

# Homebrewing HFI 2016 SWR Meter

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# Why Homebrewing

- Joy of making and using one's own equipment
- Understanding details of the working and internals
- Cost saving
- Recycling old equipment

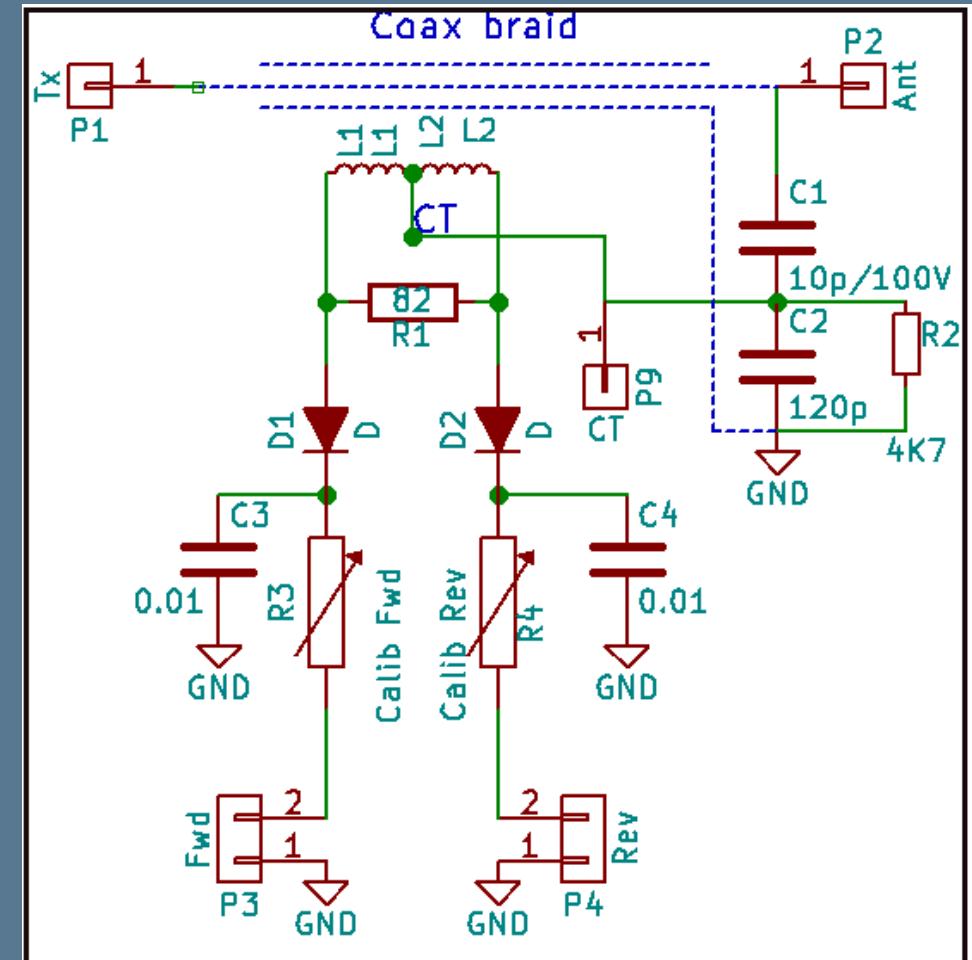


# SWR Meter

- Provides information on how well the antenna impedance matches with Tx
- OR – How much power from Tx is being transmitted from Antenna
- Connected between Tx and Antenna
- Suitable for new homebrewers also

# Schematic

- What is inside the SWR meter
- How it works
- How is it made
- What is required

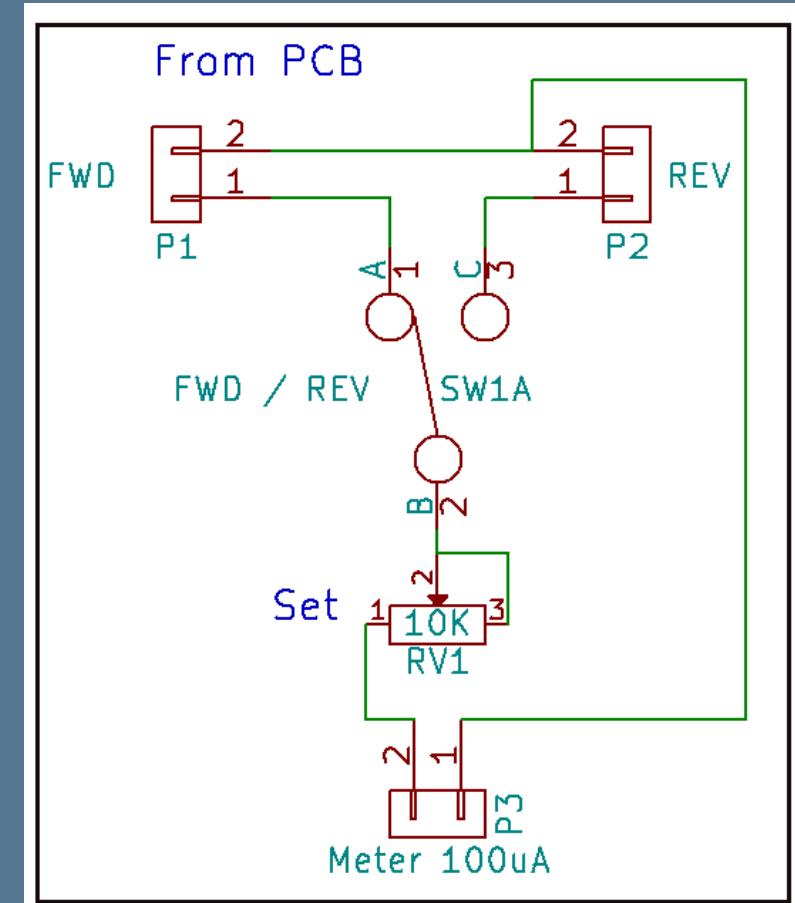


# The Front Panel

Has one switch to change between Forward and Reflected Signals

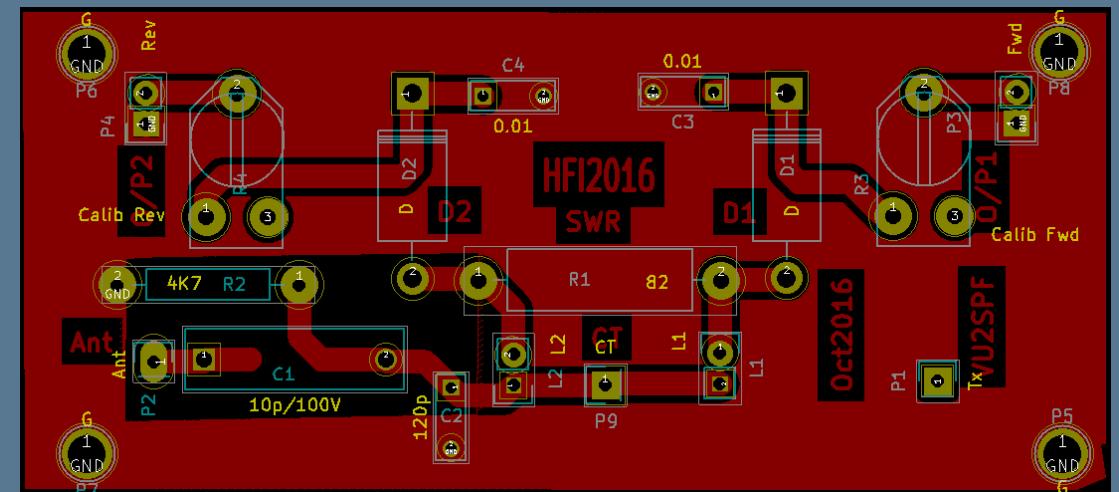
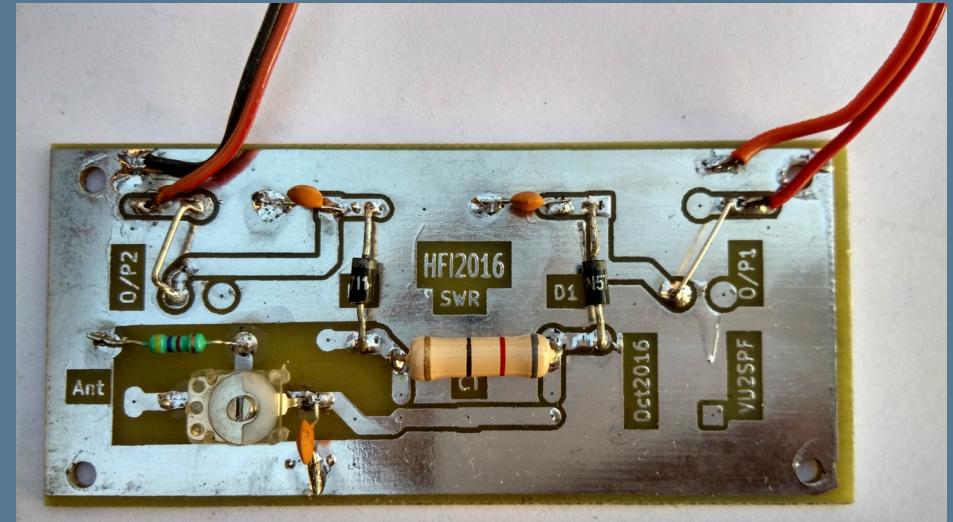
Has a Knob to adjust deflection of Meter

Has a Meter to indicate SWR



# The PCB

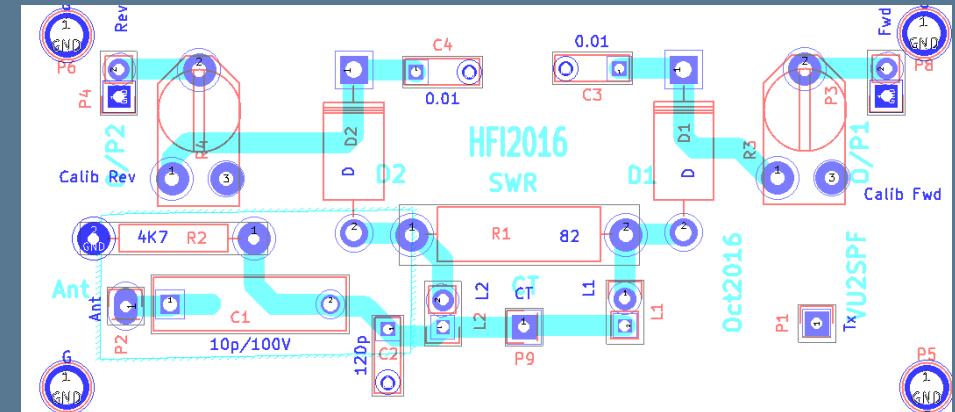
- The PCB was specially designed for HFI 2016 to commemorate 25<sup>th</sup> HFI
- Kicad was used to design the PCB
- All components soldered on Track side



HFI 2016, Nov 5-6, Abu

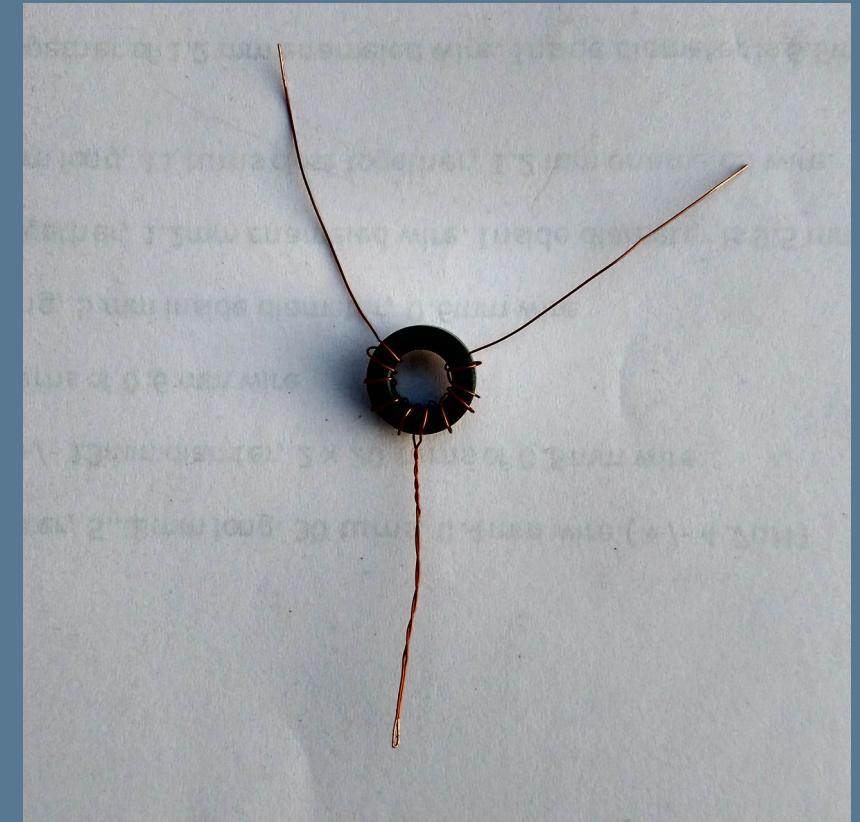
# Construction

- Solder components carefully taking care not to create bridges between tracks and ground
- Use a trimmer capacitor in place of 10pf/100V capacitor



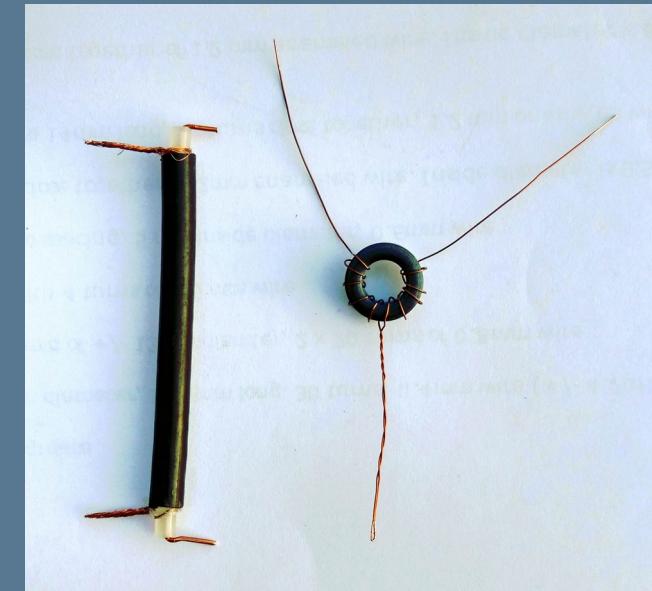
# The Sensing Coil

- Uses a FT50-43 toroid
- Using a 30 cm length of enamled insulated wire wind 5 Turns (one pass through the center is 1 T)
- Create a tap by twisting 5-6 cm wire and continue winding in the **same direction** for 5 more Turns
- Scrap off enmel from all three ends for soldering
- Tin all 3 ends



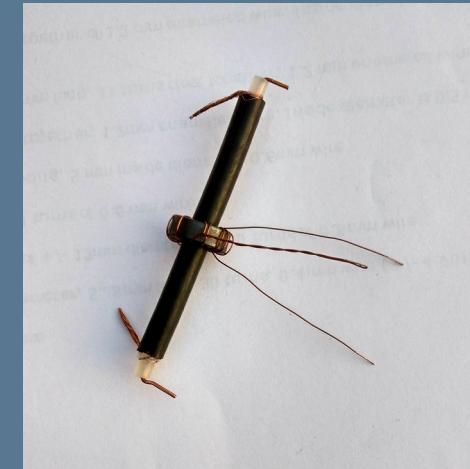
# The Primary

- Using a coaxial cable of appropriate size, fitting between Antenna and Tx connectors of SWR meter, make a piece as shown with coil



# Pickup Transformer

- Slide the Sensing coil over the prepared cable part to create the transformer.
- This transformer will convert the forward and reflected RF currents to safer measurable values



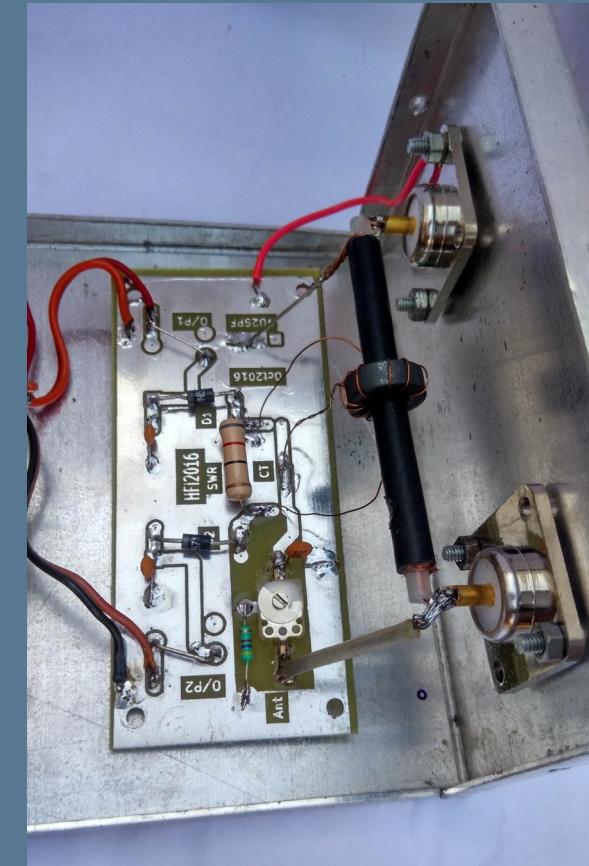
# Cabinet / Box

- We need a metal enclosure (for shielding)
- Holes for Connectors on Back panel
- Holes for Meter, Switch and Pot on Front Panel
- Mounting Holes for PCB on bottom
- Rubber/Plastic feet
- Provides safety from High RF voltages

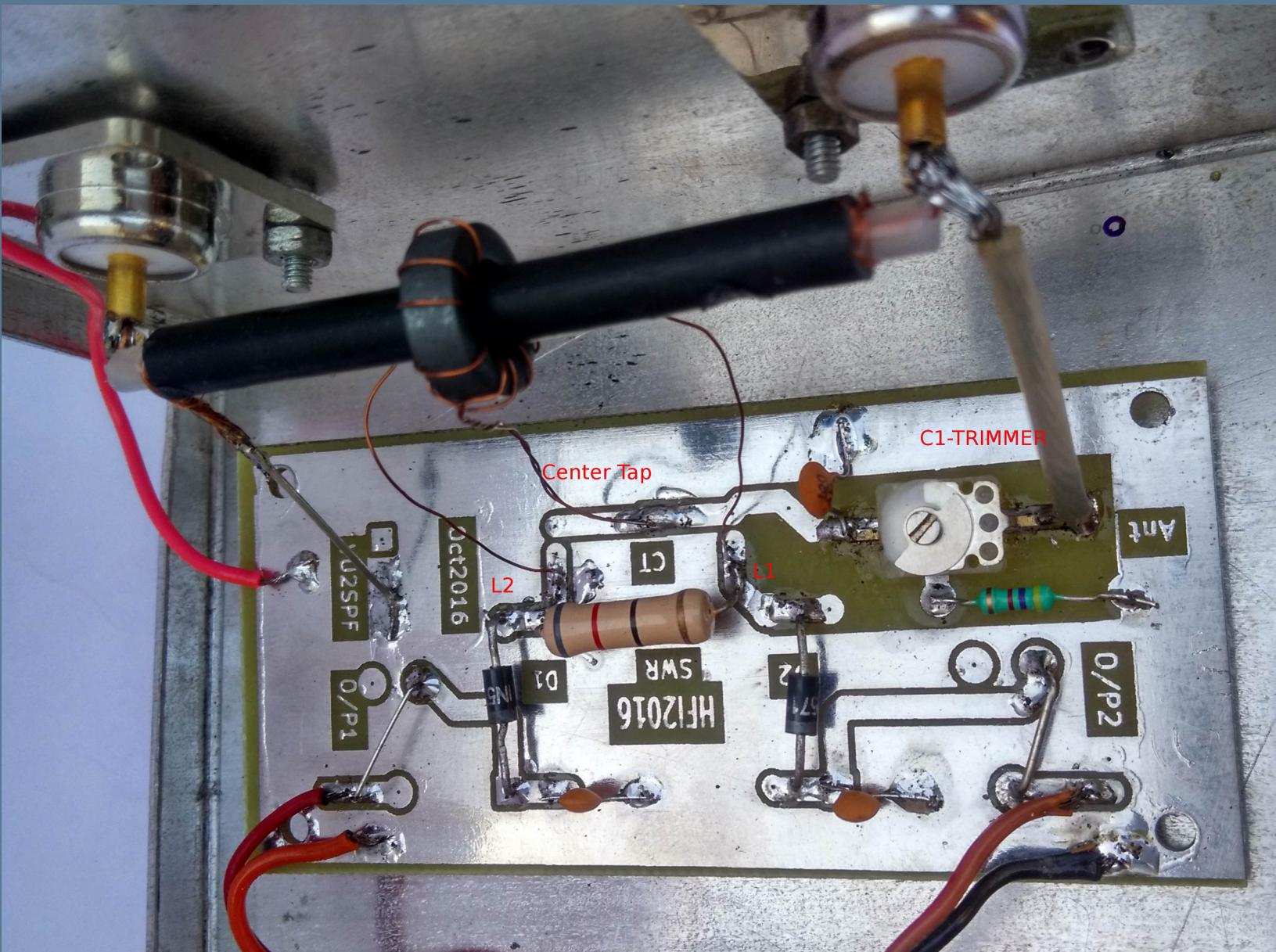


# Connection with PCB

- Solder the coaxial piece between SO239 connectors
- Solder the three terminals of sensing coil on PCB
- Only on Antenna side connect the braid to Ground of PCB
- Using a thick wire connect Ground on PCB to SO239 body

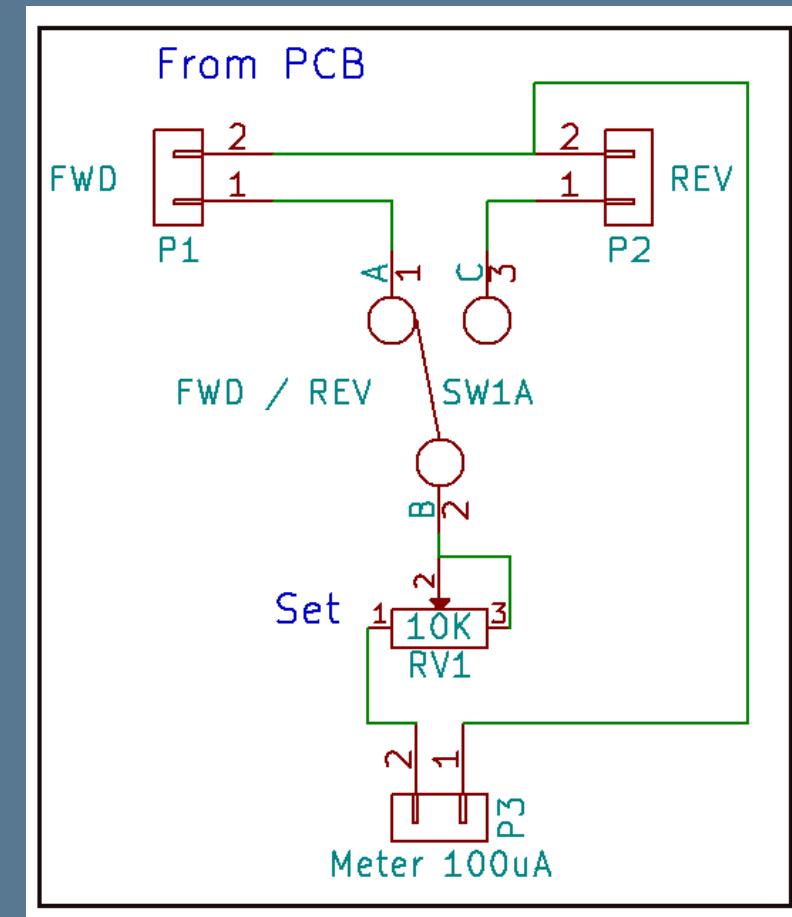


# Details of connection

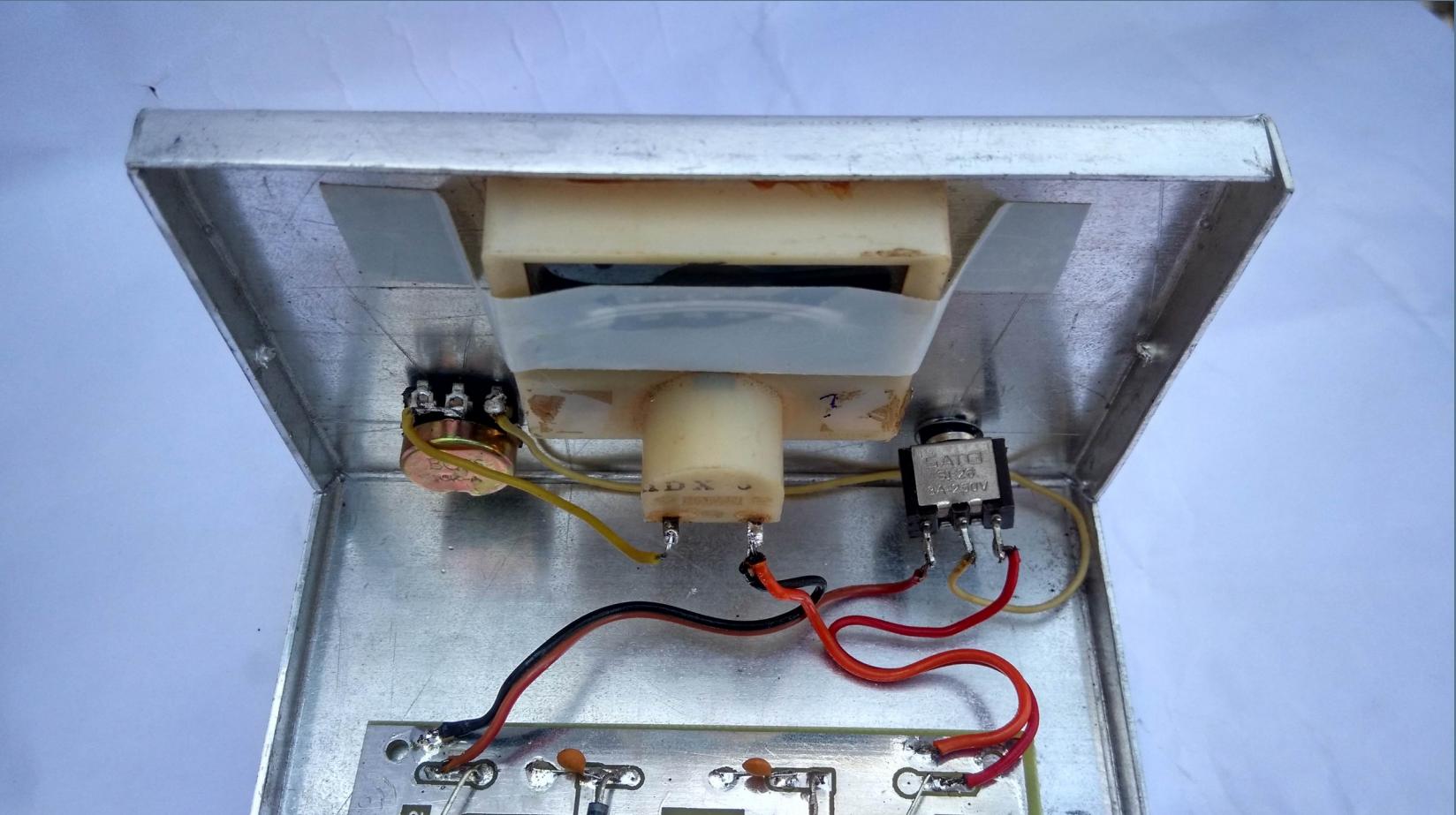


# Front Panel connections

- One 100 uA meter shared between forward and reflected (reverse) measurements
- One toggle switch to select between FWD / REV
- One Pot (10K) for adjusting deflection on meter

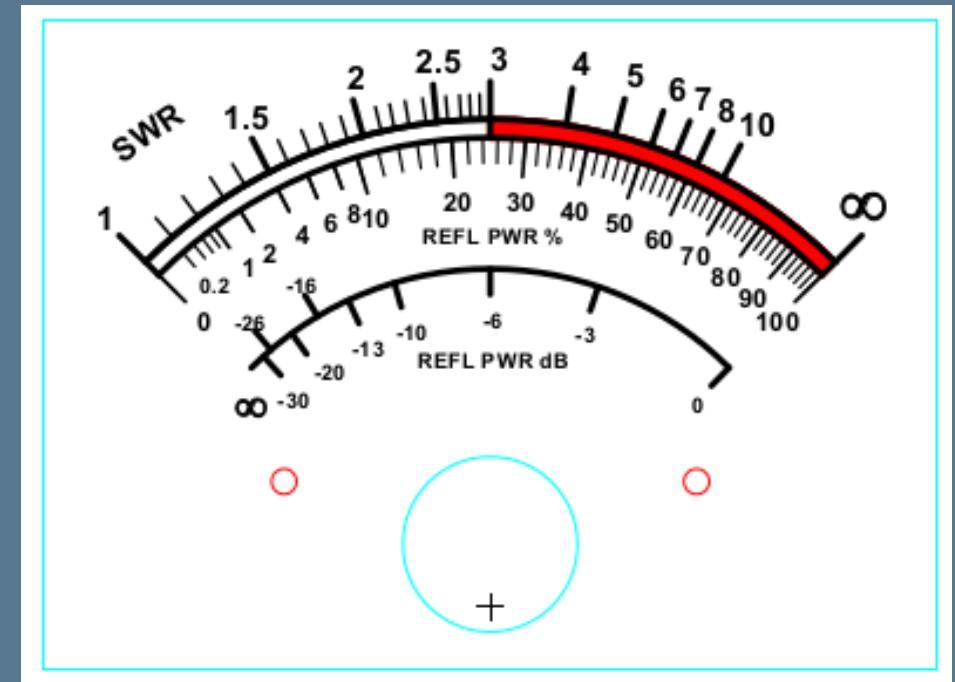


# View from Inside



# Meter

- Any 100 -500 uA meter is good. Large panel meters are better but unobtainium
- Meter Scales to be changed by printing on paper and pasting over existing scale
- Can be designed by using Galva (free program) or by scanning existing scale and photo-editing it
- VU-meters are good replacement, Multimeters can also be used

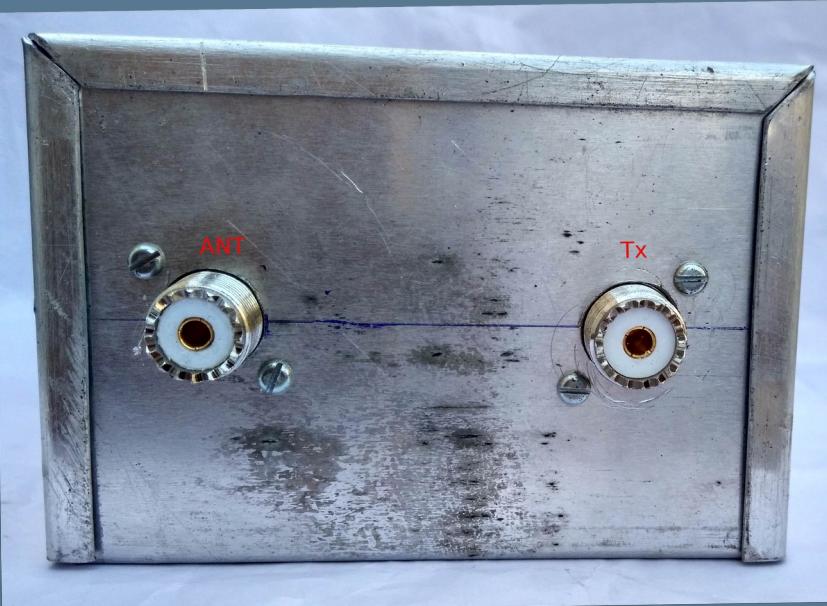


# Testing



- Need a standard load of 50 ohms
- Connect SWR meter Tx side to Transmitter output and ANT Side to 50 ohm Load
- Reduce the power of transmitter to 10W or less (to be on safe side)

# Testing..



- Key in the Transmitter and put SWR meter switch to FWD
- Using SET knob bring the meter needle on Maximum (infinity)
- Switch to REV side
- Meter should show minimum deflection, else adjust trimmer carefully using an insulated screwdriver. This is SWR of 1:1



# Testing....

- Use a 100 ohm load if possible to get a SWR of 1:2
- A 25 ohm load will also show 1:2 SWR
- 150 ohm load will show 1:3 SWR



# Using the SWR meter

- Connect antenna to ANT connector of SWR meter
- Key in the Transmitter and put SWR meter switch to FWD
- Using SET knob bring the meter needle on Maximum (infinity)
- Switch to REV side
- Meter should show SWR



# More Info

- Look up on the net for SWR bridges / Brune bridge
- [vu2spf.blogspot.com](http://vu2spf.blogspot.com)



# Thank You