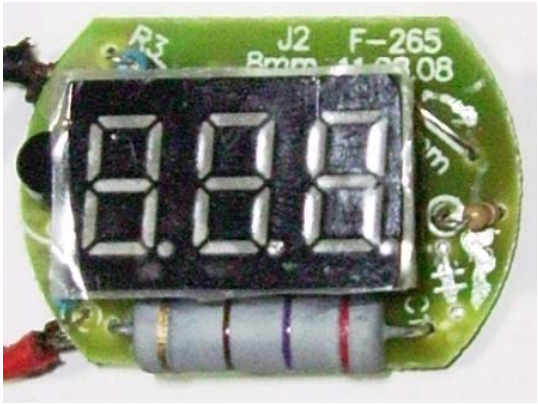
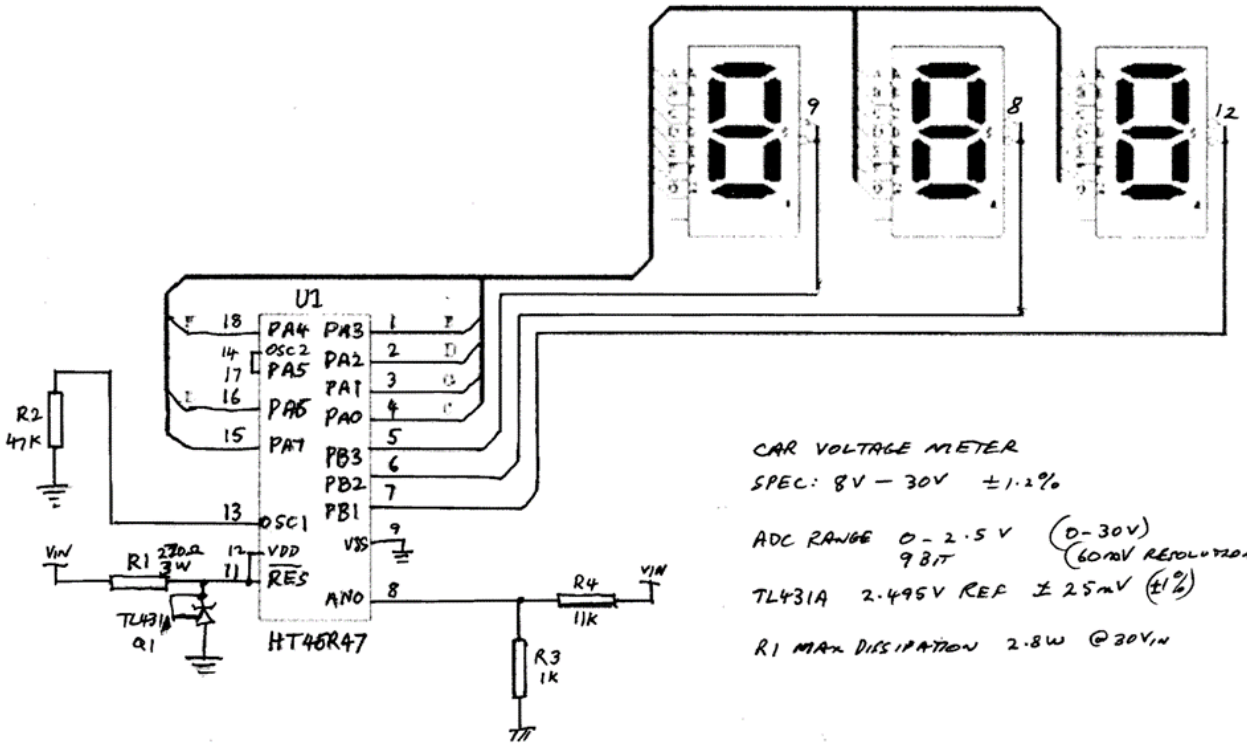
Accurate measurement over 5-30VDC range (ie. 0.1V resolution was ok). Based on a HT46R47 uP (U1) and comes with code to show 30.0V full scale. U1 supply voltage Vdd is also ADC reference, and set at 2.5V via a TL431A. Sense voltage is via separate 12:1 divider to give 30.0V FS. U1 power supply is simple 270Ω resistor dropper to TL431A, so 35mA is pulled at 12V (0.4W), increasing to 100mA at 30V (3W) !!





U1 and TL431 only need about 10mA to operate, so better to tweak R1 dropper if a regulated power supply is available. Or use a constant current regulator: LM317L for supply between 9V and 30V (caution about temp rise at 30V, using 120Ω series sense, with 1.5V min regulation voltage plus 1.25V sense, gives a 5.3V minimum supply requirement, and a max dissipation of 0.3W). The TL431 would then run on a more constant current, and the meter wouldn't drain so much current. Although the HT46R47 can operate at 5V, and TL431 could be configured for 5V Vdd as the ADC reference, the embedded program would be set to display only 30.0 FS.

Could use the meter for common cathode bias voltage (in-situ or clipped on for servicing), or for cathode current (put in each cathode of a fixed bias stage with an 8.3 ohm sense resistor that gave 2.5VFS for 300mA FS), or change R4 to 120K for a 300VDC HT meter – but still need a power rail.