Pa0nhc ARDFrx80
Setup 1/3
PCB 20180128-16 v. 20180130

REM: "-B" (battery minus) is INSULATED from mass.
While measuring, be careful not to make an accidental short-circuit from +Bat to mass (0V)., D2 will burn out !

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

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

2. Using a hiZ multi meter and oscilloscope, c**heck the following voltages in respect to mass plains** *(not 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.
G +	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	0.05V HF / +0.2Vdc	BFO is working.
IC2p7	½ B+ (+3.0 to +4.4 Vdc) and max audio is 3 Vpp	

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 *first.*
Change the value of R201 if needed.

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 value can vay due to varying amplification factor of transistors and crystal activity).

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.

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), indicating good tracking of the oscillator and antenna circuits.

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

* If the core of L3 and/or L6 becoms fully inside, enlarge the value of C25 and/or C26 a little, by soldering a smal value capacitor (10 – 27 pF) in parallel 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.

Minimal sensitivity can be set by the value of R24 (27k). With the correct value for R24 the gain potmeter 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. 300 mVrms measured at R19.

8. Sense action.
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.

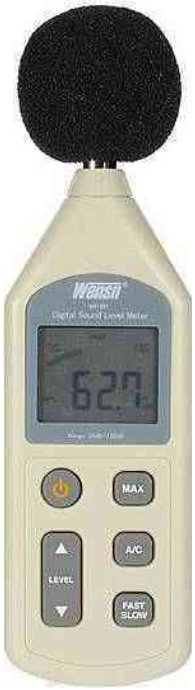
You can adjust the deepness of the signal minimum by adjusting R105. Adjust this sense action when abt 300-500m away from a low power transmitter which transmits with a *vertical* polarized antenna.

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



Resistors R31 and R32 will 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 R31 and R32 [Ohms]
17	1k5
12	680
6	220

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