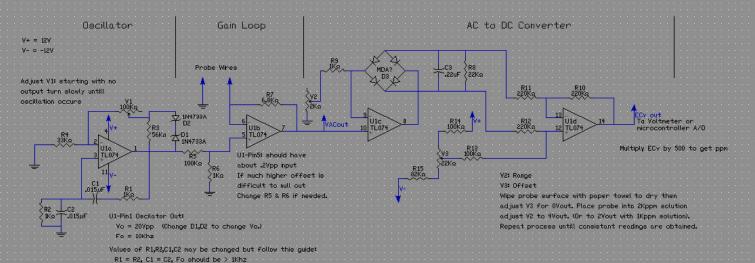
Schematic.jpg 1,587×996 pixels 1/31/16, 14:08

## EC/PPM/TDS Meter

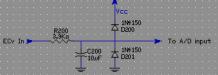
Outputs measured EC value in volts. Can be connected to meter or A/D input.



Microcontroller A/D Interface

Low pass filter averages out voltage to be more readable.

Keeps A/D or microcontroller from frying due to under/over voltage.



A/D conversion stuff:

Using 10bit A/D like those found on PIC microcontroller where 0v on A/D input reads 000 and 5v reads 1024 you can multiply the A/D value by 24 then divide by 10 to display PPM value.

EC = Electrical Conductivity between two small probes Icm apart, measured in units called microsiemens. Siemens are aka Mhos, which is Ohms (unit of resistance) backwards. Conversion between EC. PPM. and Resistance (in ohms).

Fo = 1 / (2 \* PI \* R \* C) R = value of R1 and R2 C = value of C1 and C2

Mhos = 1/Ohms Ohms = 1/Mhos EC = PPM / 500 PPM = EC \* 500 R = 1 / EC \* 1E-6

What PPM/TDS/EC meters are measuring the conductance of salts in solution. With water, Imp of salt into 1L of water = Ippm. To Create Calibration solution at 2Kppm carefully measure 1g of salt into 500ml of purified water. Be sure to shake/stir well when mixing and before calibrating. I used table salt (NaCl) however most calibration solutions have a mix of 2 or more types of salt.

PPM/EC/Ohms Table
PPM EC Ohms
2K 4 250K

 Home made probes will probably have alot nore surface area causing the resistance value to be much lower. The component values used in this circuit support a probe having an impedance of about 690chms B 4EC (aka 2Kppm). Value of R7 can be changed or replaced with a pot to compensate for probes that are too weind. Gold plated probes work best, a good source is gold plated audio cables. Must be something exposing a small but consistant amount of surface area to the solution being measured. Cleaning probe with paper towel before and after using gives ALOT more consistant results.

Probe impedance can be determined by measuring gain of U1b stage.

Measure Vin at pin 5, Vout at pin 7 using AC meter.

Rf = Feedback resistor R7 which is 6800 chms.

Rx = Rf/(Wout/Vin)-1)

So for example Vin=2v Vout=2V probe impedance = 755 ohms

Possible Improvements??

Could I possibly consolidate UIb and UIc?

Effects this would have on solution waveform?

Effects of wave shape an EC value??

Offset needs nullification BEFORE range adjustmentillillillillillilli

Co:	Place Company	Name	Here
Title	EC Meter I		
Board:	ppm-ec1.sch		Revision: A
Author:	Belladonna		Size: B