SLA Battery Monitor Formulae

Arduino ADC Calculations

Basic formula to calculate the unknown voltage on an analogue input:

$$V_{ADC} = \frac{V_{REF}}{2^{10}} \times ADC$$

V_{ADC} = Unknown voltage on the analogue input.
V_{REF} = Supply reference voltage (≈5v).
ADC = ADC reading on the analogue input.
2^{10} = Number of ADC levels for a 10bit ADC.

Turning that around to have V_{REF} as the unknown:

$$V_{REF} = \frac{V_{ADC}}{ADC} \times 2^{10}$$

V_{REF} = Unknown supply reference voltage.
V_{ADC} = Voltage on the analogue input.
ADC = ADC reading on the analogue input.

Voltage Divider Calculations

$$I = \frac{V_I}{R_1 \times R_2}$$

$$V_O = \frac{I}{R_2}$$

$$V_O = V_I \times \frac{R_2}{R_1 \times R_2}$$

I = Current through series resistors.
V_I = Voltage In.
V_O = Voltage Out.
R_1 = Top resistor.
R_2 = Bottom resistor.