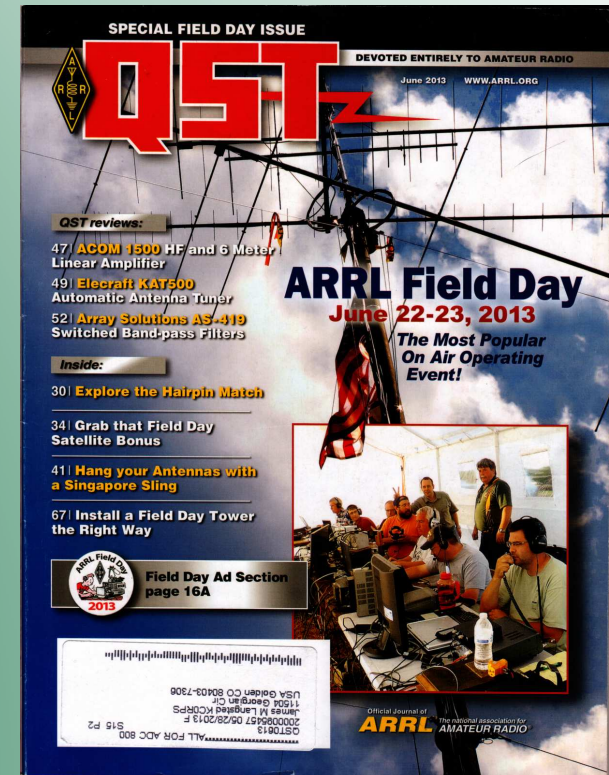# *Battery Monitor Project*

12V Battery Monitor
For Simple Battery Status

WØLIC & KCØRPS
285 TechConnect Club
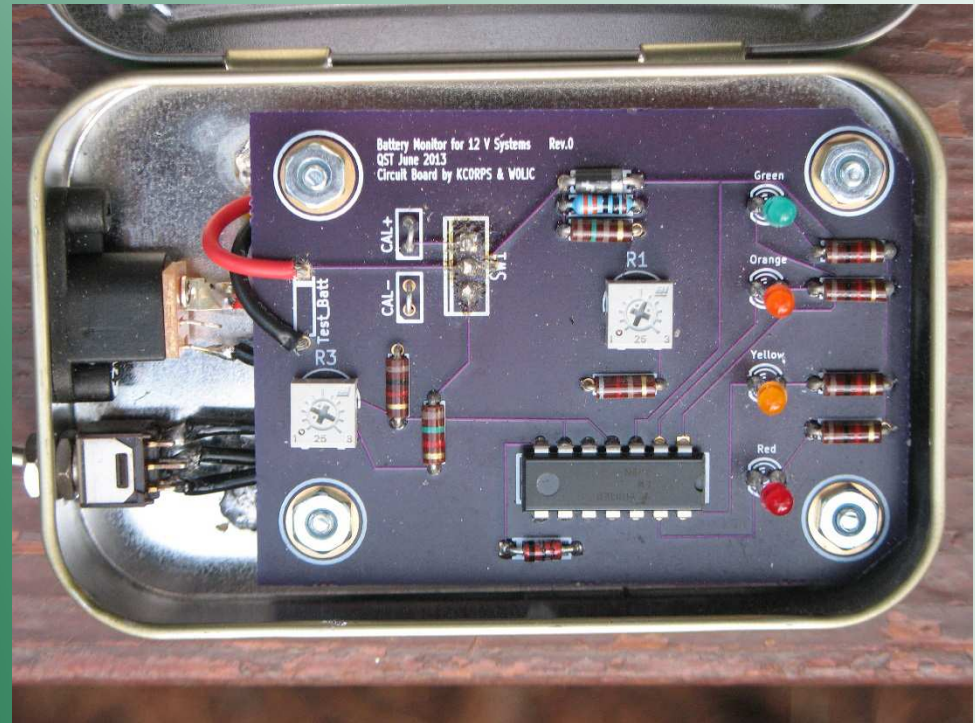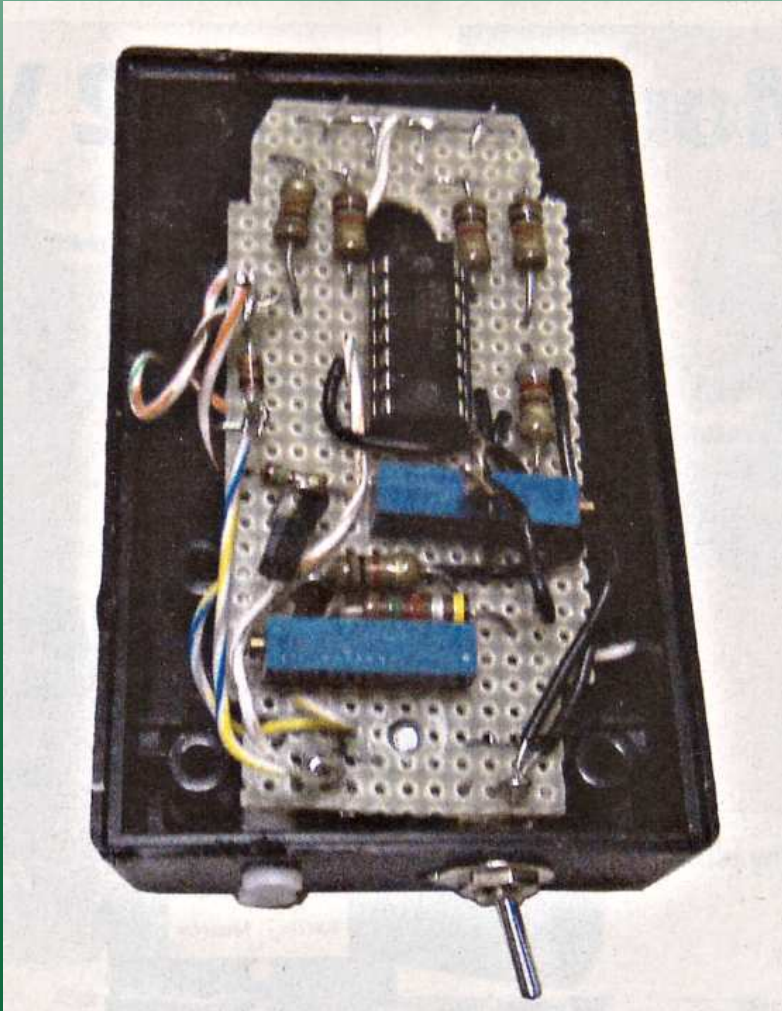June 7, 2014

Credits

- Mert Nellis W0UFO

- QST June 2013, p.43

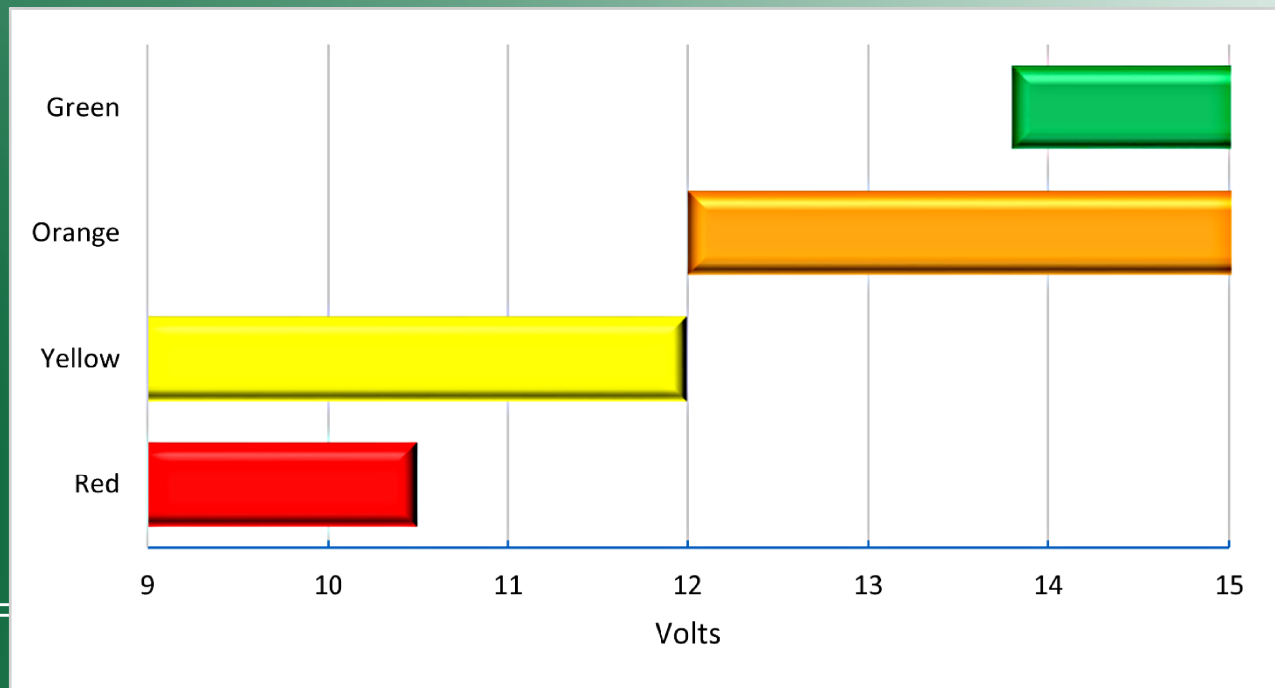- Callard & Bowser, Chicago IL

Overview

- Application

    – Monitor battery status under load

    – Monitor battery charge status with solar panel

- Features

    – Green, Orange, Yellow, Red indicator

    – Pocket size
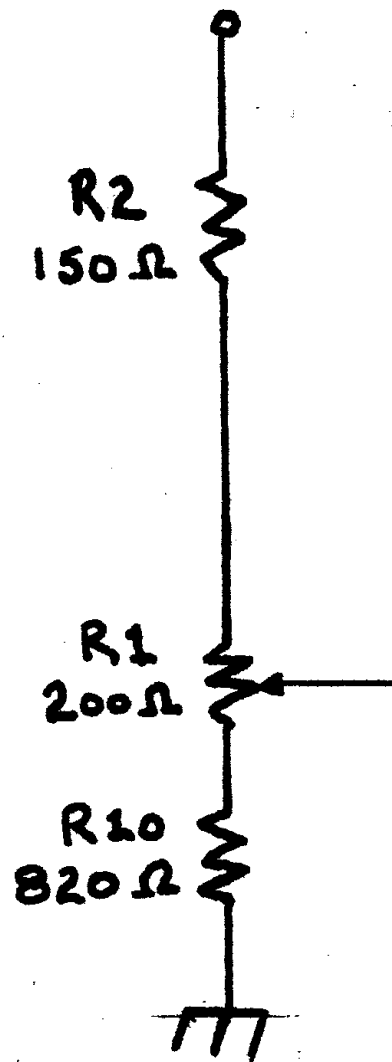
Construction Methods

Operation

- Orange + Green = 13.8V (adjustable)

- Orange >12V

- Yellow <12V

- Yellow + Red = 10.5V (adjustable)

12 V

D2
1N4002

Battery Under Test +/−

J1 TEST_PT1

J2 TEST_PT2

S1

R11 330

R9 1.5 k

5 V ref.

R2 150

D1 1N4733A

Calibrate Orange

R3 200

SENSE

R4 1.0 k

7 + 3
U1B
1
6 − 12

DS1
Green R5 1 k

5 +
U1A
2
4 −
LM339N

DS2
Orange R6 1 k

4.36 V

9 +
U1C
14
8 −

DS3
Yellow R7 1 k

11 +
U1D
13
10 −

DS4
Red R8 1 k

Calibrate Red R1 200

3.62 V

R10 820

Decimal values of capacitance
are in microfarads (μF);
others are in picofarads (pF);
Resistances are in ohms;
k=1,000, M=1,000,000.

Schematic diagram and parts list for battery voltage monitor.

D1 — 5.1 V Zener diode (or use 78L05, see text).
D2 — 1N4002 silicon diode.
DS1 — Green LED.
DS2 — Orange LED.
DS3 — Yellow LED.
DS4 — Red LED.
J1-J2 — Test pin jacks.

R1, R3 — 200 Ω potentiometer.
R2 — 150 Ω, ¼ W resistor.
R4-R8 — 1 kΩ, ¼ W resistor.
R9 — 1.5 kΩ, ¼ W resistor.
R10 — 820 Ω, ¼ W resistor.
R11 — 330 Ω, ¼ W resistor.
S1 — SPDT miniature toggle switch.
U1 — LM339N quad comparator IC.

Circuit Analysis

5V Ref. Resistor String

R2
150 Ω

R1
200 Ω

R10
820 Ω

To find the voltage at any point on a resistor string,
divide the resistance to ground at the point of interest
by the total resistance of the string times the string voltage.

Example: Find the wiper voltage when
measured at the mid-point of R1.

$V(w) = (820 + 100) / 1170 \times 5 = 3.93V$

Construction

- PC Board

    - KiCad designed

    - Advanced Circuits - $397 for 5 boards (3-day)

    - OSH Park - $27.50 for 3 boards (2x2-3/4 inch)

    - Iteed Studios – $9.90 for 10 boards (5x5 cm)

- Mounting board

    - Drill through

    - Solder to tin

- Drilling Holes (connector & switch)

    - template

Cost

- Mouser Parts - $12.00

- PC Board - $0.99

- Metal Enclosure - $2.49

    - Includes Curiously Strong Mints

The End