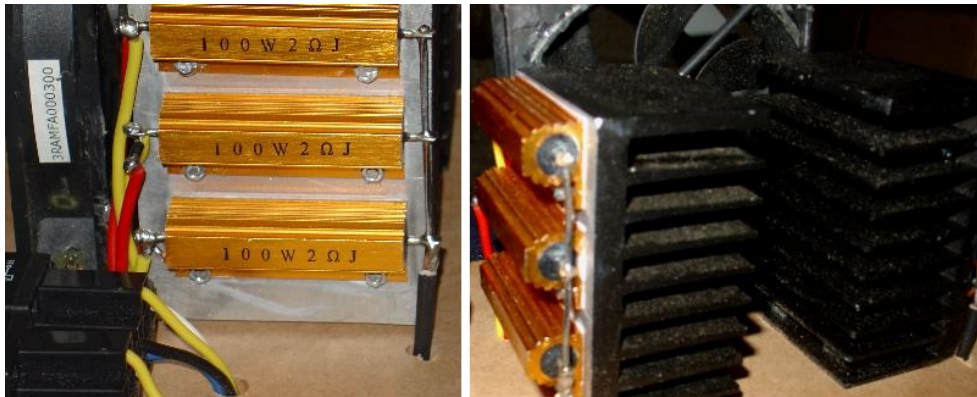


Design & Construction:

Dumpload and charge-controller circuit

for Wind Turbines



Abstract:

Wind turbine voltage regulation is usually achieved by diverting *or dumping* excess power into a dumpload (*as heat*). A universal 4-stage wind turbine dumpload charge controller circuit (*inc. resistor load*) was designed and built (*using veroboard*) for \$140.

Without a charge controller, the wind turbine's main storage battery will overcharge resulting in reduced battery capacity and damage. Exceeding the maximum charging voltage on your 12/24v lead-acid battery system, will overcharge the battery, release hydrogen gas and result in permanent capacity loss.

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Charge Controller Circuit

Four voltage comparator OP-AMPs switch-on 40 amp automotive relays when the battery voltage exceeds the trimpot set-voltages.

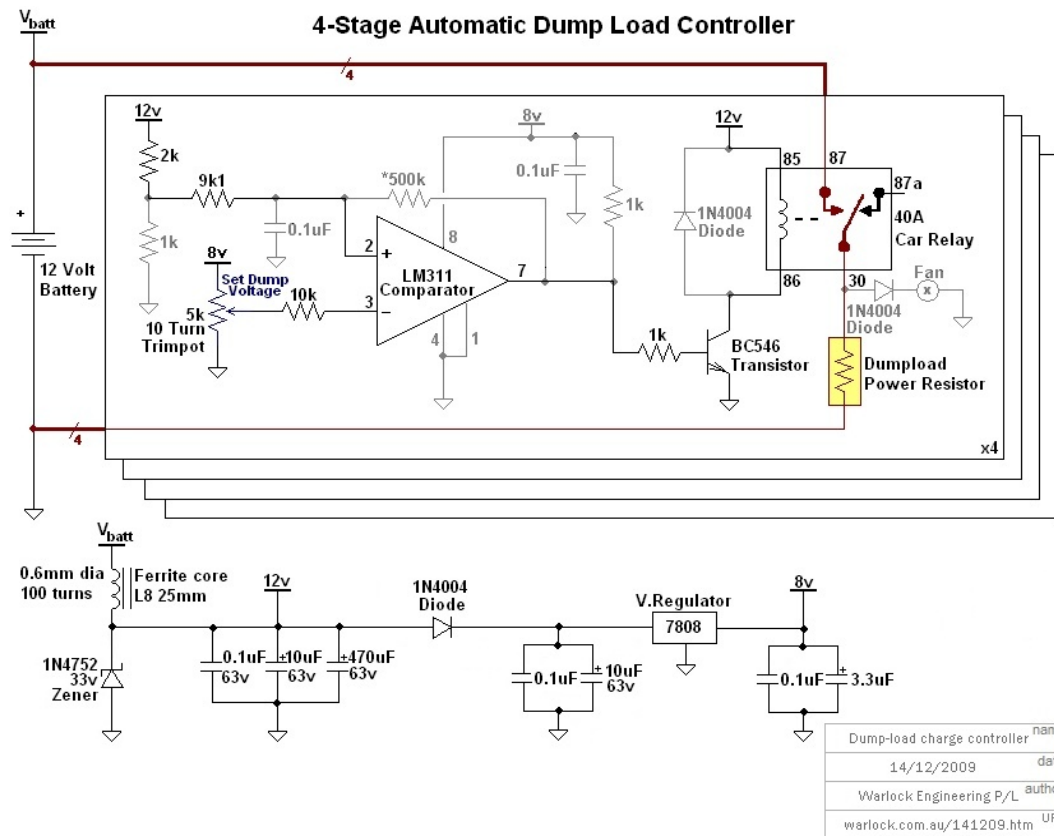


Figure 1. Circuit Diagram

A Zener diode and LC filter protects the op-amp from voltage spikes and noise. The 7808 voltage regulator provides power to the op-amp and voltage reference.

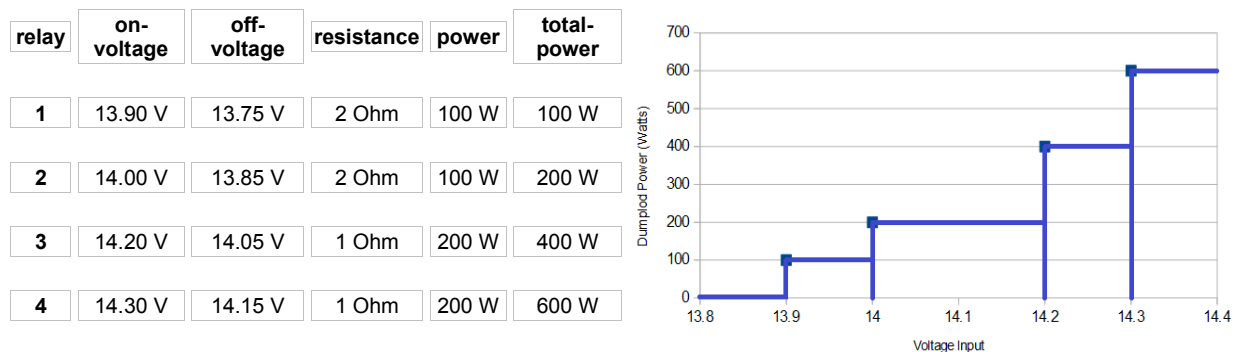


Figure 2. - Voltage thresholds and Power-load curve

The 500k Ω positive feedback resistor protects the relays from becoming unstable (*oscillation*) with 0.15 Volts of on/off hysteresis.



Figure 3. - Heatsink and Fan

6 x 100 watt power resistors connect to the battery with the automotive relays (*see table 1*), each relay is capable of diverting up to 40 Amps (*576 Watts @ 12V*) to the dumpload, the power-load curve for a typical 12v battery system (*double for 24 volts*) is shown in figure 2 .



Figure 4. - Complete System

Only 4 wires (*load & sense*) connect to the battery system, protecting it from overcharge and damage.

This type of power resistor requires a high quality fan and heatsink to operate, however the circuit works with any type of load (*up to 40A*).

Parts List

Qty	Part	Description	Unit cost	Cost
4	LM311	Comparator	\$1.75	\$7.00
4	BC547	NPN Transistor	\$0.26	\$1.04
1	7808	Voltage Regulator, 8.0 Volts	\$1.65	\$1.65
4	5k	10-turn trimpot resistor	\$1.75	\$7.00
9	1N4004	Diode	\$0.13	\$1.17
1	1N4752	Zener diode , 33 Volts	\$0.55	\$0.55
1	L8	25x15x10mm Toroid Core	\$1.75	\$1.75
28	-	Resistors	\$0.06	\$1.68
15	-	Capicators	\$0.35	\$5.25
1	-	305mm veroboard	\$11.50	\$11.50
			Total	\$38.95

Figure 5. Parts List (PCB)

Heatsink	\$20.00
12 Volt Fan	\$12.00
electronic components	\$38.59
40 Amp automotive relays (x4)	\$24.00
2 Ω (100 Watt) resistors (x6)	\$48.00
Total cost	\$142.59

Figure 6. Parts List (Misc.)