Unit 7

Cabling and Attributes

1. Protection and Command:

1.1. Function:

Its function is to protect the equipment if there is an excessive antenna or filter VSWR or phase fail, signalizing the alarms on panel.

1.2. Technical Description:

Three transformers supply the circuit: the primary ones are interconnected in delta or star, according to the main input (220 or 380V). By its secondary and rectifying diodes D40, D41 and D43, it is supplied the integrated circuit IC15, that is a 12V regulator. Its function is to supply the entire command and protection circuit.

- **Phase fail sensor:**

The integrated circuit IC4B and IC14 are responsible for phase fail sensor. The integrated circuit IC4B compares through its pins 5 and 6 the DC input voltage in "ripple". The diode zener 1N4728/9 fixes the voltage in pin 5. In its turn, the disarm point, in the phase fail, is adjusted by R49. When one phase is absent, pin 5 voltage becomes higher than pin 6, setting pin 7 from the integrated circuit. This one sets integrated circuit IC14 that activates transistor Q7 through pin 1. At this moment Led LD5 lights, commutes CN3:7, acts in the "Resets" from all the other integrated circuits and switch off triac D42 (TIC216M). When the phase returns the circuit activates by itself, causing the inverse process

- **Filter VSWR / Antenna VSWR protection.**

Both circuits are similar: the VSWR filter protection is obtained through the first diretional coupler installed between the final 3 dB hibrid and the filter input. The VWSR antenna protection is obtained thru the second directional coupler installed between the filter output and the transmitter output connector.

The detected VWSR signal from the directional coupler feeds IC4A pin 2, after filtering performed by C15, L1 and C16.

IC4A is a voltage comparator and the trip point is adjusted by R43. (4% of forward power). IC4A output pin 1 IC8 pin 10 change from low to hight remaining hight during a time determined by C17 and R45.

IC8 pin 10 pulse control IC12, flip-flop IC nich function is to count twice this event.

After the second event, the transmitter shut off, lighting LED4 on panel via transistor Q6, and remains in this state until the reset button on panel is pressed.

The circuit composed by IC13B, R58 and C29 has function to automatic reset the count after about 15 minutes, avoiding the transmitter to be locked on a sporadic event.

- **Ables and disables in the automatic:**

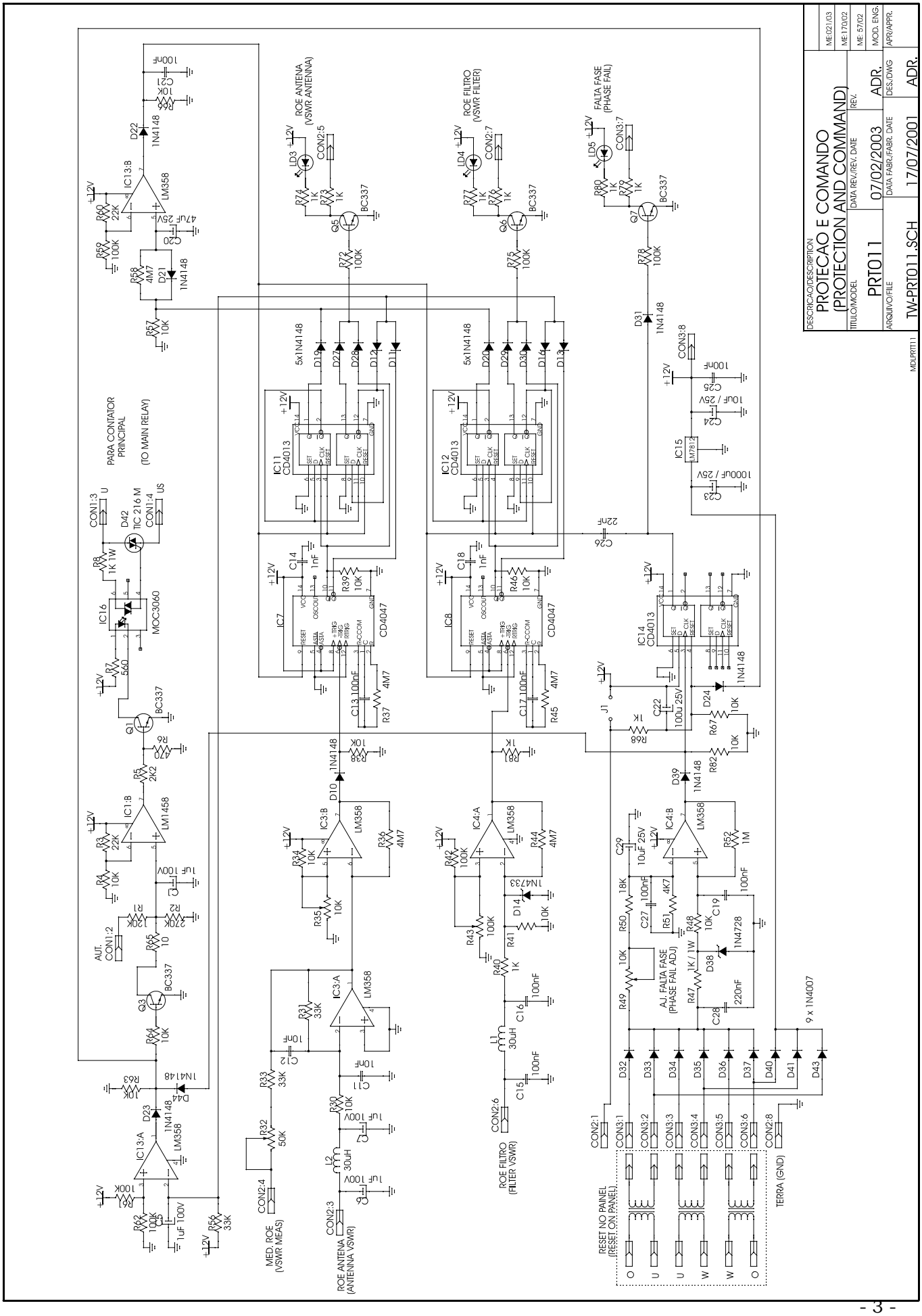
The integrated IC1B and IC13A are responsible for turn on or turn off the transmitter.

When a +12V is present in the AUT input, capacitor C1 charges through resistor R1.

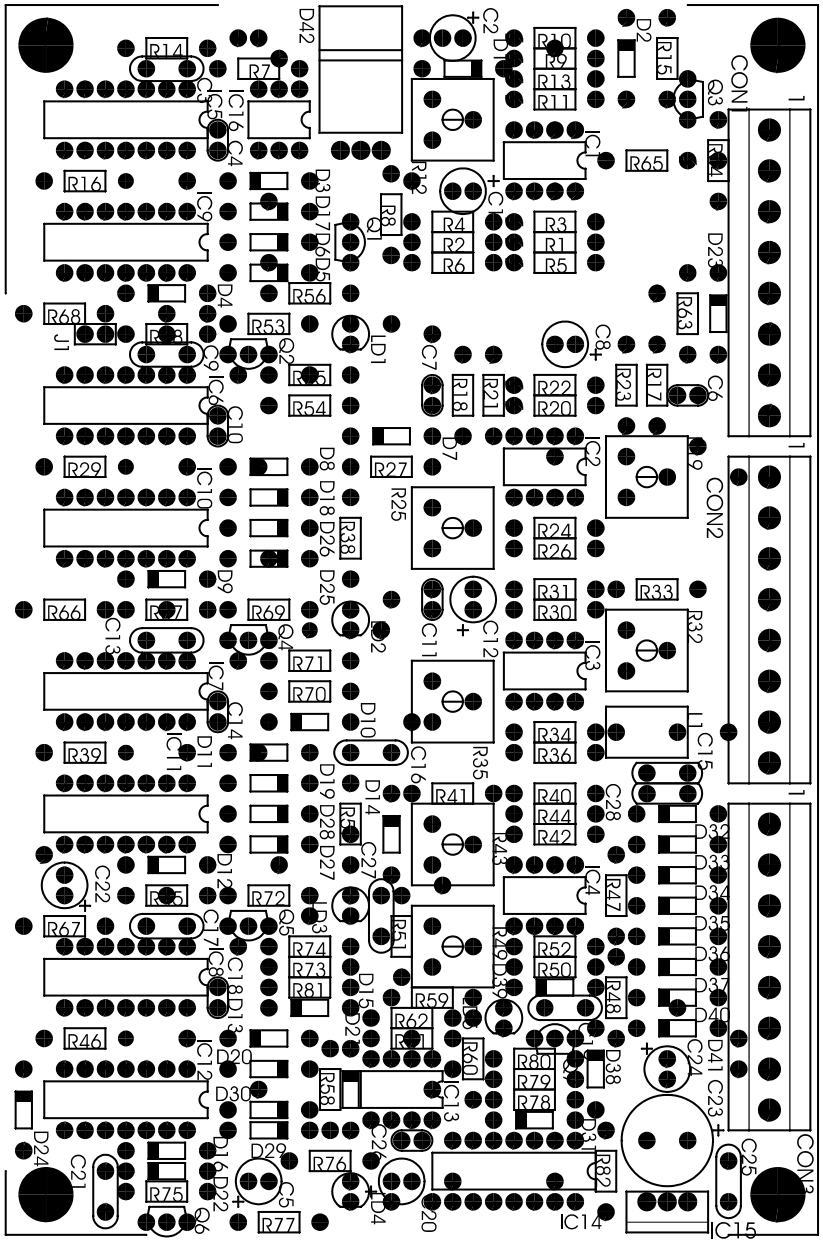
IC1B is a voltage comparator, comparing the fixed voltage at pin 6 with the voltage on pin 5. Wher the voltage on pin 5 exceeds the voltage fixed on pin 6, the IC1B pin 7 outout change to high and comutes transistor Q1. Q1 act on IC16 that activate triac D42 responsible to feed the main power relay coil.

IC13A and Q3 perform the protection, shutting off the transmitter in every protection event (VWSR and Phase Fail). IC13A pin 2 is connected with diodes D11, D12, D13 and D16. When occurs an event, IC13A out put pin 1 goes high and via R64 commute Q3 that discharges capacitor C1 and then disabling triac D42.

1.3. Circuit Diagram PRT011:



1.4. Layout PRT011:



1.5. Parts list PRT011:

Quant.	Description	Position	Code
1	SHOCK 30 µH	L1	50001
3	INTEGRATED CIRCUIT CD 4013 AE	IC11,IC12,IC14	60036
2	INTEGRATED CIRCUIT CD 4047 AE	IC7,IC8	60039
1	INTEGRATED CIRCUIT MOC 3060	IC16	60050
3	INTEGRATED CIRCUIT LM 358	IC3,IC4,IC13	60052
1	CAPAC. ELCO. RADIAL 100µF 25V	C22	74010
1	CAPAC. ELCO. RADIAL 1000µF 25V	C23	74021
2	CAPAC. ELCO. RADIAL 1µF 100V	C1,C5	74026
2	CAPAC. ELCO. RADIAL 10µF 25V	C12,C24,C29	74028
1	CAPAC. ELCO. RADIAL 47µF 25V	C20	74029
8	CAPAC. POL. METAL. 100ηF	C13,C15,C16,C17,C19,C21,C25, C25,C27	75019
1	CAPAC. POL. METAL. 220ηF	C28	75024
2	CAPAC. MULT. LAYERS 1ηF	C14,C18	76044
1	CAPAC. MULT. LAYERS 22ηF	C26	76045
1	CAPAC. MULT. LAYERS 10ηF	C11	76046
18	DIODE 1N 4148	D10,C11,C12,C13,D15,D16,D19, D20,D21,D22,D23,D24,D27,D28, D29,D30,D31,D39	82011
3	DIODE LED RED	LD3,LD4,LD5	82017
1	DIODE 1N 4733 A 5,1V	D14	82018
1	DIODE 1N 4728/9 3,3-3,6V	D38	82027
9	DIODE 1N 4007	D32,D33,D34,D35,D36,D37,D40, D41,D42	82057
1	DIODE TRIAC TIC 216 M	D42	82105
2	TRIMPOT 10 K	R35,R49	90005
1	TRIMPOT 50 K	R32	90006
1	TRIMPOT 100 K	R43	90011
1	RESISTOR 1/8W 10 Ohms	R65	100008
1	RESISTOR 1/8W 470 Ohms	R6	100025
1	RESISTOR 1/8W 560 Ohms	R7	100026
9	RESISTOR 1/8W 1 K	R40,R68,R73,R74,R76,R77,R79, R80,R81	100028
1	RESISTOR 1/8W 2 K 2	R5	100032

1	RESISTOR 1/8W 4 K 7	R51	100037
15	RESISTOR 1/8W 10 K	R4,R30,R34,R38,R39,R41,R42,R46, R48,R57,R63,R64,R66,R67,R82	100041
1	RESISTOR 1/8W 18 K	R50	100044
2	RESISTOR 1/8W 22 K	R3,R60	100045
3	RESISTOR 1/8W 33 K	R31,R33,R56	100047
5	RESISTOR 1/8W 100 K	R59,R61,R72,R75,R78	100051
1	RESISTOR 1/8W 120 K	R1	100052
1	RESISTOR 1/8W 270 K	R2	100057
1	RESISTOR 1/8W 1 M	R52	100059
5	RESISTOR 1/8W 4 M 7	R36,R37,R44,R45,R58	100064
2	RESISTOR 1W 1 K	R8,R47	103014
7	TRANSISTOR BC 337	Q1,Q3,Q5,Q6,Q7	120002
1	VOLTAGE REGULATOR 7812	IC15	126019
1	PCB PROTECTION AND COMMAND	PCI1	PCIPRT011

2. Transient suppressor main AC:

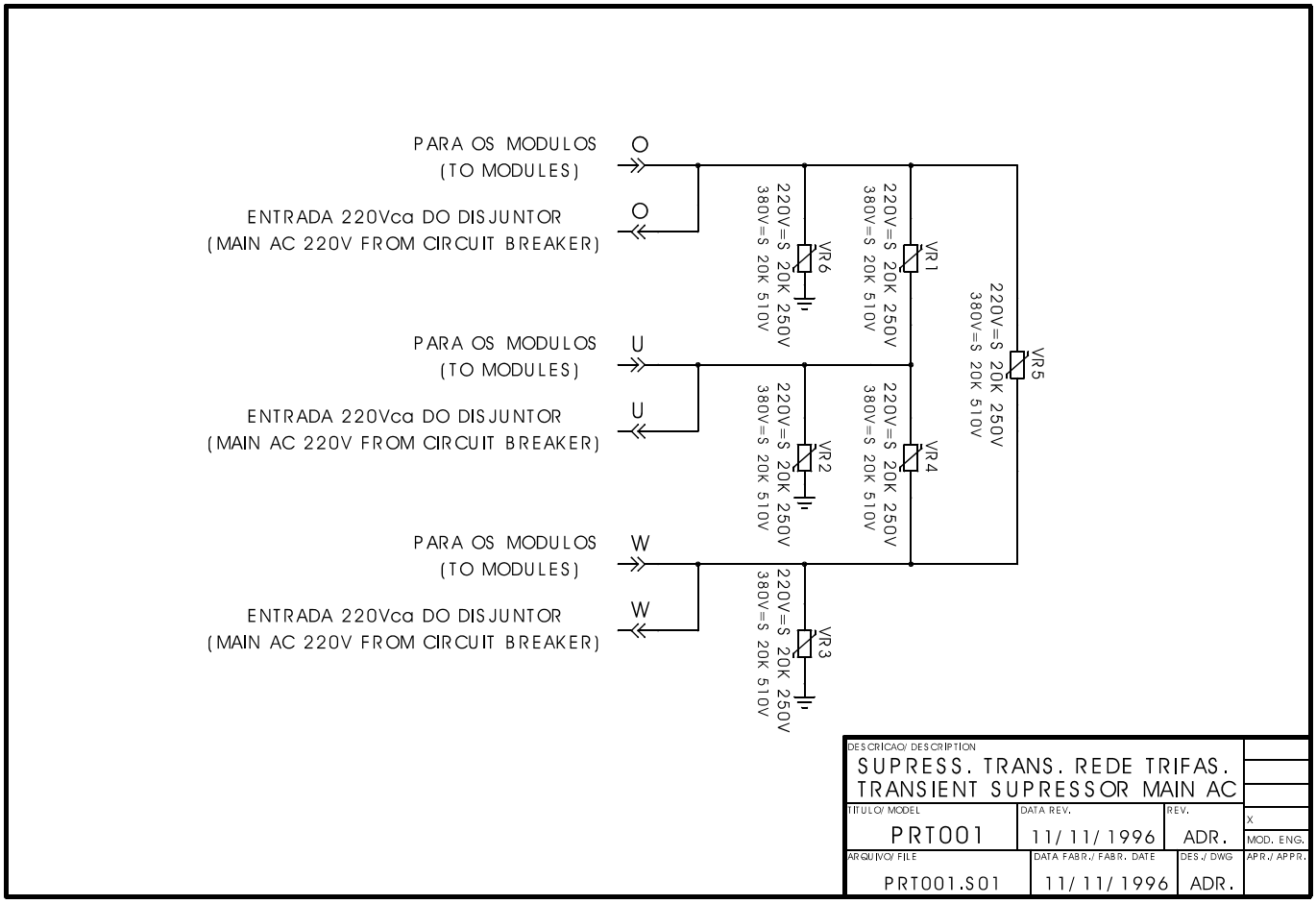
2.1 Function:

Its function is to protect against voltage peaks in the three-phase AC, caused by atmospheric and transient discharges.

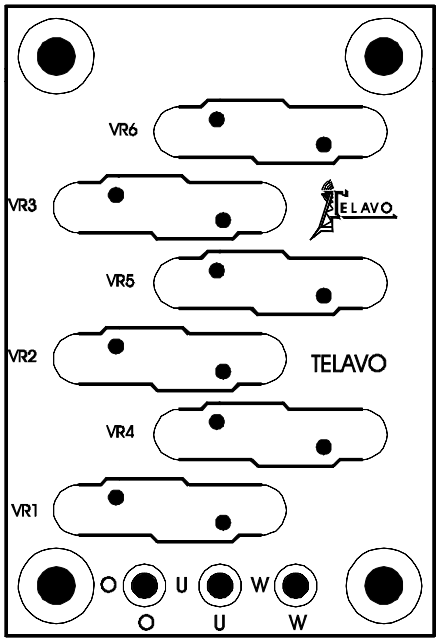
2.2 Technical Description:

This circuit is composed of three varistors: VR1, VR2 and VR3. The VR1 varistor is interconnected phase to phase and the varistors VR2 and VR3 are interconnected phase and ground.

2.3. Circuit diagram PRT001:



2.4. Layout PRT001:



2.5 Parts list PRT001:

Quant.	Description	Position	Code
6	VARISTOR SIOV S 20K 510V	VR1,VR2,VR3,VR4,VR5,VR6 P/ 380V	71033
6	VARISTOR SIOV S 20K 250V	VR1,VR2,VR3,VR4,VR5,VR6 P/ 220V	71034
1	PCB TRANSENT PROT. SUPPR.	PCI1	PCIPRT001

3. Temperature sensor:

3.1 Function:

Its function is to protect the diode banks of two main power (A and B), as well as the balanced load if there is ventilation fail.

3.2 Technical Description:

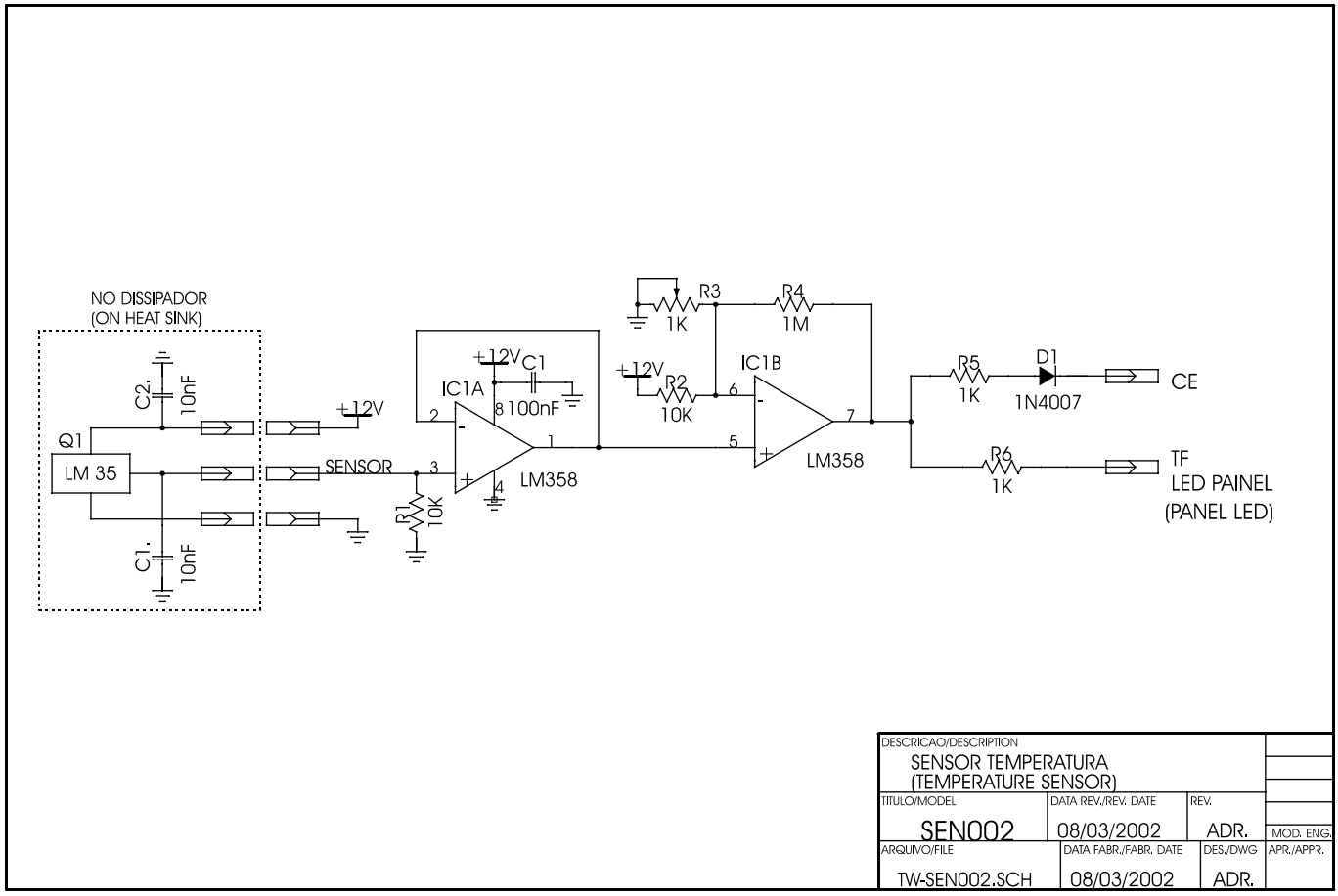
The integrated circuit IC1A is an operational IC acting as an input buffer. The "buffer" output is compared to pin 6 of the integrated circuit IC1B, where trimpot R3 determines the sensor disarm point. The disarm adjustment to 56°C is made in the plant.

Pin 7 acts at **CE**, at exciter disarm, as well as at TF Led, at power temperature or balanced load.

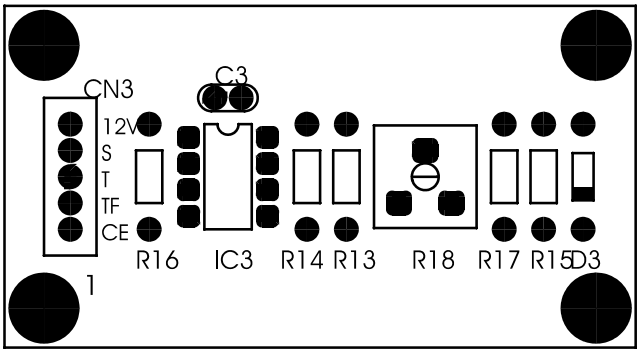
Temperature sensor Q1 is mounted in each heat sink (power A and B and balanced load) in order to accomplish the function.

In its output we have 10mV/°C, be that, if we have 50°C, this component voltage output will be 500mV.

3.3. Circuit Diagram SEN002:



3.4. Layout SEN002:



3.5. Parts list SEN002:

Quant.	Description	Position	Code
1	INTEGRATED CIRCUIT LM 358	IC1	60052
1	CAPAC. POL. METAL 100ηF	C1	75019
1	DIODE 1N4007	D1	82057
1	TRIMPOT 1K	R3	90002
2	RESISTOR 1/8W 1 K	R5,R6	100028
2	RESISTOR 1/8W 10 K	R1,R2	100041
1	RESISTOR 1/8W 1 M	R4	100059
1	PCB TEMPERATURE SENSOR	PCI1	PCISEN002

4. TV Monitor:

4.1. Function:

The TV monitor function is to detect the output RF signal and final amplifier, providing the video carrier output power reading and audio carrier and the video signal monitoring that have been transmitted.

4.2. Technical Description:

The obtained signal through the directional coupler supplies the monitor input, by connector J1.

The resistors R14 and R15 provide 50 Ohm termination for interconnecting cabling. The diodes D2 and D3 function is to detect the RF signal and they are polarized to a better linearity through R1, R2, D1, C1 and L1. The linearity adjustment is made by R4.

The detected signal by D2 supplies the detector peak circuit via R4, formed by IC1, IC2A and associated components in order to obtain the output peak sync power reading from the power stage.

Through R12, the reading is adjusted to the panel. The detected signal by D3, after passes by Q1, that provides high impedance to D3, it supplies the 4.5 MHz filter formed byL2, C26, C27, C12, R18 and R19. The filter can be short cut by CH1.

The video signal through trimpot R20, supplies the video IC6 that through R38 shows a 75 Ohm output impedance.

4.3. Adjustment Procedure:

a) The trimpot R12 is put at half course.

b) The directional coupler detector is adjusted in order to obtain the reading in the meter and directivity.

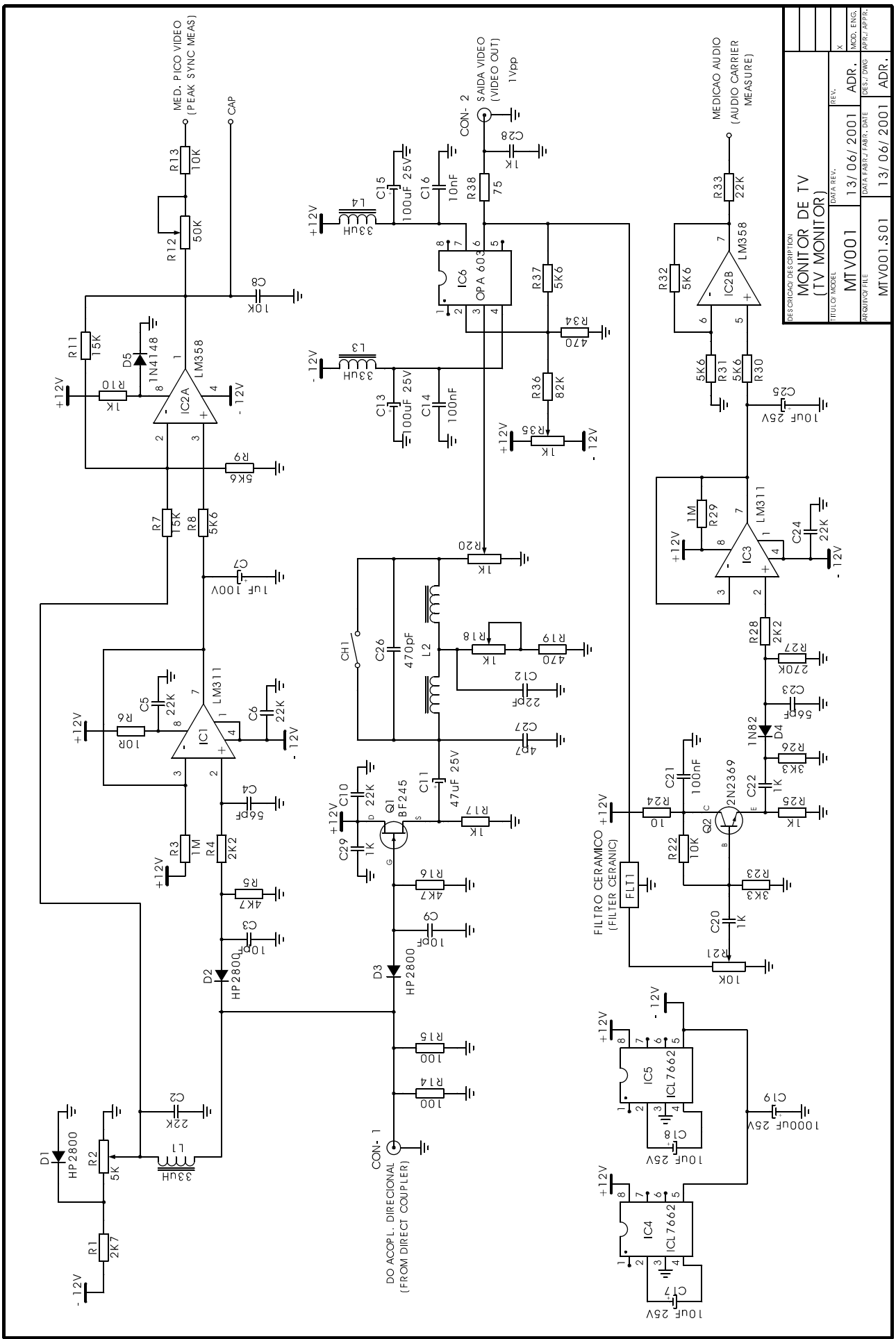
c) R20 is adjusted till we obtain video 1Vpp in the oscilloscope that is terminated in 75 Ohm.

d) R35 is adjusted to 0Vdc in the blanking level.

e) Through R2, the video linearity is adjusted.

f) Through L2 and R18, the filter is syntonized for 4.5 MHz minimum value over the video.

4.4. Circuit Diagram MTV001:



4.5. Layout MTV001: