POWER BOX, ELECTRONIC BOARDS

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1 ENERGY DISTRIBUTION/PROTECTION BOARD

1.1 Introduction

The energy distribution and protections board is an electronic circuit (Figure 1.1) designed to provide electrical protection to batteries and equipment, using worldwide commercial components. Each board allows connecting two 85W solar panels, two 95A/hr batteries and provides energy for four instruments (10A maximum).

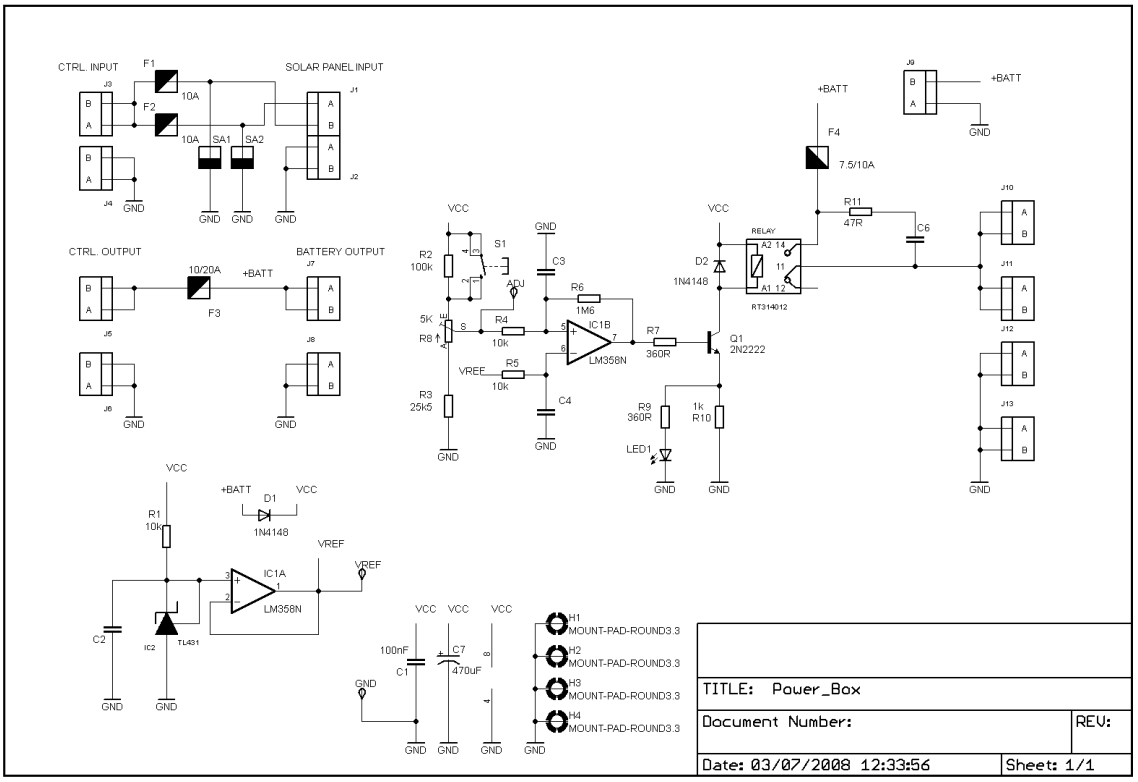

Figure 1.1 – Electronic circuit of the Energy Distribution/Protection Board.

Electrical protections includes car and gas fuses, also includes a low battery protection circuit (LBP) that cuts output energy at 11.8V, allowing battery charge recovering. The LBP circuit it is not designed to have automatic start for reduces energy consumption, but can start at 13.6V with some false starts.

1.2 Calibration

This board, shown in the figure 1.2, must to be calibrated before be installed. For calibrate, use one voltmeter, one (0 – 15Vdc) power supply and cables; follow the instructions:

a) Connect the power supply to the circuit board at J7 and J8; see Table I to check polarity. Set the power supply to 13V and turn it on;

b) Press the start/restart button, circuit must be started, LED1 turns on. If circuit doesn't go on, increase the input voltage to 15 volts and repeat step "C";

c) Measure voltage at VREF pad, and ADJ pad (see figure 1.2). ADJ voltage is your cut off voltage and VREF the comparator set voltage, take note about VREF voltage;

d) Set the power supply to 11.8V. Slowly, and monitoring the ADJ voltage, adjust trim pot until you equalize the ADJ voltage to VREF voltage. At this point, circuit is ready to turns off at 11.8V and turns on at 13.6V;

e) Test the circuit using the power supply. First set the voltage to 13V and press the start/reset button, circuit must turn on; slowly reduce the voltage, and when input voltage is 11.8V, circuit turns off. Now slowly increase input voltage, and at 13.6V, circuit turns on again;

f) If on/off voltages (11.8-13.6V) presents deviation more than 5%, please use the trim pot to move down or up the span of these voltages. Repeat steps F and G until these values are in the range.

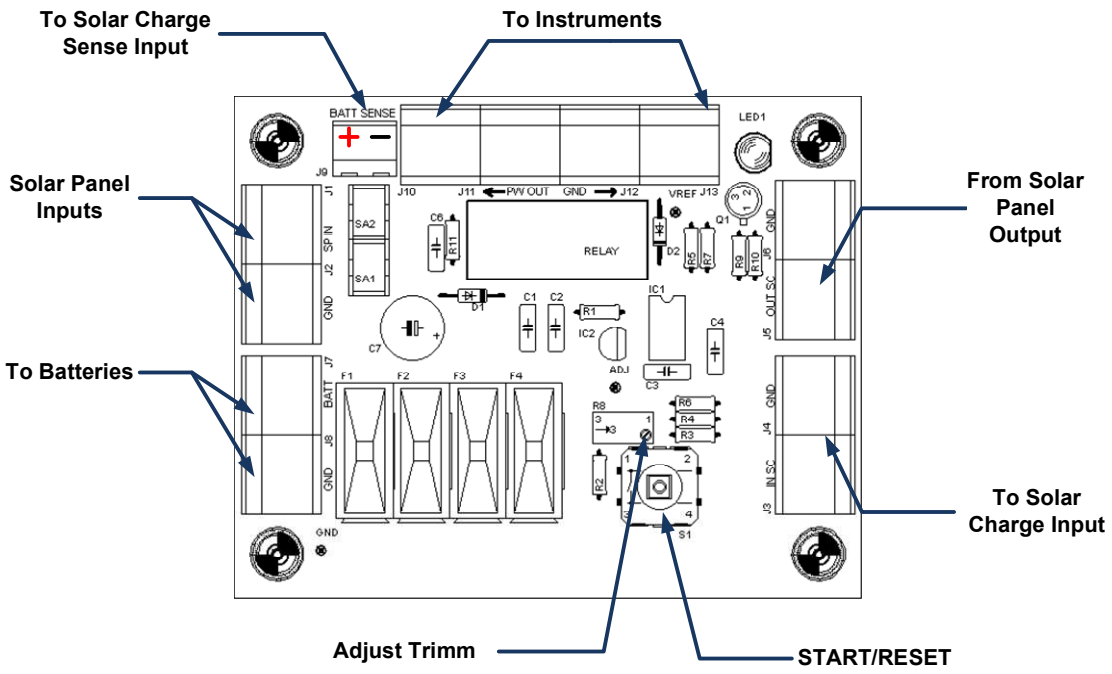

Figure 1.2 – Energy distribution and protection board.

Table I – Board Connectors and jumpers.

Connector	Description	Notes
F1	Solar panel fuse	10A fuse
F2	Solar panel fuse	10A fuse
F3	Batteries fuse	20A fuse
F4	Instruments fuse	7.5/10A fuse
J1	Solar panel input	Positive terminals
J2	Solar panel input	Negative terminals
J3	Input of the solar charge controller	Positive terminals
J4	Input of the solar charge controller	Negative terminals
J5	Output of the solar charge controller	Positive terminals
J6	Output of the solar charge controller	Negative terminals
J7	Battery output	Positive terminals
J8	Battery output	Negative terminals
J9	Solar charge controller, battery sense	See figure 1.2 for polarity
J10	Power output for instruments	Positive terminals
J11	Power output for instruments	Positive terminals
J12	Power output for instruments	Negative terminals
J13	Power output for instruments	Negative terminals

2 POWER OVER ETHERNET (PoE) BOARD

2.1 Introduction

The Power Over Ethernet, or PoE board (Figure 2.1), is an electronic circuit designed to provide (15V) power supply to WLAN radios of the VFRS project, including a new feature, the capability of automatic temporized reset, that can be useful in environments and instrumentation at places where the radio could hang-up. Each board allows the connection of one WLAN radio with one LAN input and power supply parallel connection.

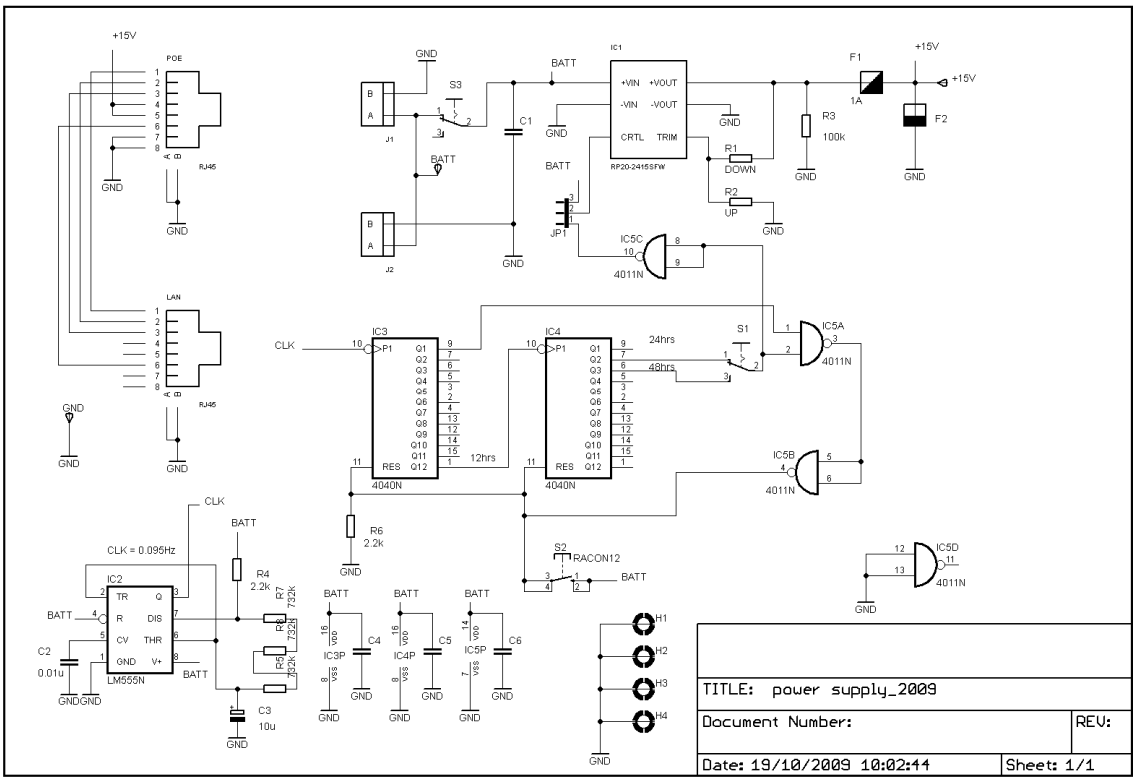

Figure 2.1 – Electronic circuit of the PoE board.

2.2 Operation

The PoE board (figure 2.2), comes with two operation modes, the normal and the automatic timing reset. To select between one of these two operation modes, change the position of the jumper JP1.

In normal mode, the board provides energy continuously; this mode is useful when WLAN radio is used as telemetry. The automatic timing reset mode is used in cases

when the WLAN radio can hang-up, this mode is useful when the WLAN radio is used also as a main computer; and can be programmed to 24 or 48 hours reset trough the time set switch S1. Jumpers, connectors and switches description are presented at Table II.

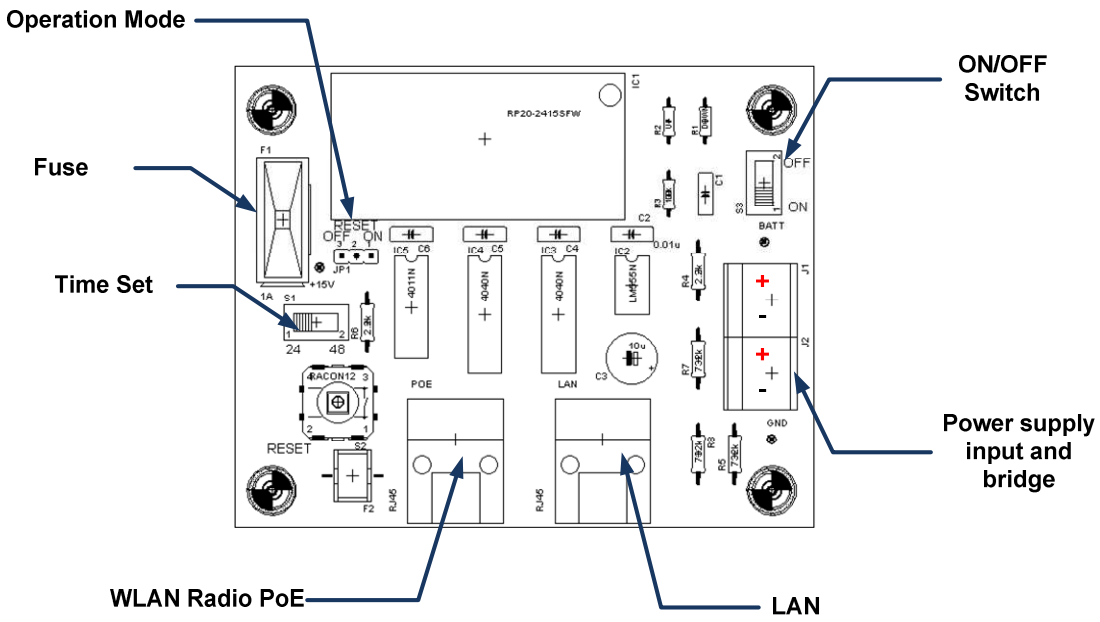

Figure 2.2 – Power Over Ethernet board.

Table II – Board Connectors and jumpers.

Connector	Description	Notes
F1	Power Over Ethernet fuse	1A fuse
SW1	Time set switch for automatic reset mode	Position 1 = 24H Position 2 = 48H
SW2	Automatic reset mode start button	Press to restart timer
SW3	ON/OFF Switch	
JP1	Operation mode selector	1,2 = Automatic reset mode ON 2,3 = Automatic reset mode OFF
J1	Power supply input and bridge	See figure for polarities
J2	Power supply input and bridge	See figure for polarities

3 COMPONENT LIST

Table II - Energy distribution and protection board, component list

Q.	Description	Code	Provider
3	STANDARD-FLACHSICHERUNG 10 A	839736 - 62	CONRAD
1	STANDARD-FLACHSICHERUNG 20 A	839795 - 62	CONRAD
12	PRINTKLEMME MKDS 5/ 2-6,35	744545 - 62	CONRAD
1	TL 431C = KA 431 Z 2,5V	176176 - 62	CONRAD
1	C LM358P=LM358N DIP	174440 - 62	CONRAD
2	DIODE 1N4148 500MW	162280 - 62	CONRAD
1	MINI-IMPULSTASTER 12 X 12 MM	700410 - 62	CONRAD
5	KERAMIK KONDENSATOR VS PRINT X7R 100 NF	500956 - 62	CONRAD
1	HOCHFREQUENZ ELKO 25V 470µF 10X16 RM5	446406 - 62	CONRAD
1	PRÄZISIONS IC FASSUNG 8 POLIG	189600 - 62	CONRAD
1	TRIMMER 74W 5K	423971 - 62	CONRAD
1	TRANSISTOR 2 N 2222=A	163147 - 62	CONRAD
1	LEIST.-PR.-REL. RT1 16A 1UK 12VDC	504201 - 62	CONRAD
1	WIDERSTAND METALL 0,6 W 1% 47R BF 0207	418099 - 62	CONRAD
2	WIDERSTAND METALL 0,6 W 0,1% 1K BF 0207	423360 - 62	CONRAD
1	WIDERSTAND METALL 0,6 W 1% 360R BF 0207	420689 - 62	CONRAD
1	WIDERSTAND METALL 0,6 W 1% 6K8 BF 0207	418358 - 62	CONRAD
3	WIDERSTAND METALL 0,6 W 1% 10K BF 0207	418374 - 62	CONRAD
1	WID.0.6W1%25K5	413259-62	CONRAD
1	WIDERSTAND METALL 0,6 W 1% 100K BF 0207	418498 - 62	CONRAD
1	WIDERSTAND METALL 0,6 W 1% 1M6 BF 0207	418668 - 62	CONRAD
1	3ED 5MM TYP L-7113YT	180150 - 62	CONRAD
1	PRINTKLEMMENBLOCK MKDS 1,5/ 2	743370 - 62	CONRAD
2	EPCOS GASENTLADUNGSABLEITER 90V 20KA MIT DRAHT	564060	Farnell
4	04450715H — LITTELFUSE — FUSEHOLDER, ATO BLADE	9943510	Farnell

Table III – PoE board, component list

Q.	Description	Code	Provider
1	DC-DC Konverter RP20-2415SFW 15V 20W	169-099	RS
1	WIDERSTAND METALL 0,6 W 1% 100K BF 0207	418498 - 62	CONRAD
2	PRINTKLEMME MKDS 5/ 2-6,35	744545 - 62	CONRAD
1	KERAMIK KONDENSATOR VS PRINT X7R 100 NF	500956 - 62	CONRAD
1	STANDARD-FLACHSICHERUNG 1 A	839612 - 62	CONRAD
2	MODULARBUCHSE 8-POLIG GESCHIRMT	716196 - 62	CONRAD
1	EPCOS GASENTLADUNGSABLEITER 90V 20KA MIT DRAHT	564060	Farnell
1	04450715H — LITTELFUSE — FUSEHOLDER, ATO BLADE	9943510	Farnell
1	C-MOS IC 4011 DIP	172570 - 62	CONRAD
2	C-MOS IC 4040 DIP	172626 - 62	CONRAD
1	IC NE 555 TIMER DIP 8	177113 - 62	CONRAD
1	MINI-IMPULSTASTER 12 X 12 MM	700410 - 62	CONRAD
2	SCHIEBESCHALTER SLS121RA04	701735 - 62	CONRAD
1	TANTAL-KONDENSATOR 10UF 35V RM2,54 20%	447034 - 62	CONRAD
1	KONDENSATOR 10nF 1kV	107-791	RS
3	WIDERSTAND METALL 0,6 W 1% 750K BF 0207	421081 - 62	CONRAD
1	WIDERSTAND METALL 0,25W 1% 2K2	408204 - 62	CONRAD