ARDFrx2 SETUP. 20180123-14

IMPORTANT : the negative pole of the 9V battery is INSULATED from the mass plaines ! Be careful when measuring. If a short circuit happens between +B and a mass plane, D2 immediately is damaged. D2 then has to be exchanged.

You could wind the adjustable coils yourself.
L1 and L2 abt. 80nH, 4.2 turns on a 7V1S Neosid coil form.
L3 and L6 abt. 3.3uH, 16.2 turns on a Neosid 7F1 coil form.
Pin 1= start, pin 5 = end.

Checking and adjusting.

1. First check for a short circuit :
- Connect a 2Adc meter in series with the + plus pole of the battery and the plus pole of the PCB.
- SHORTLY connect the battery minus with the minis of the PCB.

The battery current is maximal 30mA. If 150-200mA runs, the "+5" is shorted.

2. After that, check the following items, using a hiZ meter and a calibrated >= 20MHz oscilloscope.

IC1p8	+ 5.0V	VR1 operates.
I (B+)	ca. 17 to ca. 27 mA	FETs 1&4 operate (varies with gain setting).
R24/C13	- B = -0.75 to -0.79 V	D2 is OK.
R25/C11	+ 0.63 V	D1 is OK.
Gain pot "min"	- 0.43 Vdc	R24 (22k) sets min. sensitivity
R203	**700 mVtt** & 1.25 Vdc	BFO operates. Both values can vay due to spread in transistor and crystal properties. Use LOW CAPATIRY probes.
R22/C32	ca. +2 tot +3V	Detector operates. **REM:** this voltage is dependent of the signal strength injected by BFO T1, the properties of Xt and T1, and of the value of C207.
IC2p7	1/2 B+ = +3.0 to +4.4Vdc. Max. audio is 4Vpp.	IC2 operates.

3. Connect a coax cable, with a small loop at the end, to a SW receiver.
- Hold the loop near the coil or circuit of interest.
- Tune the receiver to the frequency of interest.
– Connect a dummyload to the ARDFrx2.

4. BFO T1 (**Beat Frequency Oscillator)**
- Check BFO oscillation at 10.700 MHz +- 1 kHz.
Important : *If t1 does not oscillate, it has to be corrected first.*
WITHOUT BFO signal, detector FET5, and the whole receiver is much less sensitive.
The best value for C207 is when the sensitivity of FET5 is maximal for very weak signals.

5. IF coils.
- Turn the gain pot to max gain.
- Adjust L3 and L5 repeatedly for max noise.

As coils are becoming more difficult to obtain, the suggests more than one type coil. But these coils inductances and Qs differ. The total amplification therefore will differ, AND the needed tuning capacitances for L3 and L6 will differ.

If tuning of L3 and/or L6 to a positive maximum cannot be achieved :

– If a coil core is fully inside the coil form, then add a small capacitor of 3p3 to C25 and/or C26.
– If a coil core is fully on top of the coil can, than change the value of capacitor C25 and/or C26 for one with a bit lower value.

6. IC1 local oscillator.

WARNING : for L2 and L1 use a special well fitting trim key 1mm x 2mm and little force !!

- Set the tune potentiometer R5 in position "Minimum frequency".
- Find the local oscillator frequency using a receiver.
- Adjust the core of L2 to 133.3 Mhz.
– Do NOT lock the core using wax or glue.

If tuning of L2 to a positive maximum cannot be achieved :

– If the coil core is fully inside L2, change C4 and C5 for a bit higher value.
– If the coil core is fully on top of L2, change C4 and C5 for a bit lower value.

7. Antenna coil L1.

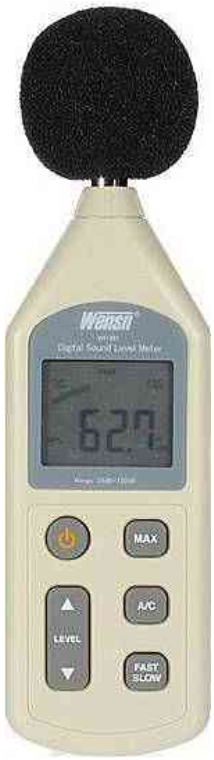
- Connect a 50 Ohms antenna.
- Tune the ARDF receiver to abt.144.7 MHz
- Adjust the core of L1 for max. antenna noise or signal.
– Do NOT lock the core using wax or glue.

If tuning of L1 to a positive maximum cannot be achieved :

– If the coil core is fully inside L1, change C2 for a bit higher value.
– If the coil core is fully on top of L1, change C2 for a bit lower value.

Sensitivity :

a. When feeding a weak 2m signal, a -120dBm 80% AM signal should clearly be detect able.
b. Disconnect the antenna
c. Connect a 50 Ohms dummy load. The background noise should drop a ***little*** in strength.
d. Disconnect the dummy load, and connect a 50 Ohms antenna.
In city environment the background noise level should rise notice able.



8. Gain adjustment.

The holes for R24 and R25 are made wider for easier component change.

With a dummyload connected to the antenna bus, and max. gain, the audio noise voltage measured at R19 should be abt. 0.3 Vac.

This is correctable by correcting the total gain of audio filter IC2. R15/C34 and/or R18/C35 can be exchanged for other valuse. REM : The product of R15.C34 and R18.C35 should be abt. [1000 nF.kOhm].

9 Protection of every ones ears (Fb6 / FB7).

Listening for a long period to a sound pressure of more tha 85 dBspl will cause damage to the ears. Even ONE very loud "tick" caused by on/of switching also can cause damage. If someone experiences ear-sizzling or whistling, ***a few days rest*** is advised to try to minimize possible damage.

YOU are responsible for preventing damage to ears of everyone using your equipment.

Headphones can differ widely in audio output.

You therefore *have* to measure the sound pressure to be sure (see photo).

REM : The left and right channels of the headphone bus should be connected in parallel.

The best way to reduce the acoustic output of the headphone, is to insert series resistors between the PCBs two "HP" connections, and the headphone two chassisbus connections. **See schematic.**

a. Connect the headphone which from now on always will be used together with this receiver.
b. Tune to a modulated, strong AM or SSB signal.
c. Set a dB meter to dBa and slow reading modes.

d. Hold the microphone of this dB meter close to a membrane of the to be used headphone
e. Find the spot of maximal loudness.
f. Adjust the receivers GAIN and TUNE for the strongest indication by the dB meter.
g. Note the dB meter reading, and calculate the needed attenuation for maximal 85 dBa reading.
h. After modification, check maximal loudness again.

I do NOT take any responsibility for all those actions.
YOU are responsible for your ears and those of others using your receiver and headphone. Be aware of possible UNRECOVERABLE damage to ears when (short or long term) loud noises are produced..