

THE "DEF" RECEIVER

The Sniffer That Makes a Difference.

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Your beam or Doppler system can get you to the area of the hidden transmitter with relative ease. Many hunters can cover the area to the fox in as little time as it takes to drive there. Big problems start when you are within 100 metres of the fox.

When you take the antenna off your receiver, the signal still booms in S9. You will find that if you terminate the end of the coax with a dummy load instead of the antenna, the signal still breaks through several hundred meters from the fox. The signal is coming through the case of the receiver and breaking through the coax. Signals are combining to give a random reading that changes with hand capacitance and body position.

Many hunters find a particular quirk, or null, and kid themselves that the equipment is showing direction. Most, if not all hunters using handhelds without an antenna try to use the signal strength to find the fox. Signal strength does increase with proximity but varies even more with hand and body position.

The "Def" receiver (Direction Finding Equipment for Fox Hunting) solves these problems and leads you straight to the transmitter antenna, in fact to a

point where your antenna touches the fox antenna.

The "Def" receiver is derived from experience with the Field Strength Meter as published in the ARRL Handbook section on direction finding. It was found that this equipment was indeed deaf, and needed to be more portable. The "def" receiver together with the "Mef" antenna from last month's issue of ZS makes a very fast and accurate tool for finding the fox.

How it Works.

The circuit of Fig 1. describes the equipment. The receiver consists of three parts. RF amplifier, filter, and DC amplifier.

The RF amplifier must be able to reduce its gain to below one and increase its gain to the maximum available for the given layout of the pcb. R1 applies a variable voltage to G2 of the BF982 allowing the operator to vary the gain to his requirements. The layout is critical to avoid breakthrough and oscillation at maximum gain.

The output of the RF amplifier is matched to the pair of tuned circuits which are etched on the pcb. The tuned circuits form a narrow filter in order to improve adjacent channel rejection and keep out that local broad-

cast transmitter, that the fox is hiding next to.

Filter output is rectified by D1 and fed into the DC amplifier. The gain of the amplifier is kept as low as practical so that the system remains stable. The range switch provides a means of adjusting the gain as the operator approaches the fox. The circuit is run from a single 9V battery for convenience.

Construction

The receiver is housed in a metal box together with a handle and the "Mef" antenna. The three items form a gun shaped assembly, easy to use with one hand when on the run.

The printed circuit board is essential and it is not recommended that the receiver is built on proto board.

The components should be mounted on the pcb as shown in Fig 2. The variable resistor R1 is mounted on the track side of the pcb. The track side of the pcb faces towards the front cover. Wires are soldered into the terminations T3 to T7. T3 & T4 go to the on/off switch. T5, T6, and T7, go to the three position range switch and also come out on the track of the pcb, on route to the front panel. The meter is screwed to the pcb on the track side.

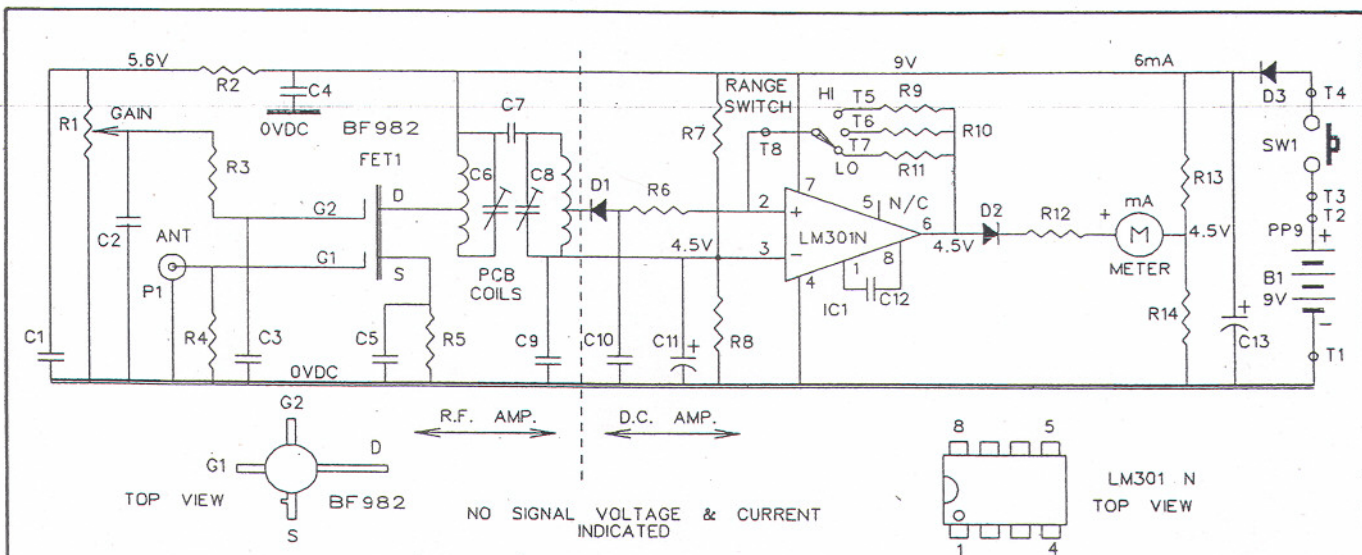


Fig 1. The circuit diagram of the "DEF" receiver.

The meter position on the front of the box is important. Great care should be taken in marking out the position of the meter. Make sure that all the outer edges of the pcb are inside the base edge of the box. Mount the meter on the cover before fastening to the pcb. The meter case provides a mounting for the pcb. The pcb should not be screwed down to the box by any other means than by the meter. Connecting the box to the ground of the pcb will reduce the isolation of the receiver. The receiver is housed in a standard Mini A2 box as shown in Fig 3. The assembled pcb, meter, and controls form the complete receiver, housed in the cover half of the box. The base of the box now forms a rear cover and has attached to it the wooden handle and the "Mef" antenna. Coax from the "Mef" antenna comes through a hole in the base, and is best fastened to the base of the box by a piece of aluminum angle, and screws. The wooden handle can be shaped easily on a jig saw and screwed to the end of the base of the box as shown in Fig 3. A battery holder consists of a small piece of tin plate cut from a food can. The strip of metal is 55 x 20 mm. and bent over the battery. The metal strip is soldered to the component side of the pcb by passing bare wires through the pcb holes to the pads on the solder side. Solder the wires to the metal strip to hold it in place. The PP9 battery connector has its connections soldered to T1 & T2; make sure that they are the correct way round. Positive terminal of the battery goes to the T2 terminal and the anode of diode D3.

Testing

When the pcb is complete but not yet mounted into the box start your testing. Remove IC1 from its dip 8 holder and connect the battery. Check with a multi meter that you have the voltages that are shown on the circuit diagram Fig 1. Check that the voltage either side of R3 goes from 0 Vdc to 5.6 Vdc when R1 spindle is turned. Turn the voltage on R3 to 2 Vdc and disconnect the battery. Plug IC1 into the dip 8 holder making sure you have pin 1 in the right place. Check Fig 3, Fig 1, and the pcb marking to make sure you have it correct. Check that you have connected a wire from the centre of the antenna plug P1 to the FET1 lead G2 and from the FET1 D lead to the centre of the coil next to C6 as shown in Fig 2. Connect a short

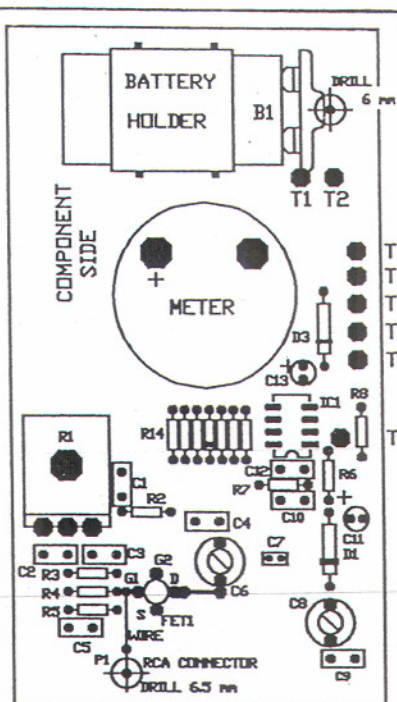


Fig 2. Overlay of the "DEF" pcb showing the position of components. The resistors starting with R14 are shown in Fig 4.

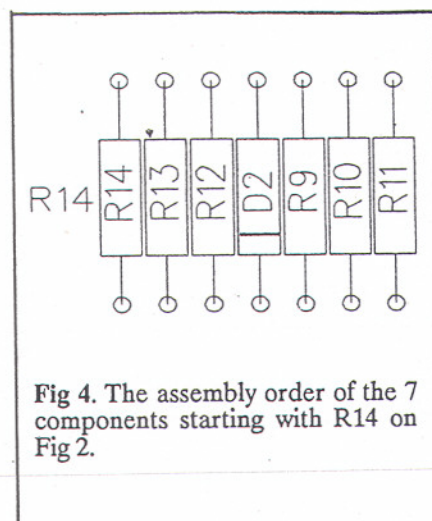


Fig 4. The assembly order of the 7 components starting with R14 on Fig 2.

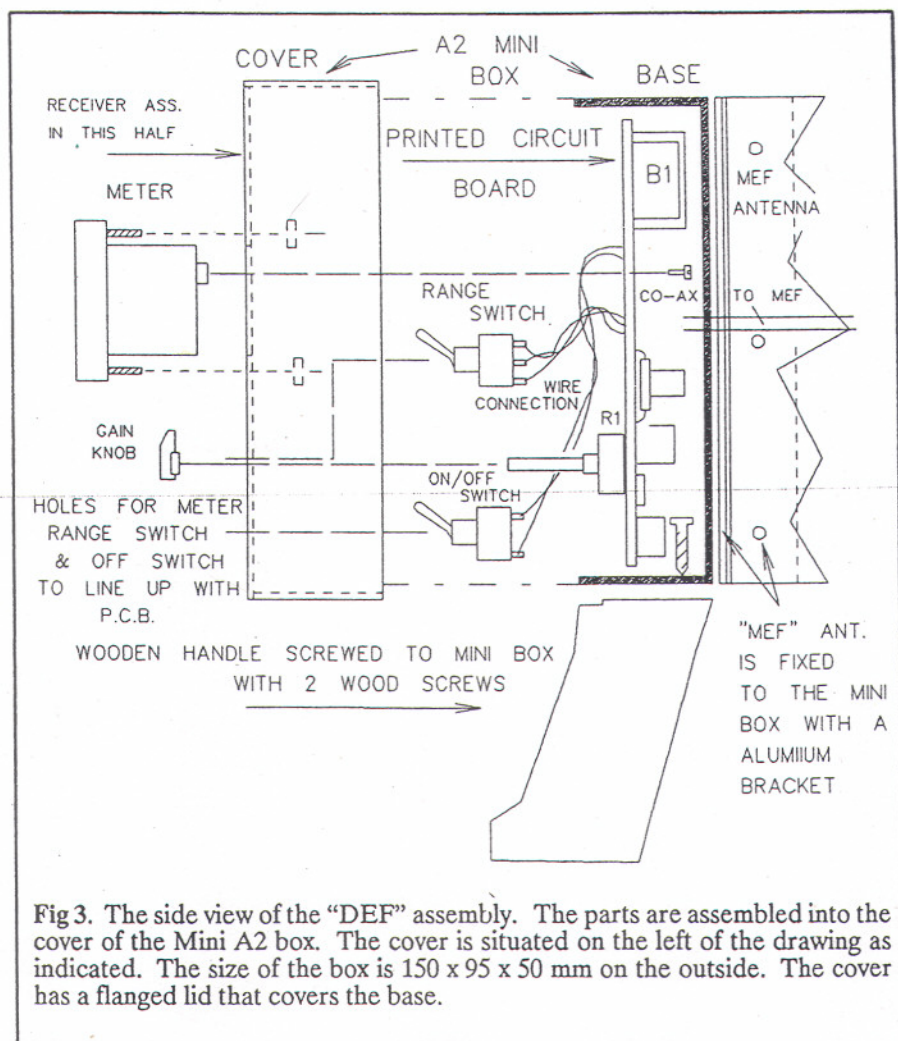


Fig 3. The side view of the "DEF" assembly. The parts are assembled into the cover of the Mini A2 box. The cover is situated on the left of the drawing as indicated. The size of the box is 150 x 95 x 50 mm on the outside. The cover has a flanged lid that covers the base.

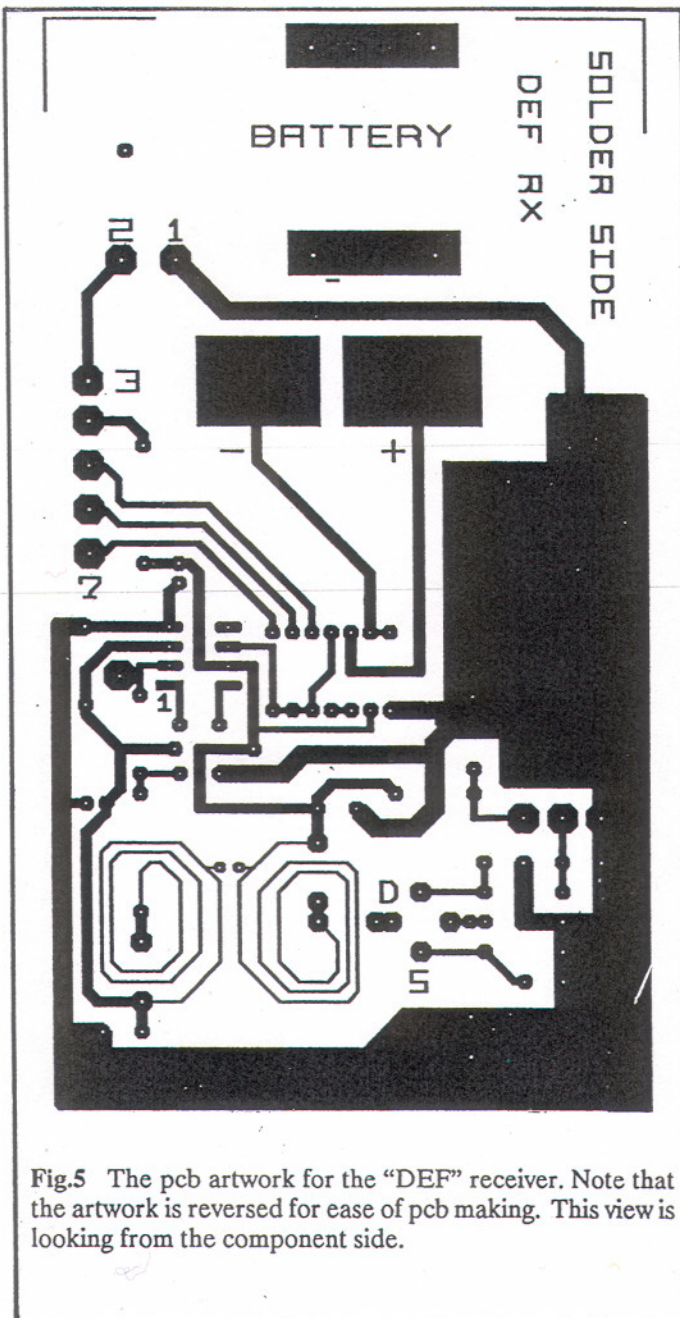


Fig.5 The pcb artwork for the "DEF" receiver. Note that the artwork is reversed for ease of pcb making. This view is looking from the component side.

piece of wire (200mm) into the centre connection of the antenna connector P1, to act as a small antenna. Reconnect the battery. Bring a handy talky within close range of the pcb (400mm) and press the ptt. Adjust C6 and C8 with an insulated trimming tool for maximum reading on the meter M. Adjust R1 and the distance away from the walky talky as the signal reaches near its maximum on the meter M. Mount the pcb in its box connecting the coax from the "Mef" antenna while closing the box. Using your handy talky set the "Mef" capacitors for straight ahead reading and seal them with wax against moisture.

In The Field

The "Def" receiver is easy to use in the field. The operator soon makes good use of the range and gain controls to achieve the best meter movement that shows the direction. The "Def" and "Mef" can take a lot of abuse if the receiver is constructed correctly. This equipment will point directly at the fox antenna. Rotating the assembly sideways will show an increase when the antenna is at a position which matches the polarisation of the fox antenna. This will give you useful information on how the fox is hidden.

ZS

PARTS LIST

Resistors:

R1 10k PCB Mounted potentiometer
R2 = 5k6
R3 = 22k
R4 = 47R
R5 = 220R
R6 = 10k
R7,R8 = 8k2
R9 = 220k
R10 = 1 Meg
R11 = 2.2 Meg
R12 = 3k8
R13,R14 = 1k

Capacitors:

C1, C2, C4 = 220n
C3, C5, C9, C10 = 1n
C6, C8 = 2 - 10p variable capacitor
C7 = 1n
C11,C13 = 22uF
16V Elec
C12 = 47p

Semiconductors:

D1 = OA90*
D2,D3 = IN4148
IC1 = LM301 N
FET1 = BF982

Miscellaneous:

P1 = RCA
PCB connector
M = 1 mA meter
Range = 3 pos toggle
SW1 = 2 pos toggle
A2 Mini Box
Knob for R1
Dip 8 pin base
PP9 Battery
Connector

Kits & component parts are available from:

Vidiquip

P.O.Box 2076
Wilro Park 1731
(011) 764 1439

BOEK WINKEL

SARL Log Boek R8.00

AVB ingesluit

Posgeld en Verpakking R2.50

per bestelling van 1 tot 5 boeke