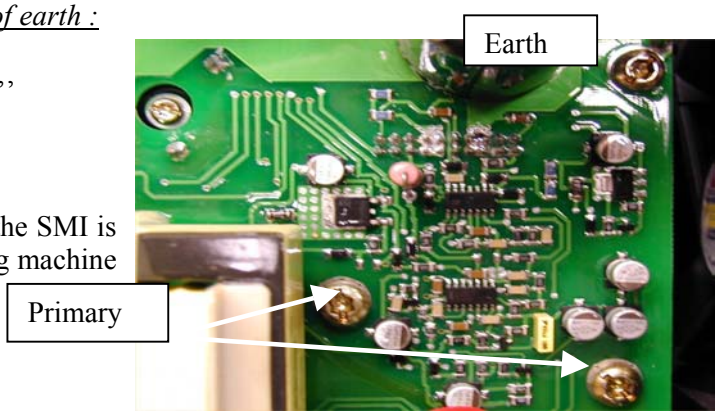
2.2) The welding machine trip the main supply

2.2.a*) Control of SMI insulation between of earth :*

In the case of the welding trip the main supply:
Check with a MultiMate in position ‘‘Ohmmeter’’

Check between each primary screw and the earth.

You read a infinite resistor, in the contrary case the SMI is probably put in short-circuit, to return the welding machine to the SAV

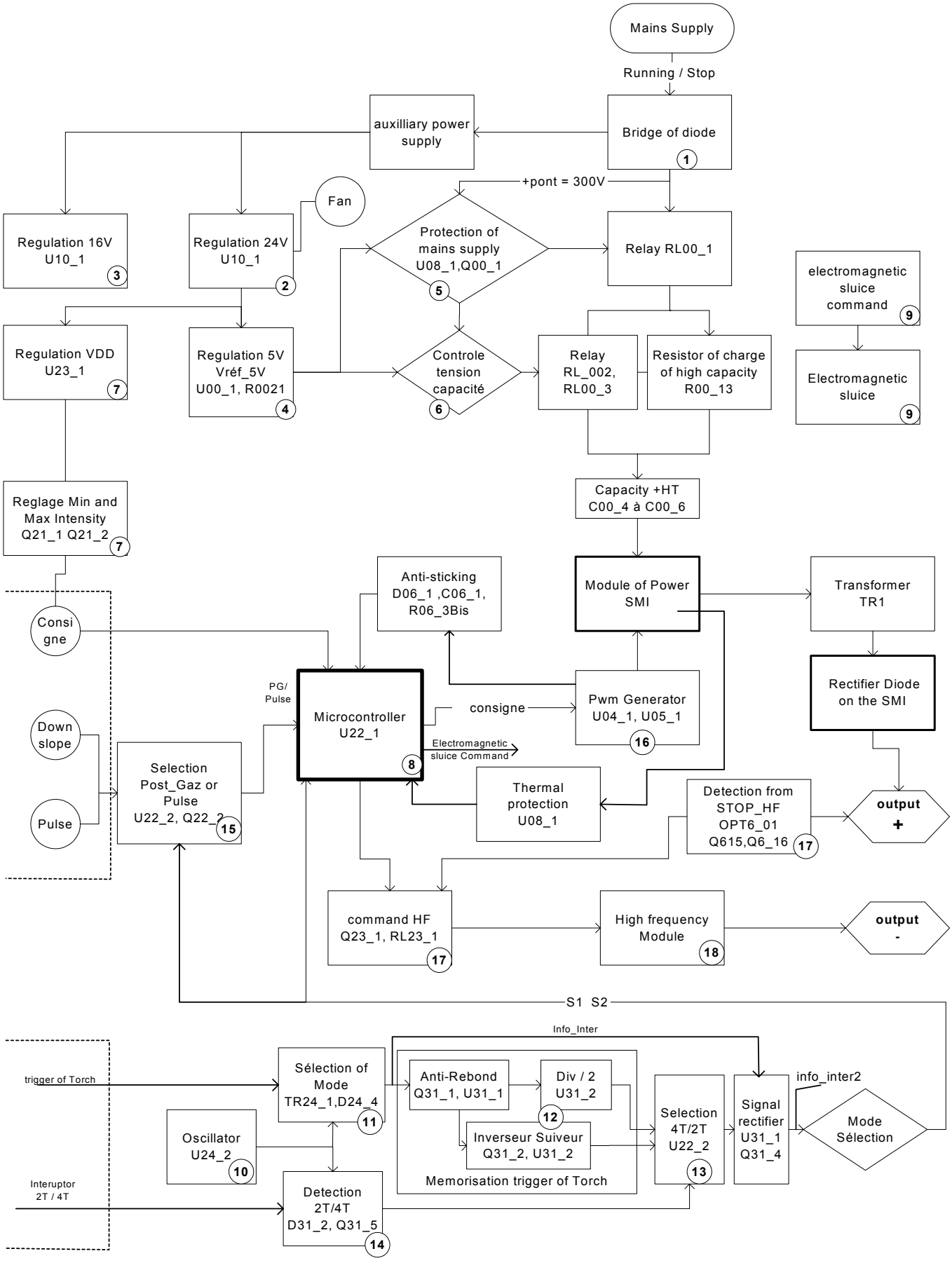


2.3) the gas leaking on the torch:

You have a Gas leakage all the time of welding machine, because the Electromagnetic sluice is blocked.

You try out in electromagnetic sluice gate into blowing to 3 or 4 bars by the front of the station and start the welding machine for activate electromagnetic sluice.
Control the filter in the extremity of electromagnetic slice.
If you have a same problem, replaced electromagnetic slice.

3) Description of functions of Gysmi 160 HF



4) Procedure of breakdown service of the GYSMI TIG 160 HF

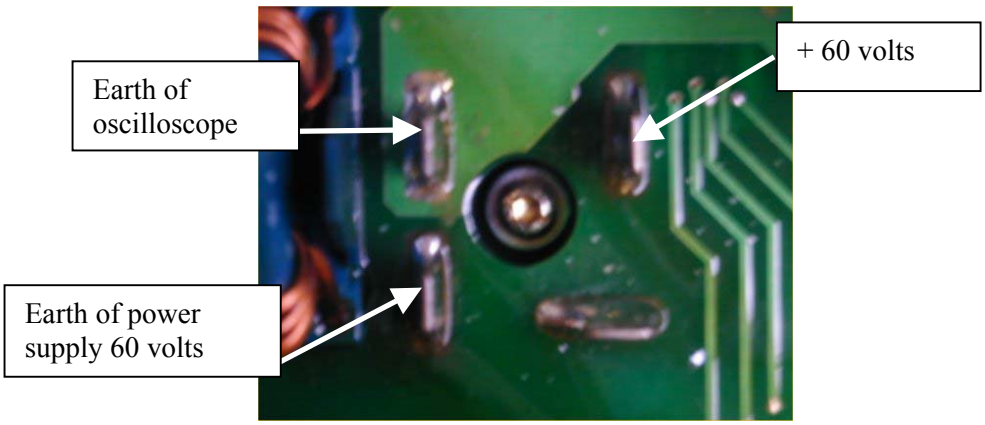
One voltmeter or MultiMate
One oscilloscope + one voltage probes *10
Two DC Isolated power supplies (30 Volts minimum: 40V max.), limit of Current 1 Amp.
Electrics Cables and wires
For the following operations, disconnect the machine of mains supply.

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

Check the function of each part of the electronic board with external power supply. If there is no oscilloscope, you could use a voltmeter with the average voltage "CH1 average" the measure indicated on the chronogram of the points to be controlled. Regulate the power supply 60V and current limited to 0.5 Amps

For the test of the reduced power supply, it is necessary to disconnect the red wire of the ventilator. You connect the power supply 60volts of the bridge on the PCB. (See photo below)

This makes it possible to test chart without having together the risks of the tension sector and obtaining the same signals as for an operation on sector. The description of the functions makes it possible to visualize a voltage output on each integrated circuit.



Description of Functions	Action	Components	Page
1) 60V on the bridge	G_13 =+Pont = 60V	Pont 50A	1

Auxiliary power supply Viper start, the signal is in output on the Viper, Signal of oscillator on pin 5 of the U10_1 circuit. The consummation of the power supply is I = 0.06A nearly.
Attention, if the power supply is in short- circuit the tensions will not be nominal value.
V_24V measured value equalizes with 27Volts approximately.
V_15B measured value equalizes with 16.7Volts approximately.

2) Regulation V_24V by the Viper	G02 = 24V	U10_1	1

The power supply is present on the function 4, 5, 6, 7, 9, 10,11,17

3) Regulation V_15VB by the viper	G03 = 16V	U10_1	1

The power supply is present on the function 12, 13, 14, 15, 16

4) Regulation Vref 5V	M18= 5V	U00_1,R00_21	2

Measure the voltage Vref5V = 5V around

5) if V_24V, Vref = 5V Presents, the **Relay RL00_1 switch** the voltage +Pont = 60V . The Resistor R00_13 is used for to charge the capacitors C00_4 to C00_6 RL00_1,U08_1,Q00_1,R00_13 2

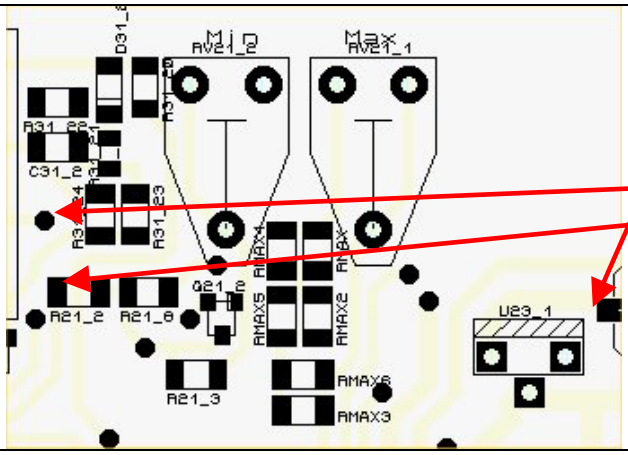
V_Pont = 60 Volts, if the voltage is null, check the resistor R00_13.

6) If +HT=300V present, the **Relay RL00_2 and RL00_3 switch** after check of voltage on the pin's of capacitors C00_4 à C00_6 Shunt R00_13 RL00_2,RL00_3,U08_1 2

Note: In reduced power supply the Relays RL00_2 and RL 00_3 do not switch because the voltage mains supply is not present.

7) Regulation VDD = 5V with power supply 24V U23_1 page 6

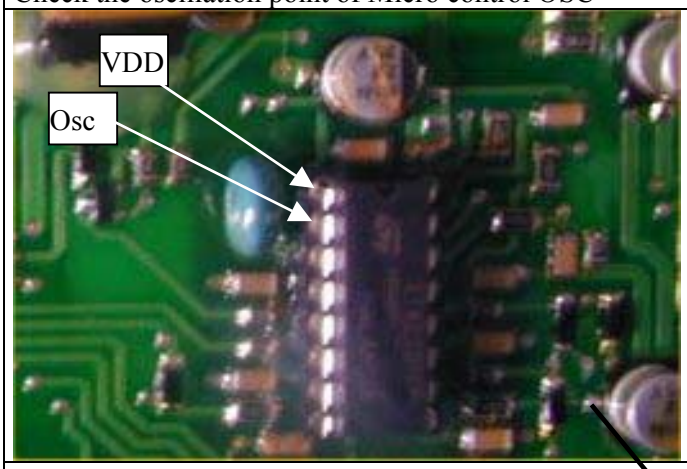
Vdd measurement = 5V is present in the micro-controller (function 8) and the reglage Min Max.

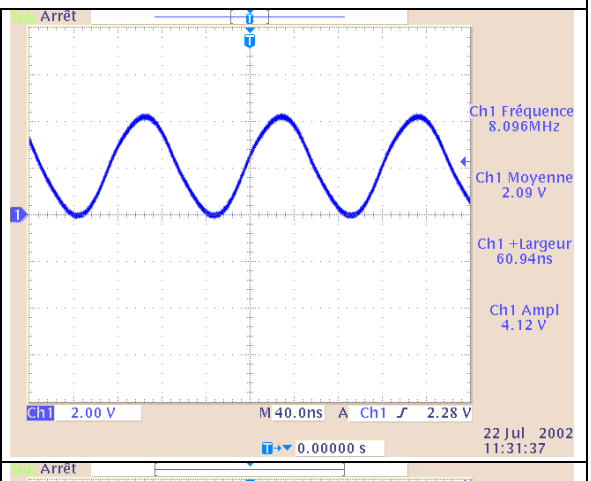


Vdd measurement = 5Volt
V max measurement = 1Volt around
V min measurement = 3.8 Volt around

8) Oscillation of Micro-controller, Regulation Min Max U22_1,X22_1 page 6

Check the oscillation point of Micro control OSC

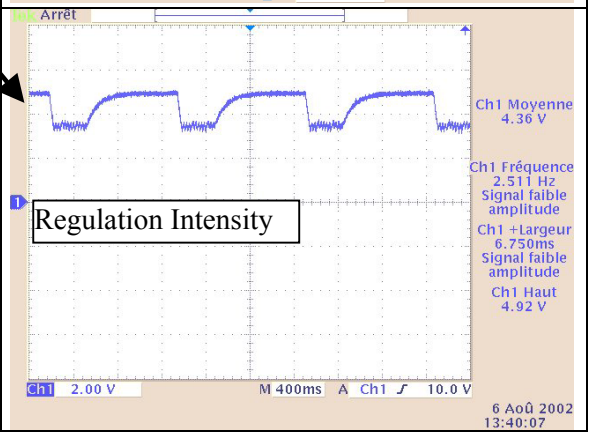




The right chronogram is obtained with the parameters:

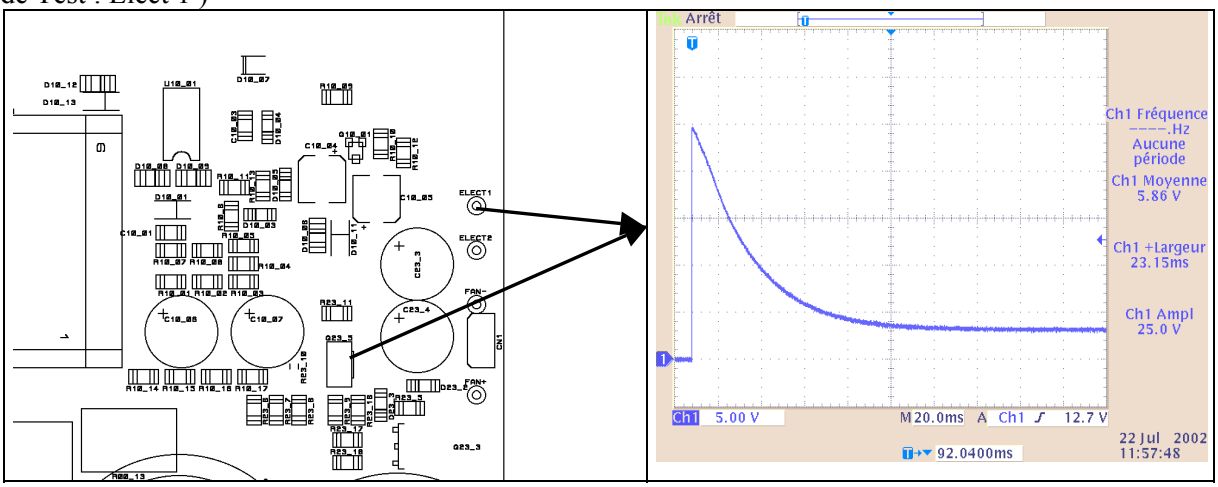
Potentiometer current min 10A

The mode selector in position MMA
(Example of the signal from regulation intensity)



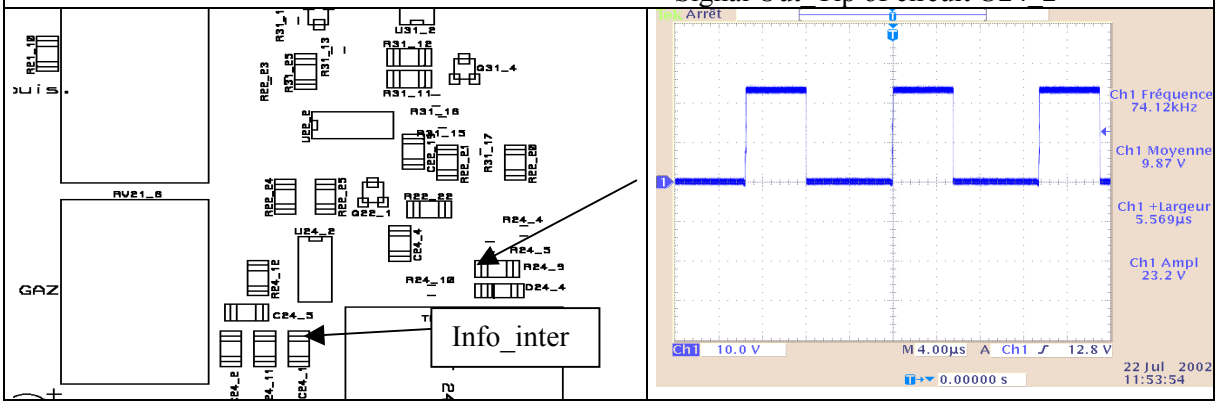
9) Command of electromagnetic sluice gate Q23_4,Q23_5,Q23_3 Page 6

The signal Com_Elec provide by the micro-controller, The signal peak voltage 24V on the electromagnetic sluice gate then the circuit supplies hold current to maintain the opening during approximately 3 seconds.
(Pts de Test : Elect 1)



10) Oscillator of command interface U24_1,U24_2 Page 6

Signal Out_Tip of circuit U24_2



You have a signal Out_Tip of pin circuit U24_2, frequency 75Khz

11) Mode Selector (MMA, TIG TSL, Amorçage) TR24_1,D24_4 Page 7

You checking the value according to the position of interrupter mode selection in front face.
If the values are not good, check the interrupter (type, on Off, On mode selection in Ohmmeter or U24-2 is faulty.
This signal is supplied on the operational amplifier and the diodes for obtain the next table.
This signal S1 and S2/bar are sent to the micro -controller.

Function	Signal Info_inter	S1	S2/bar
Amorçage gâchette.	0.9V	0	0
TIG HF	2.7V	0	1
Tig TSL	5.2v	1	1
MMA	7.0v	1	0

12) Functions memorizing trigger 2T/ 4T Q31_1,U31_1,U31_2,Q31_2 page 7

The circuit U31_1 and Q31_1 latch the signal info_inter, the transistor Q31_2 reverse the signal info_inter that the trigger of torch is activate and send towards the function (selector circuit 2T/4T)

You measure the signal Info_Inter after resistor R31_18 near the circuit U31_1

13) Setting forms some according to the selector 4T/ 2T U22_2 C,D page 7

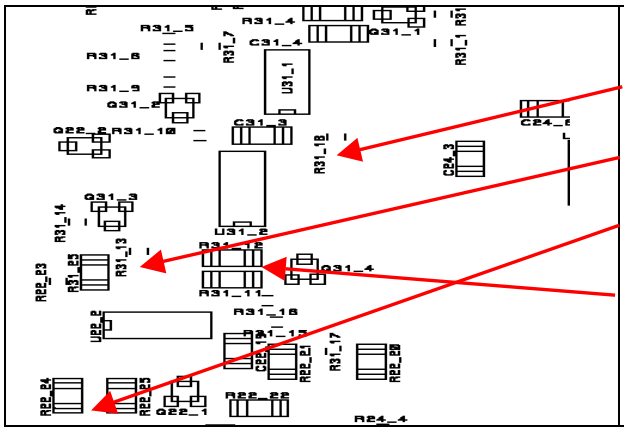


Image of the Info_inter Signal

Detection 2T/4T : Pin 12 of U22_2 : (see paragraph 14)

Signal Post_gaz or Pulse: (see paragraph 15)

Memorisation trigger: test Point R31_11 and R31_12

14) Detection 2T / 4T U22_2 A,B page 7

This function controls a position of interrupter in the front face than activation the output of transistor Q31_5.

Position of interrupter	Pin 12 of U22_2
2T	Niveau 0 : 10V
4T	Niveau 1 : 0V

15) Post_gaz or Pulse selector U22_2 A,B page 7

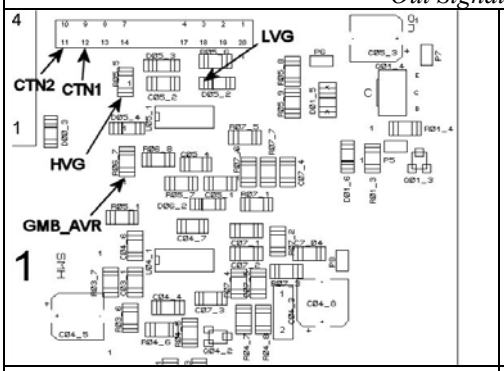
This function controls the signal Post_gaz or Pulse to the micro-controller in function of trigger on the torch.

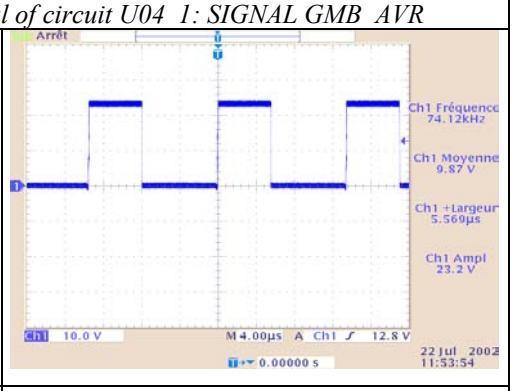
Trigger of Torch	Pin 8 of Micro-controller (U22_1)	Value measured
Inactive	Signal Post_gaz	0 to 5Volt
Active	Signal Pulse	0 to 5Volt

16) PWM generator U04_1,U05_1 page 3

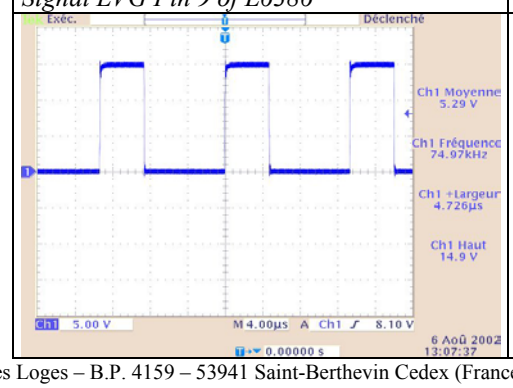
This function generate a frequency for the circuit (UC3845), this signal is transmitted at the circuit driver (L6386) for the control of module SMI.

Out Signal of circuit U04_1: SIGNAL GMB_AVR

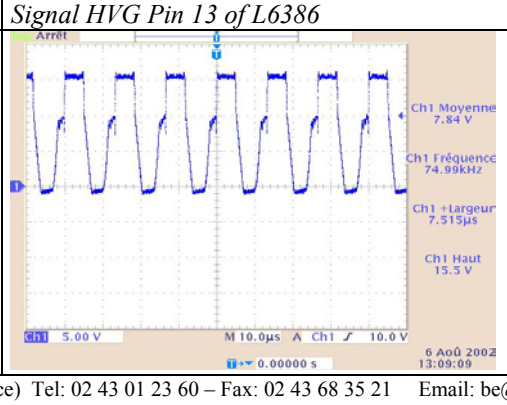




Signal LVG Pin 9 of L6386



Signal HVG Pin 13 of L6386



17) Circuit of command High frequency Q23_1, RL23_1 page 6

The micro-controller sends the control signal on the Q23_1 transistor, which makes switch Relay RL23_1. The mains supply is injected on the module Hf.
This function is activated when the interrupter mode is on HF and switch presses on the trigger of torch, relay RL23_1 switch.

18) Module of high frequency Q30_1,D30_6,Q30_2 page 4

The module HF generates a voltage high (1000V).
You don't intervene on this function when the station is under tension
This function must be to check with the upper cover of the station and to carry out a test of welding TIG.

Checking of welding machine:

After having controlled all functions in order, you will resolve the red son of the fan.

Screw the high carcass of the welding machine
Connect the TIG 160 on the mains supply.
The Green Led lit and the fan turn.

Control the voltage of the output on the welding machine.

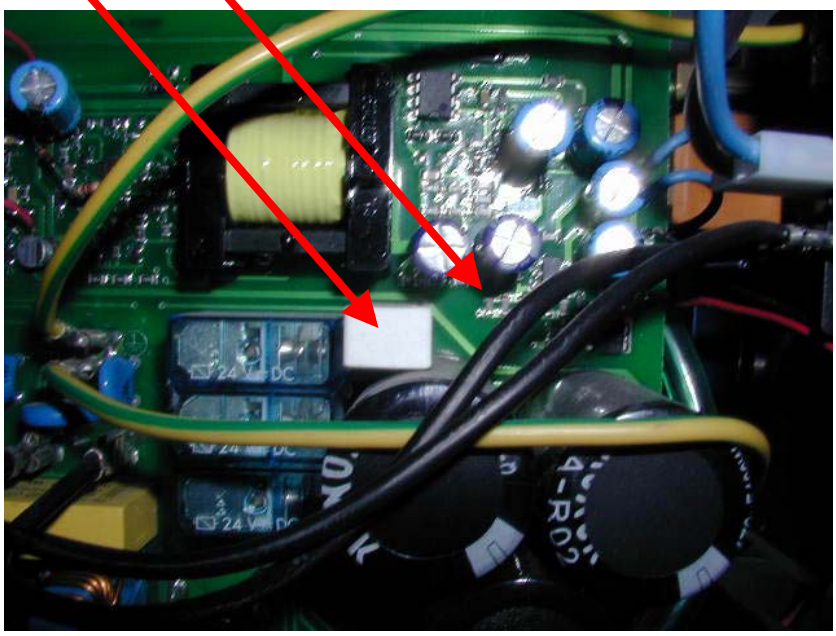
Position mode selector	Output voltage	Checking
MMA (Position 80 ampères)	Around 60 Volts	Testing to charge or welding
MMA (Position Min 10 ampères)	Voltage between 10V at 60 Volts	
MMA L	Around 14Volts	Testing to charge or welding
HF	Don't Checking Measure	Testing to TIG

5 Evolution of GYSMI TIG 160 HF

Evolution of PCB 2.0, this modification is very important

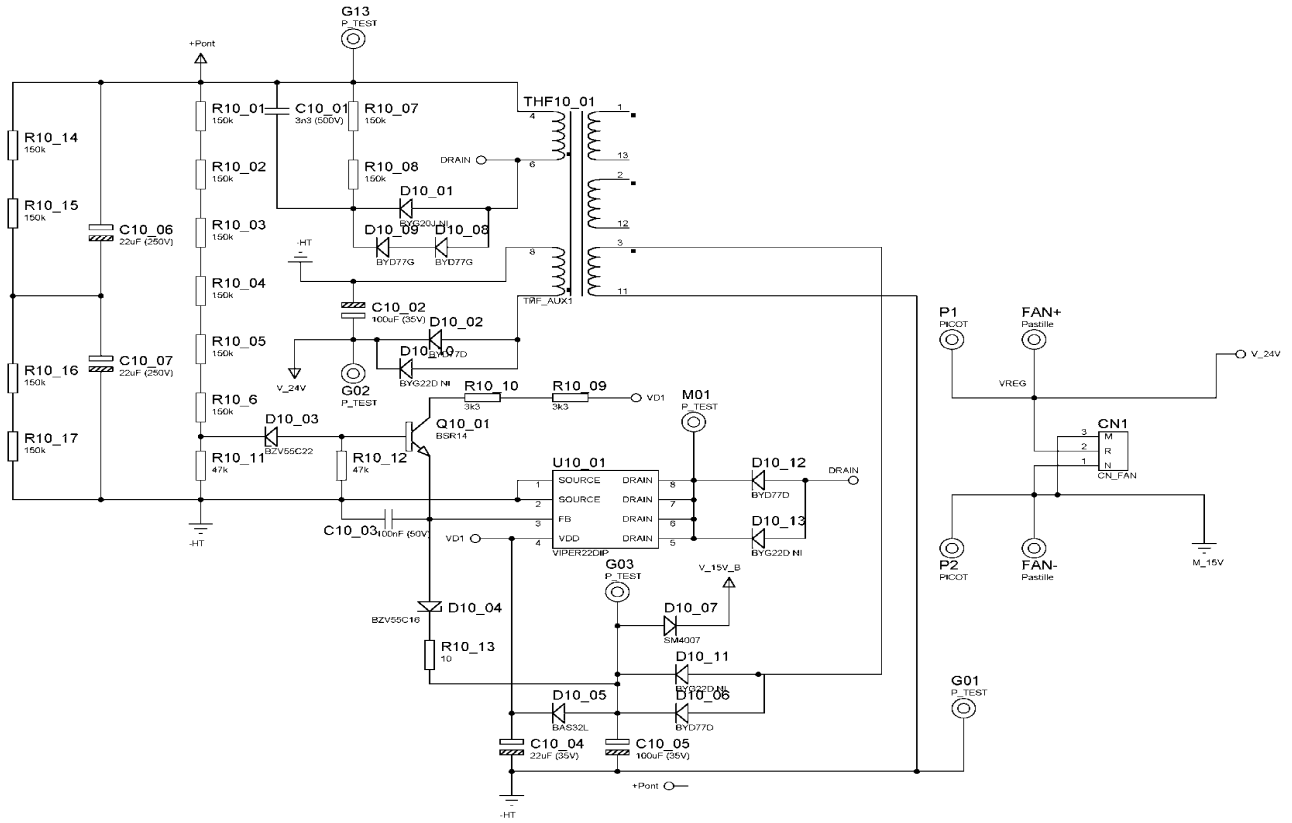
2.1	Change the resistor of charge R00_13 (4.7ohm 7W) mark “TYH” by the resistor value (4.7ohms 11 W Reference GYS 63146)

This modification is very important



5) Electrical Schematics:

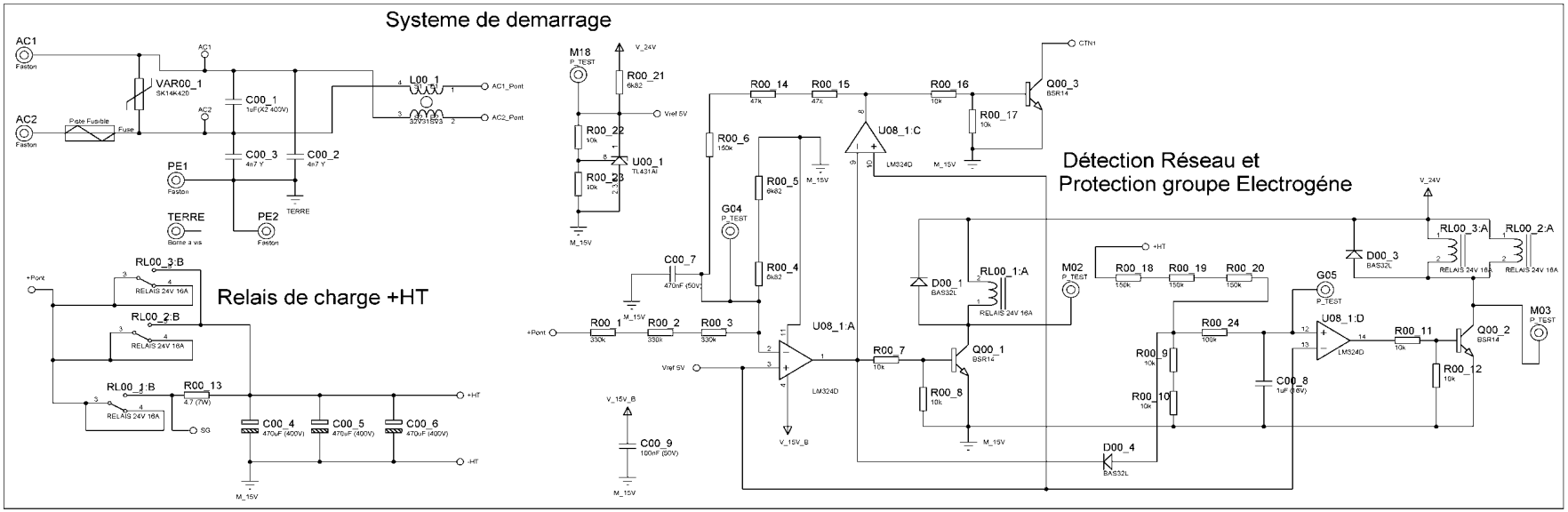
Schema 1 : auxiliary power supply



TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR	APPROUVE		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	Alimentation auxiliaire		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 1/8

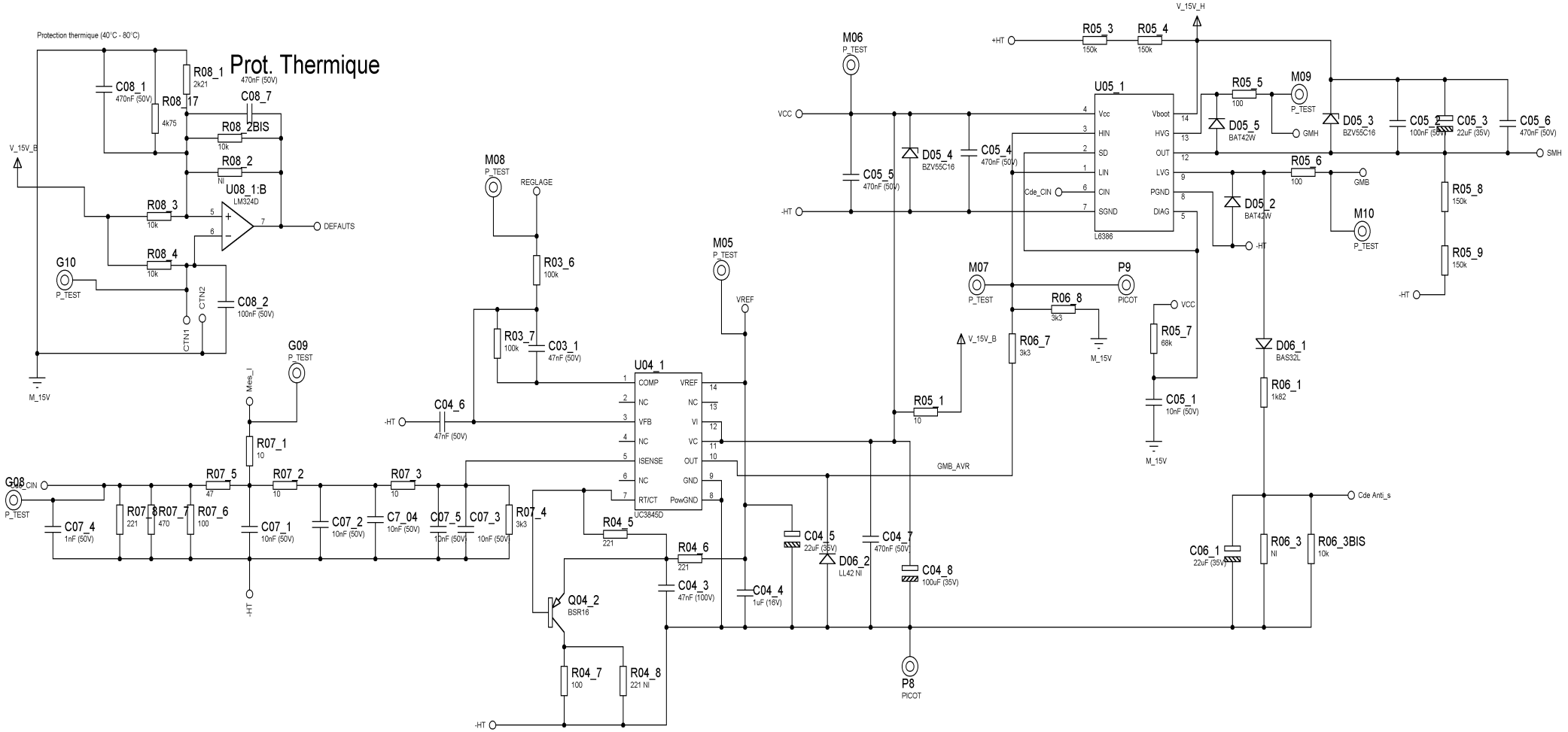
CAUTION: Do not remove components on this part of the diagram before handing-over UNDER TENSION: Risk of destruction of the machine.

Schema 2 : Power group Protection + SMI



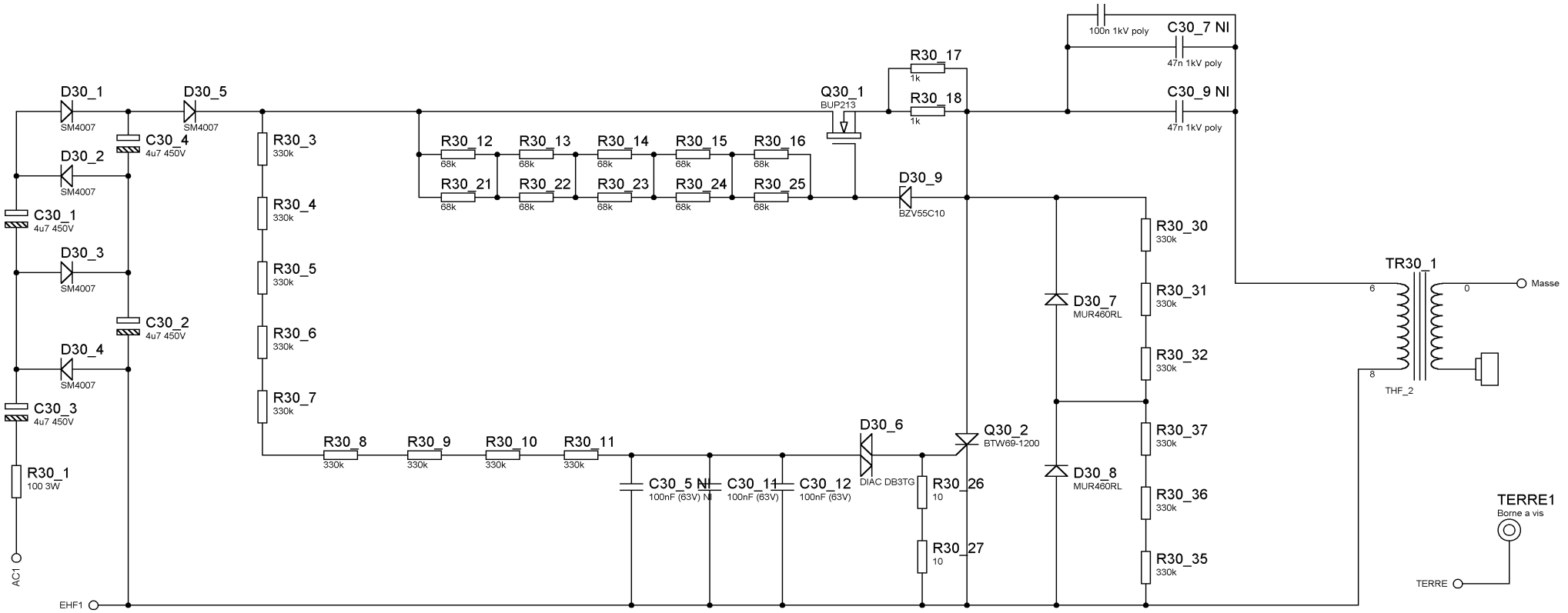
TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR	APPROUVE		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	CEM, Alim haute, SMI, Protection surtension		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 2/8

Schema 3 : PWM generator + Thermal protection



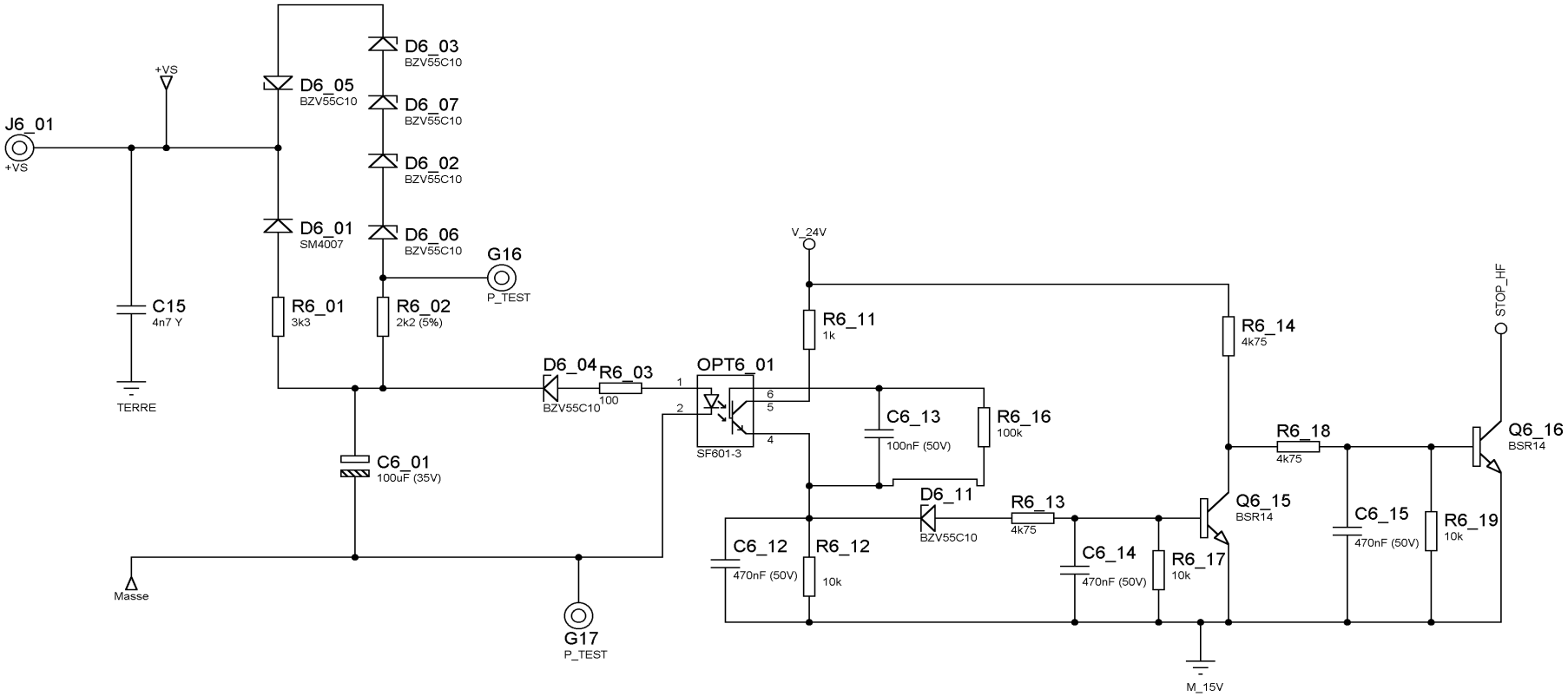
TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR	APPROUVE		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	Commande Puissance, Protection thermique		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 3/8

Schema 4 : Frequency high voltage



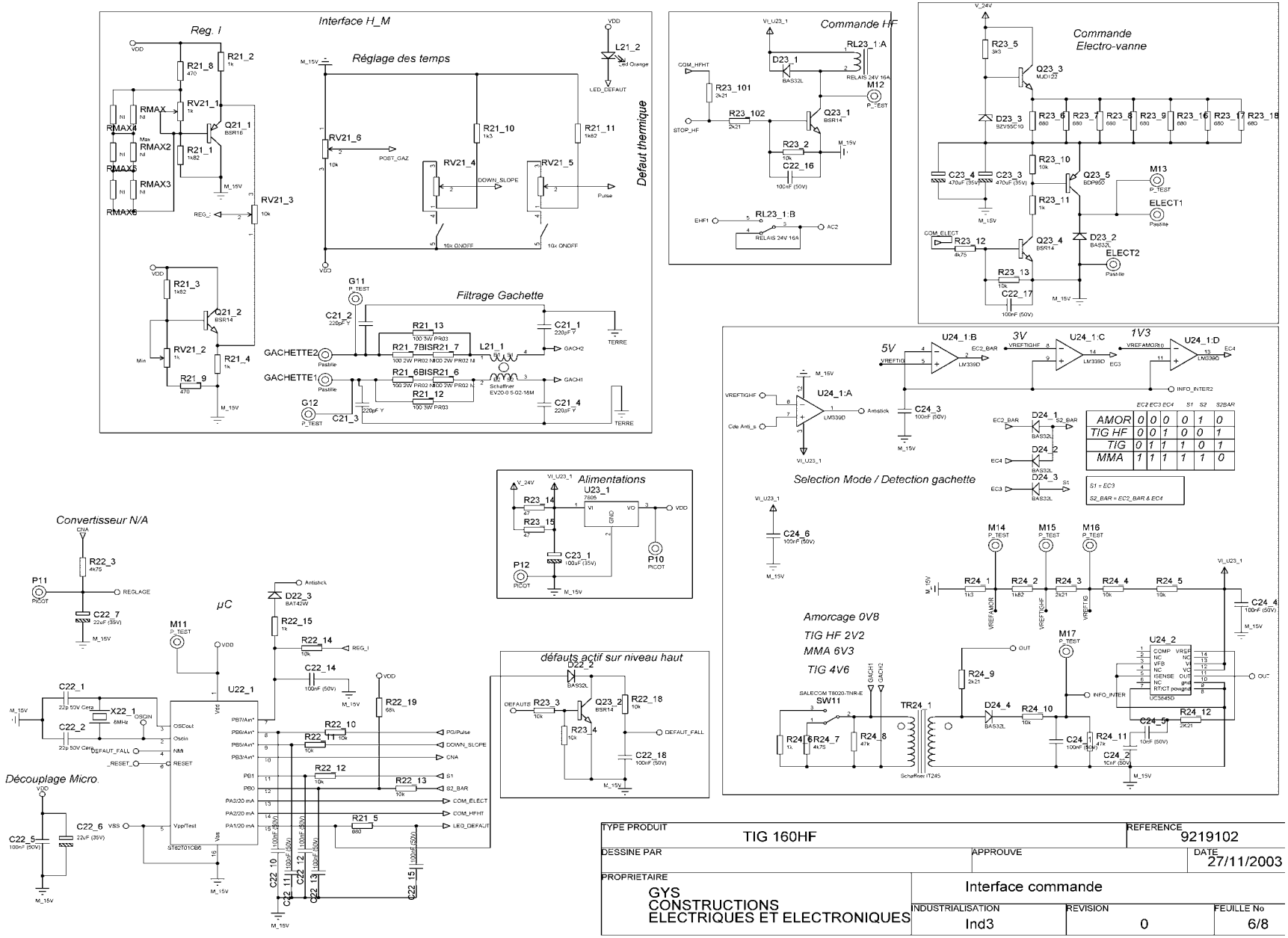
TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR	APPROUVE		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	Module amorcage HF		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 4/8

Schema 5 : Detection of the output voltage

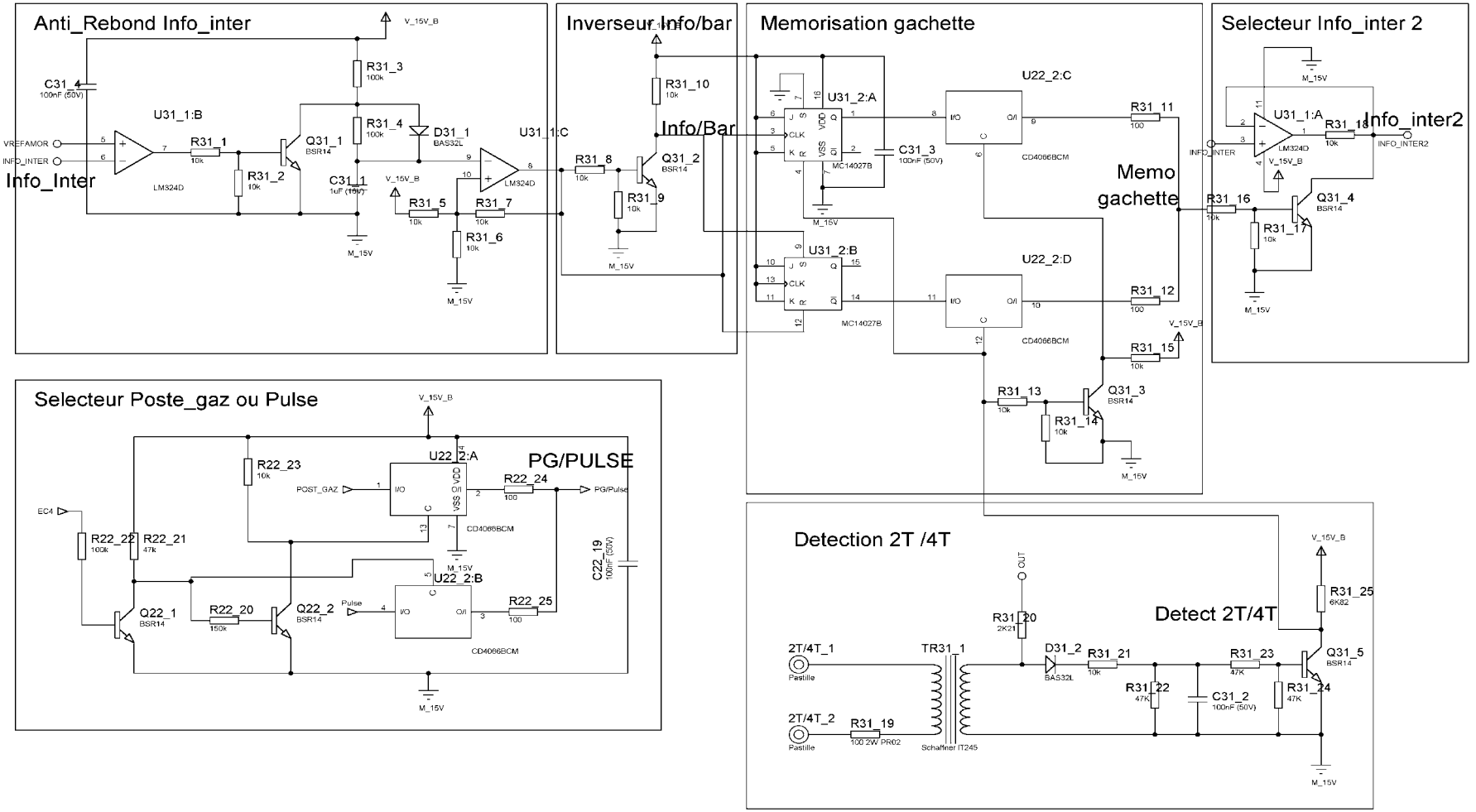


TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR	APPROUVE		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	Detection de la tension d'amorcage		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 5/8

Schema 6 : Micro-Controller + Control command of Signal

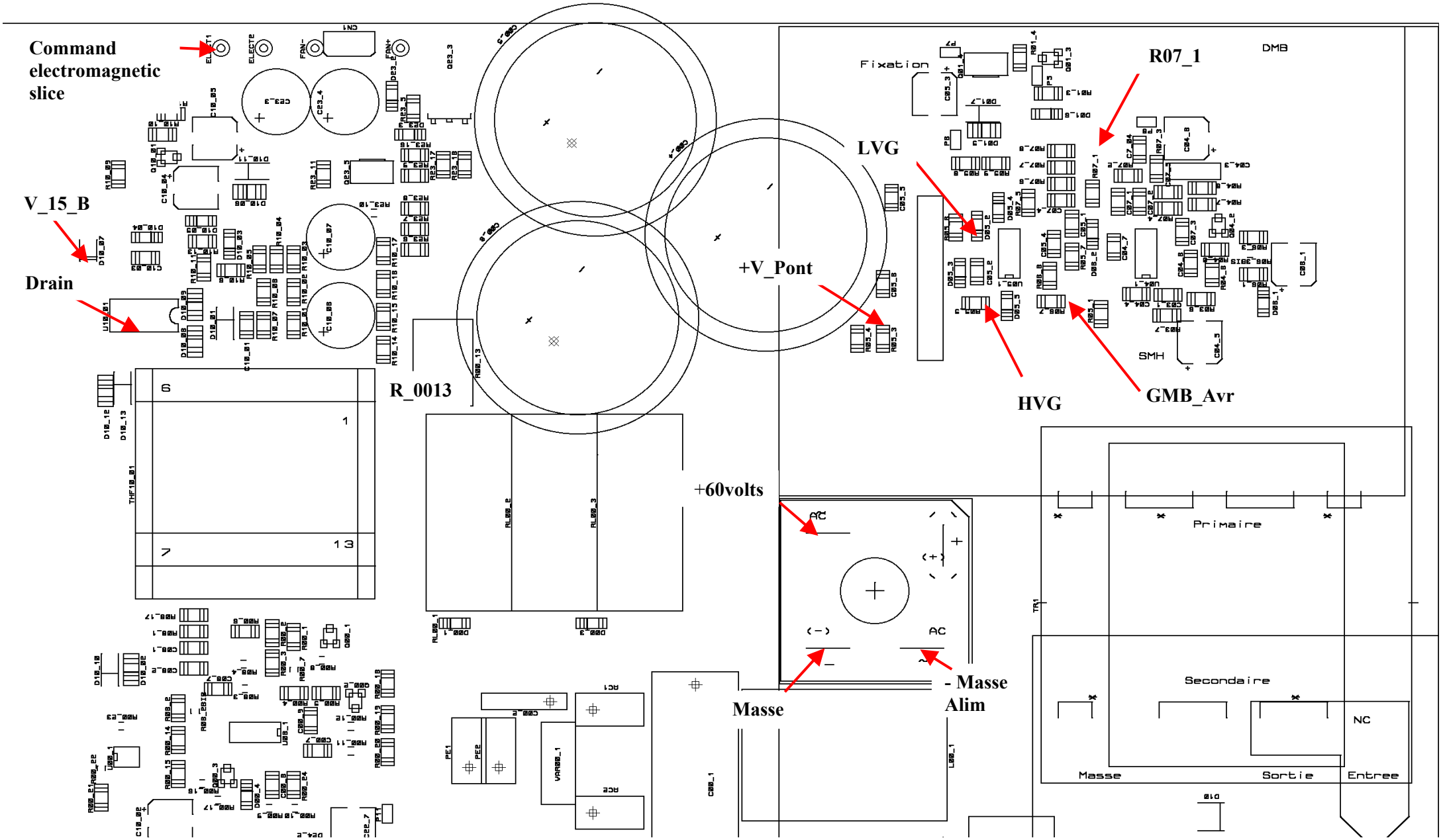


Schema 7 : Detection 2T/4T and Pulse

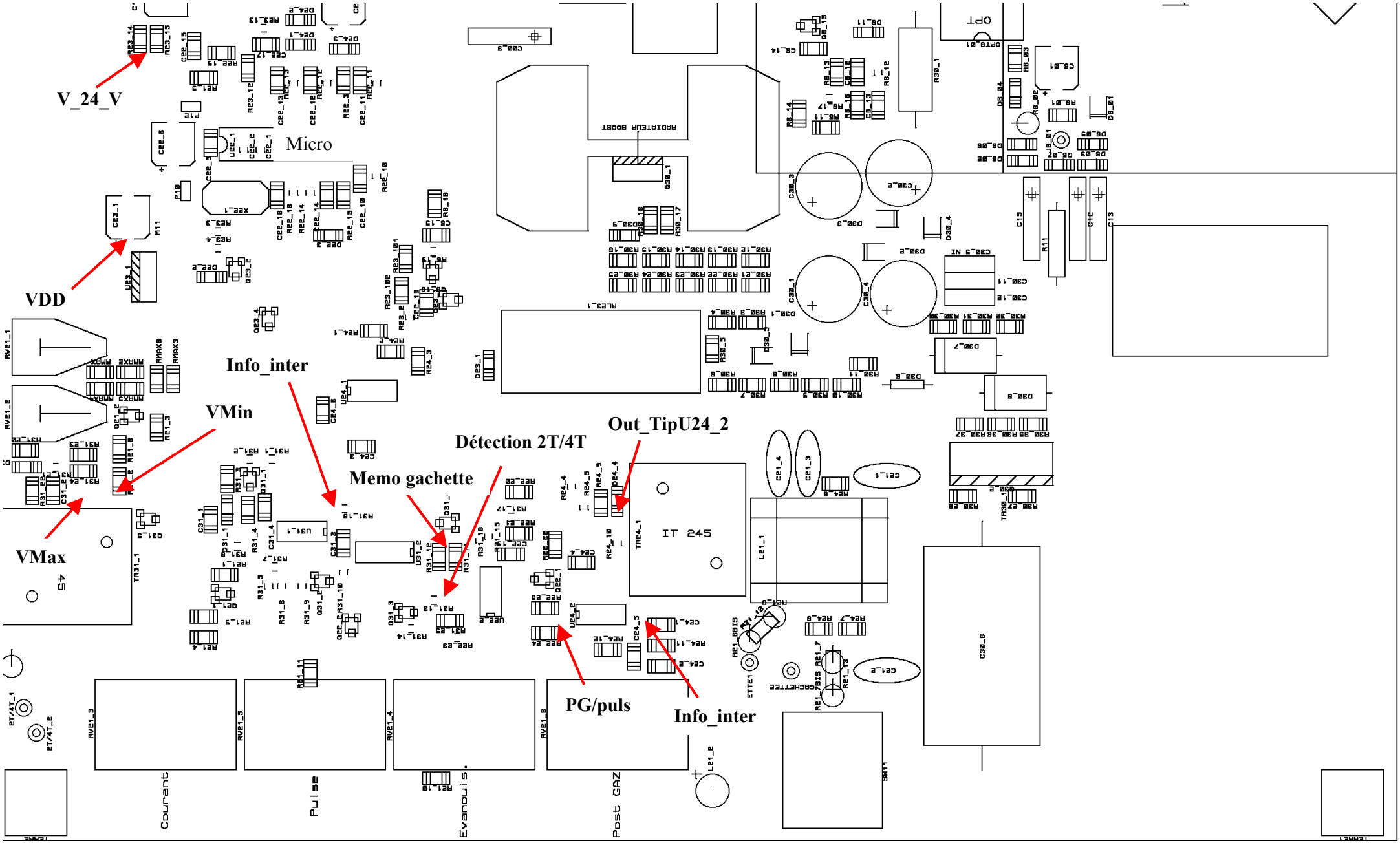


TYPE PRODUIT: TIG 160HF			REFERENCE: 9219102
DESSINE PAR: DAVID LEKIC	APPROUVE:		DATE: 27/11/2003
PROPRIETAIRE: GYS CONSTRUCTIONS ELECTRIQUES ET ELECTRONIQUES	2T / 4T et Pulsé		
	INDUSTRIALISATION: Ind3	REVISION: 0	FEUILLE No: 7/8

6) Test Points and components repaired on the main Board (page 1)



6.1) Test Points and components repaired on the main Board (page 2)



7) Bill of materials of the PCB Index 2.0

BILL OF MATERIALS (Default)
==========

Design: Y:\008_TIG 160HF\Ind2_3\PCB\PCB TIG 160HF Ind2_3.DSN
Doc. no.: <NONE>
Revision: <NONE>
Author: <NONE>
Created: 08-Oct-96
Modified: 18/11/03

Partslist generated OK.

QTY	PART-REFS	VALUE	REFGYS
Modules			
18	M01,M02,M03,M04,M05,M06,M07, M08,M09,M10,M11,M12,M13,M14, M15,M16,M17,M18	P_TEST	NULL
Resistors			
18	R00_1,R00_2,R00_3,R30_3, R30_4,R30_5,R30_6,R30_7, R30_8,R30_9,R30_10,R30_11, R30_30,R30_31,R30_32,R30_35, R30_36,R30_37	330k	64024
3	R00_4,R00_5,R00_21	6k82	64043
21	R00_6,R00_18,R00_19,R00_20, R05_3,R05_4,R05_8,R05_9, R10_01,R10_02,R10_03,R10_04, R10_05,R10_6,R10_07,R10_08, R10_14,R10_15,R10_16,R10_17, R22_20	150k	64020
47	R00_7,R00_8,R00_9,R00_10, R00_11,R00_12,R00_16,R00_17, R00_22,R00_23,R06_3BIS,R6_12, R6_17,R6_19,R08_2BIS,R08_3, R08_4,R22_10,R22_11,R22_12, R22_13,R22_14,R22_18,R22_23, R23_2,R23_3,R23_4,R23_10, R23_13,R24_4,R24_5,R24_10, R31_1,R31_2,R31_5,R31_6, R31_7,R31_8,R31_9,R31_10, R31_13,R31_14,R31_15,R31_16, R31_17,R31_18,R31_21	10k	64048
1	R00_13	4.7 11W	63146
7	R00_14,R00_15,R10_11,R10_12, R22_21,R24_8,R24_11	47k	64033
7	R00_24,R03_6,R03_7,R6_16, R22_22,R31_3,R31_4	100k	64040
6	R01_3,R06_1,R21_1,R21_3, R21_11,R24_2	1k82	64009
9	R01_4,R6_11,R21_2,R21_4, R22_15,R23_11,R24_6,R30_17, R30_18	1k	64004
3	R04_5,R04_6,R07_8	221	64035
9	R04_7,R05_5,R05_6,R6_03, R07_6,R22_24,R22_25,R31_11, R31_12	100	64015
1	R04_8	221 NI	64035 NI
7	R05_1,R07_1,R07_2,R07_3, R10_13,R30_26,R30_27	10	64012
12	R05_7,R22_19,R30_12,R30_13, R30_14,R30_15,R30_16,R30_21, R30_22,R30_23,R30_24,R30_25	68k	64053
2	R06_3,R08_2	NI	NI
7	R06_7,R06_8,R6_01,R07_4, R10_09,R10_10,R23_5	3k3	64021
1	R6_02	2k2 (5%)	63112
7	R6_13,R6_14,R6_18,R08_17, R22_3,R23_12,R24_7	4k75	64013
3	R07_5,R23_14,R23_15	47	64018
3	R07_7,R21_8,R21_9	470	64108
5	R08_1,R23_101,R23_102,R24_3, R24_9	2k21	64010
1	R11	10M 3kV	63082
8	R21_5,R23_6,R23_7,R23_8, R23_9,R23_16,R23_17,R23_18	680	64003
4	R21_6,R21_6BIS,R21_7, R21_7BIS	100 2W PR02 NI	63081 NI
2	R21_10,R24_1	1k3	64032
2	R21_12,R21_13	100 3W PR03	63114
2	R24_12,R31_20	2K21	64010
1	R30_1	100 3W	63174
1	R31_19	100 2W PR02	63081
3	R31_22,R31_23,R31_24	47K	64033
1	R31_25	6K82	64043

QTY	PART-REFS	VALUE	REFGYS
Capacitors			
1	C00_1	1uF(X2 400V)	63462
5	C00_2,C00_3,C12,C13,C15	4n7 Y	63461
3	C00_4,C00_5,C00_6	470uF (400V)	63447
10	C00_7,C04_7,C05_4,C05_5, C05_6,C6_12,C6_14,C6_15, C08_1,C08_7	470nF (50V)	64028
3	C00_8,C04_4,C31_1	1uF (16V)	64029
23	C00_9,C05_2,C6_13,C08_2, C10_03,C22_5,C22_10,C22_11, C22_12,C22_13,C22_14,C22_15, C22_16,C22_17,C22_18,C22_19, C24_1,C24_3,C24_4,C24_6, C31_2,C31_3,C31_4	100nF (50V)	64006
2	C03_1,C04_6	47nF (50V)	64044
1	C04_3	47nF (100V)	63457
6	C04_5,C05_3,C06_1,C10_04, C22_6,C22_7	22uF (35V)	64050
5	C04_8,C6_01,C10_02,C10_05, C23_1	100uF (35V)	64051
8	C05_1,C07_1,C07_2,C07_3, C07_5,C7_04,C24_2,C24_5	10nF (50V)	64007
1	C07_4	1nF (50V)	64008
1	C10_01	3n3 (500V)	64112
2	C10_06,C10_07	22uF (250V)	63389
4	C21_1,C21_2,C21_3,C21_4	220pF Y	63430
2	C22_1,C22_2	22p 50V Cera	64065
2	C23_3,C23_4	470uF (35V)	63385
4	C30_1,C30_2,C30_3,C30_4	4u7 450V	63386
1	C30_5 NI	100nF (63V) NI	63369 NI
1	C30_6	100n 1kV poly	63377
2	C30_7 NI,C30_9 NI	47n 1kV poly	NI
2	C30_11,C30_12	100nF (63V)	63369
Integrated Circuits			
1	U00_1	TL431AI	64063
2	U04_1,U24_2	UC3845D	64057
1	U05_1	L6386	64079
2	U08_1,U31_1	LM324D	64054
1	U10_01	VIPER22DIP	63501
1	U22_1	ST62T01CB6	64066
1	U22_2	CD4066BCM	64254
1	U23_1	7805	63510
1	U24_1	LM339D	64056
1	U31_2	MC14027B	64266
Transistors			
18	Q00_1,Q00_2,Q00_3,Q01_3, Q6_15,Q6_16,Q10_01,Q21_2, Q22_1,Q22_2,Q23_1,Q23_2, Q23_4,Q31_1,Q31_2,Q31_3, Q31_4,Q31_5	BSR14	64002
1	Q01_4	PZT2222A	64106
2	Q04_2,Q21_1	BSR16	64001
1	Q23_3	MJD122	64052
1	Q23_5	BDP950	64107
1	Q30_1	BUP213	64091
1	Q30_2	BTW69-1200	64096
Diodes			
14	D00_1,D00_3,D00_4,D06_1, D10_05,D22_2,D23_1,D23_2, D24_1,D24_2,D24_3,D24_4, D31_1,D31_2	BAS32L	64014
4	D01_5,D10_02,D10_06,D10_12	BYD77D	64000
4	D01_6,D05_3,D05_4,D10_04	BZV55C16	64023
1	D01_7	BYG22D	64XXX
3	D05_2,D05_5,D22_3	BAT42W	64026
1	D06_2	LL42 NI	64026 NI
7	D6_01,D10_07,D30_1,D30_2, D30_3,D30_4,D30_5	SM4007	64030
9	D6_02,D6_03,D6_04,D6_05, D6_06,D6_07,D6_11,D23_3, D30_9	BZV55C10	64027
1	D10	SMCJ188CA	64117
1	D10_01	BYG20J NI	64XXX
1	D10_03	BZV55C22	64016
2	D10_08,D10_09	BYD77G	64016
3	D10_10,D10_11,D10_13	BYG22D NI	64XXX
1	D30_6	DIAC DB3TG	63308
2	D30_7,D30_8	MUR460RL	63304

QTY	PART-REFS	VALUE	REFGYS
Relay			
4	RL00_1,RL00_2,RL00_3,RL23_1	RELAIS 24V 16A	52601
Resitor var			
2	RV21_1,RV21_2	1k	63086
2	RV21_3,RV21_6	10k	63096
2	RV21_4,RV21_5	10k ONOFF	63087
SMI			
1	SMI1	SMI_IND4	
Miscellaneous			
2	2T/4T_1,2T/4T_2	Pastille	
4	AC1,AC2,PE1,PE2	Faston	75028
1	CIRCUIT NU	CIRCUIT NU	64194 Ind1
1	CN1	CN_FAN	64256
1	CONNECTEUR CDE	CONNECTEUR CDE	51126
1	ECROU M5	D5 Crante	41154
6	ELECT1,ELECT2,FAN+,FAN-, GACHETTE1,GACHETTE2	Pastille	NULL
15	G01,G02,G03,G04,G05,G06,G07, G08,G09,G10,G11,G12,G13,G16, G17	P_TEST	NULL
1	INVERSEUR 2T/4T	SALECOM T8013-TXXXXX	
1	J6_01	+VS	
1	L00_1	32V31SV3	63667
1	L21_1	EV20-0.5-02-18M	63665
1	L21_2	Led Orange	63328
1	OPT6_01	SF601-3	63455
10	P1,P2,P5,P6,P7,P8,P9,P10,P11, P12	PICOT	
1	PONT50A	50A	52215
1	RADIATEUR BOOST	RADIATEUR BOOST	64202
1	RADIATEUR SMI	98x150	64200
6	RMAX,RMAX2,RMAX3,RMAX4,RMAX5, RMAX6	NI	
1	RONDELLE	M3	41230
1	SUPPORT DIL16	SUPPORT DIL16	64092
1	SW11	SALECOM T8020-T	64068
2	TERRE,TERRE1	Borne a vis	63149
1	THF10_01	THF_AUX1	64132
1	TORE	BFI T157-26	63663
1	TR1	TR_E55	64124
2	TR24_1,TR31_1	Schaffner IT24	563666
1	TR30_1	THF_2	64133
1	VAR00_1	SK14K420	63446
5	VIS1,VIS2,VIS3,VIS4,VIS5	M5 Torx	41231
1	VIS6	M3x15	41039
1	VIS7	M5 x 12	41095
1	X22_1	8MHz	64067

1 Fan		92*92*12	51032
1 électrromagnetic sluice		24Volt continus	71505

8) Chronogram of operation according for mode 2T /4T and the trigger torch