ARDFrx80-7 Setup

Please print this PDF.

REM: "-B" (battery minus) is INSULATED from mass.

While measuring, <u>be careful</u> not to make an accidental short-circuit from +Bat to mass (0V), as D2 will burn out.

1. First check for a power-short-circuit :
- Connect a 2 A dc meter in series with a 9V battery.
- While observing the meter, connect them <u>for one tenth of a second</u> to the receiver.

The battery current should be <u>lower than 25 mA</u>. If much higher, search for the fault.

2. Using a hiZ multi meter and oscilloscope, check the following voltages **in respect to mass plains** (<u>not</u> to "bat-").

I (B+)	max. 20 mAdc	With gain varied from min to max, and I(B=) varies : FETs 1&4 are working.
IC1p8	+5.0V	VR1 is working.
R24	-B = ca. -0.75V	D2 is OK.
R25	ca. +0.63V	D1 is OK.
At R21 slider in pos. "Max"	abt. 0.1 Vdc	Adjustable by R25 (82k)
At R21 slider in pos "Min"	abt. - 0.51 Vdc	Adjustable by R24 (27k)
R105	ca. +1.4V or 5V	(When sense PB pressed / released).
R110 / 111	ca. +1.4V	Buffers are working.
R22	ca. +2 to +3V	Detector is working.
R203	<u>0.05V HF</u> / +0.2Vdc	BFO is working.
IC2p7	1/2 B+ = +3.0 to +4.4Vdc & max. audio is 3Vpp.	

Monitor the frequencies of both oscillators (10.7 Mhz and 14,2 Mhz) by using a SW-receiver, of which the antenna connector is connected with a coax cable and pick-up loop, held near the direction finders PCB.

3. BFO (Beat Frequency Oscillator) **T1 / 10.7 MHz "biases" FET5, making this infinite impedance detector far more sensitive and linear.** **IMPORTANT:** if T1 does not oscillate, REPAIR this fault <u>*first.*</u>

- Check the BFO for oscillation at 10.700 MHz +- 1 kHz..
   Monitored with an oscilloscope, on R22 should be ca. 700mVpp / 1.25 Vdc (this can vay due to varying amplification factor of transistors and crystal quality).

4.   Local oscillator IC1 / L2.   DO NOT turn the coil core !
With tune potentiometer set to "Min. freq.", adjust C110 for 14.190MHz oscillator frequency.

Then check: With the tune potentiometer set to "max. freq", the oscillator freq. should be between

14.29 MHz and 14.32 MHz.

REM: To widen the tuning range, the value of C7 must be made smaller. After that, readjust C110.

> **After finishing :**
> The local oscillator in IC1 can be made less temperature sensitive, by covering all oscillator components (except trimmer capacitor C110) with purified cosmetic bee wax (**www.imkershop.nl**) . **Do NOT use candle wax !**
> Add 3 - 5 droplets wax at a time, and melt it using a solder iron t = 170 C, which is grounded to a 3mm ground screw. .
> Also heath the pins and the IC body, so the wax flows between the IC and the PCB.
> _Trimmer capacitor C110 should be left free from wax._
> _DO NOT put wax in the coil hole._

5. Antenna.

   Use loop on a cable connected to a signal generator, and couple a signal of 3.56 MHz into the ferrite antenna

   or

   transmit low power into a dummy load or antenna.

- Tune the ARDFrx to it, adjust gain, and **adjust C105** (_NOT L102_) for max. audio.

- Check for reasonable constant sensitivity over the full tuning range (at 3.50 , 3.54 and 3.58 MHz).

6. IF.

Adjust L3 and L6 for max audio. Different types coils have different inductance. This is of influence to the valu of their tuning capacitor.

* If the core of L3 and/or L6 comes fully to the top, reduce the value of C25 and/or C26 a little by chnging it for a capacitor with a bit lower value.

* If the core of L3 and/or L6 becoms fully down, enlarge the value of C25 and/or C26 a little, by soldering a smal value capacitor (a few pF) in parallel (place it onto the bottom side of the PCB).

REM: without signal input, and "Gain" set to max; the mixers background noise should clearly be heard. Indicating good sensitivity.

Sensitivity test : Listening during evening hours, outside city environment, in an area without man-made-noise, and max. sensitivity. You should notice a little lower noise background when turning the ferrite antenna from horizontal into vertical position, indicating that the receivers own noise level is a little lower than the noise coming from the E-layer above. That is optimal.

7. Gain regulation.

With correct adjusted of minimum and maximum sensitivity, the sensitivity potentiometer R21 works smoothest.

With R21 in position "Min", a maximal strong antenna signal should cerate not more than 200 mVrms audio tone measured at R19.

With R21 in position "Max", the self noise of the receiver should create receiver audio noise of abt. 200 mVrms measured at R19.
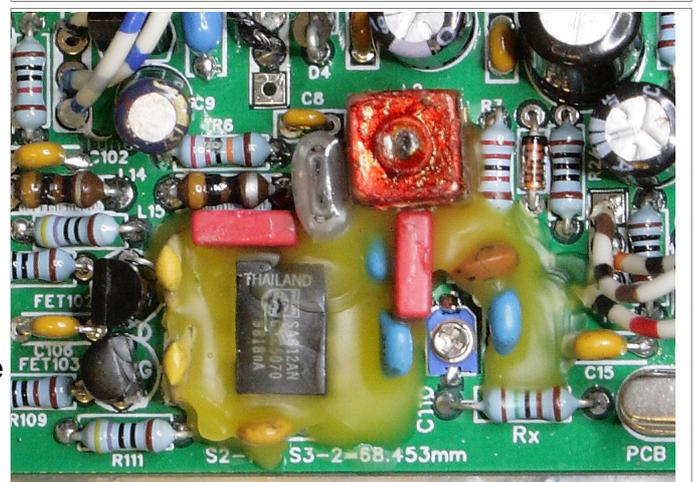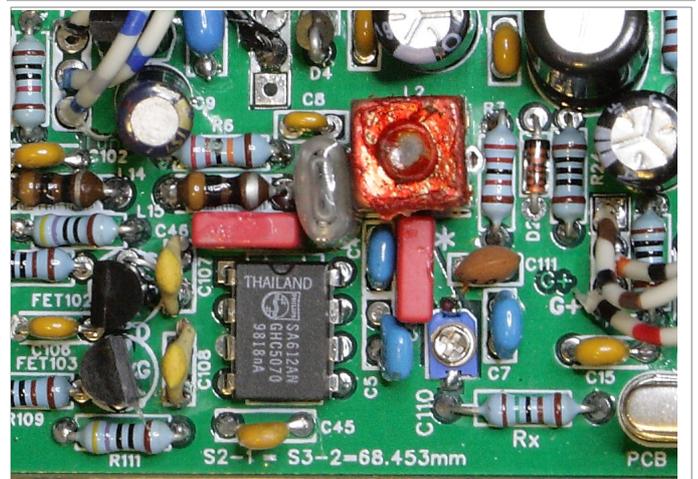
Minimal sensitivity can be set by the value of R24 (22k).

8.   Sense.
On one side of the antenna pattern the signal should become minimal when the sense-button is pressed. The deepness of the minimum is influenced by the length of the sense antenna, the coupling strength between ferrite rod and L101, and the distance between transmitter and RDF.

You can adjust the deepness of the signal minimum by adjusting R105. Adjust this sense action when abt 300-500m away from a low power transmitter which transmits with a _vertical_ polarized antenna.

The opposite pattern side should become 3dB louder with a pressed sense button.

If wires connected to SA1 and SA2 are interchanged, the maximum and minimum in antenna diagram interchange in direction too.

The maximum in the antenna pattern should be in walking direction.

An arrow on the top of the receiver should indicate that.

Protecting the ears of the user of your RDF

**Ferrite beads FB6 en FB7 are exchanged for resistors.
These resistors will, like ferrite beads, block possible received RF on the headphone cord,
AND will function as attenuator for to loud audio output.**

You should measure the maximal loudness produced by, the combination of your RDF and the used head phone, by holding a (cheap) dB meter to the inside of a headphone speaker. It never should become louder than 85 dB(A).

**Long time listening to louder levels than 85 dBspl can (will) damage ears.
One loud "BANG" will damage ears.**

Resulting attenuation [dB].	Resistor values for FB7 and FB8 [Ohms]
17	1k5
12	680
6	220

REM : i take NO responsibility for these values and advises !   Max. loudness is YOUR OWN responsibility.