Simple Top-Band Receiver

by Chris Plummer G8APB

From previous articles* you will gather that there are a small number of sado-masochistic maniacs spread around the country, otherwise known as "Top-Band d.f.ers" (direction finding experts). The previous articles covered the construction and use of a d.f. set for Top-Band and, as can be imagined, a set that has a specialised antenna and headphone output is of limited use in a moving vehicle to monitor signals at random intervals. So the author developed the 1·8MHz monitor receiver using an external car whip, and including an amplifier with loudspeaker output. This receiver can of course be used for any Top-Band listening, and is reasonably sensitive and stable. It can also be adapted for use on the 3MHz band by setting the v.f.o. on the low side of the input signal, i.e. tuning 3·045–3·345MHz and using less inductance on the tuned input circuits.

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The Circuit

Basically the heart of the circuit is identical to the previous design except that the unwanted sense-amplifier circuit is removed, and an i.c. audio-amplifier has been added. In the author's prototype the a.g.c. system is still disabled but details are given in Fig. 1 to allow for a.g.c.

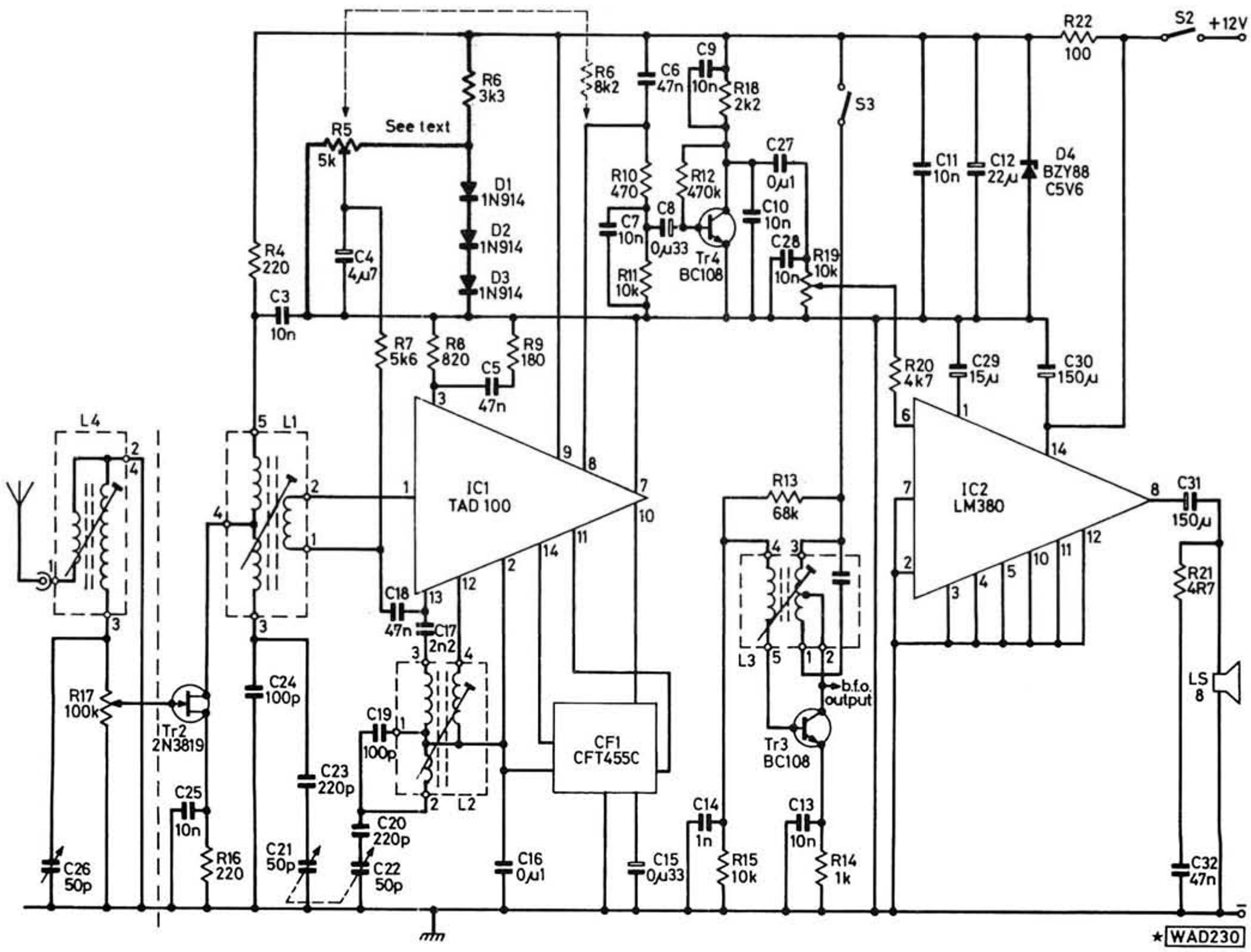


Fig. 1: The circuit diagram of the simple Top-Band receiver with the a.g.c. disabled. To enable the a.g.c. the components under the tint are omitted and the connection shown dotted made instead. C4 is changed to 10µF and R7 to 8·2kΩ. The p.c.b. will accommodate the changes

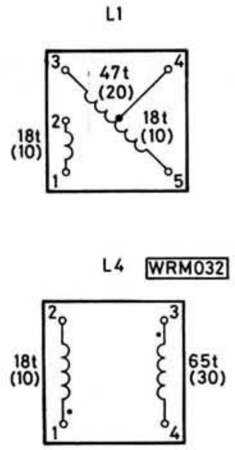
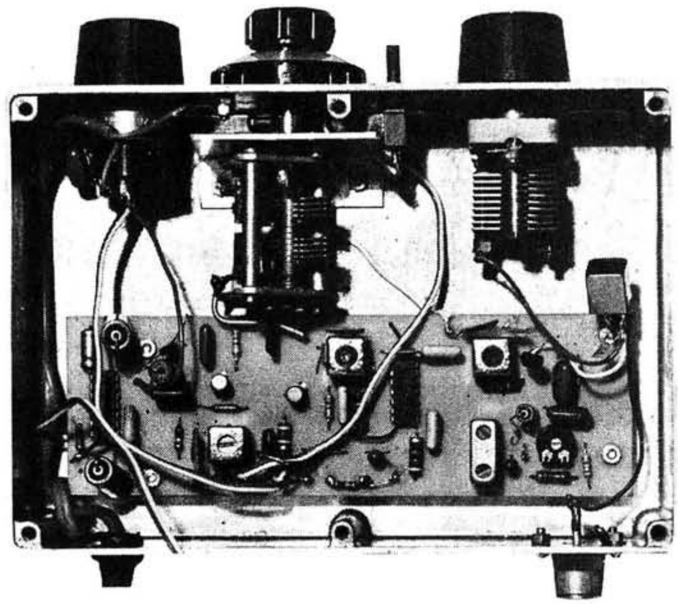


Fig. 2: Coil winding details



The author's prototype receiver. The speaker is housed in the lid of the box

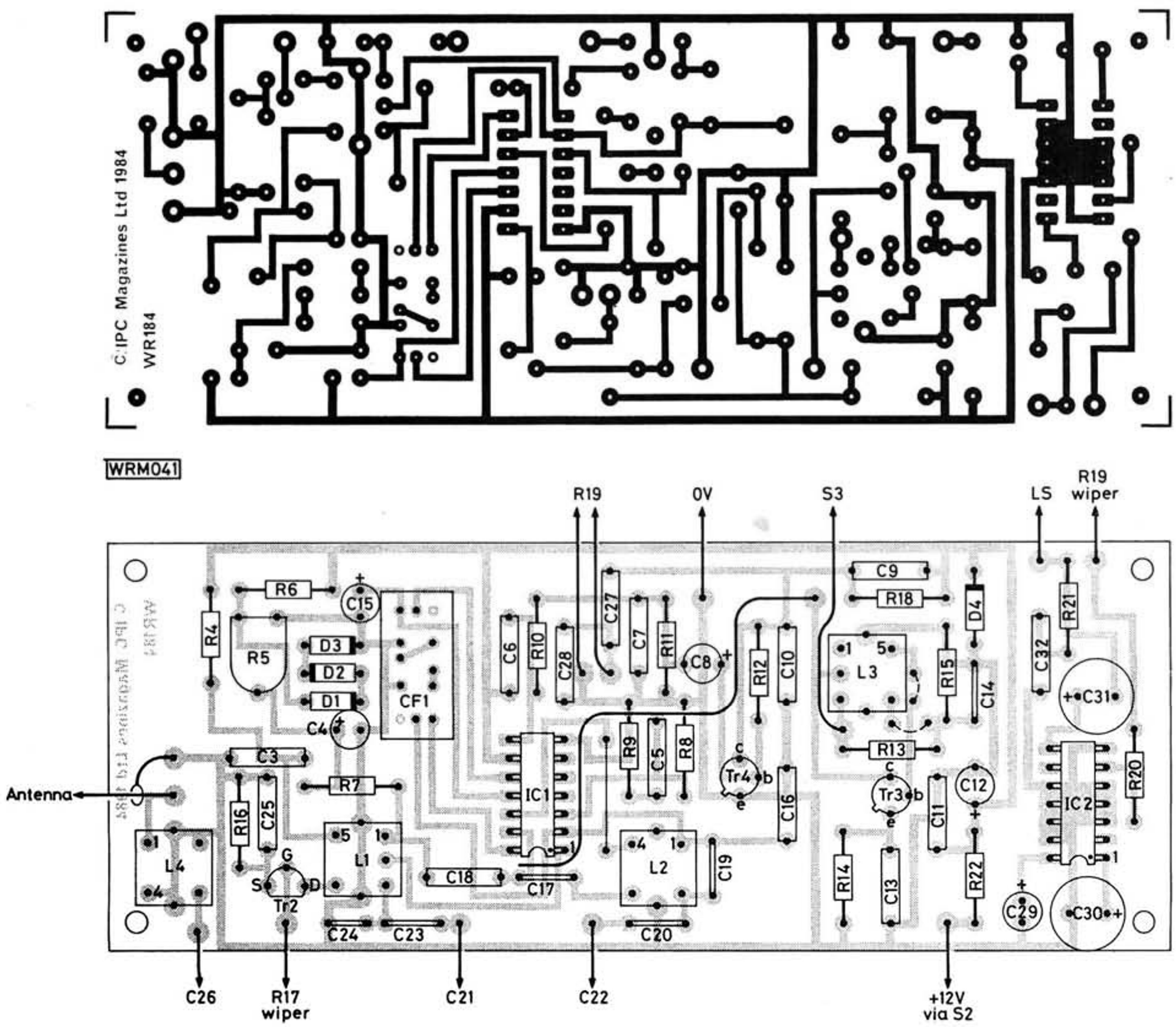


Fig. 3: Full-size p.c.b. track pattern and component layout for the receiver

★ components

Resistors

Carbon film ¼W 5%

4·7Ω	1	R21
100Ω	1	R22
180Ω	1	R9
220Ω	2	R4,16
470Ω	1	R10
820Ω	1	R8
1kΩ	1	R14
2·2kΩ	1	R18
3·3kΩ	1	R6
4·7kΩ	1	R20
5·6kΩ	1	R7
10kΩ	2	R11,15
68kΩ	1	R13
470kΩ	1	R12

Potentiometers

Min. horizontal presets

5kΩ	1	R5

Carbon track

10kΩ (log) (with switch)	1	R19
100kΩ (1in.)	1	R17

Capacitors

Polyester

10nF	8	C3,7,9,10,11,13,25,28
47nF	4	C5,6,18,32
0·1µF	2	C16,27

Ceramic plate

100pF	2	C19,24
220pF	2	C20,23
1nF	1	C14
2·2nF	1	C17

Min. Electrolytic p.c.b. mounting

0·33µF	25V	2	C8,15
4·7µF	25V	1	C4
15µF	16V	1	C29
22µF	16V	1	C12
150µF	16V	2	C30,31

Air-spaced variable

50pF	1	C26 (Jackson C804)
50pF + 50pF	1	C21,22 (Jackson C808)

Semiconductors

Diodes

1N914	3	D1,2,3
BZY88C5V6	1	D4

Transistors

BC108	2	Tr3,4
2N3819	1	Tr2

Integrated Circuits

LM380N	1	IC2
TAD100	1	IC1

Miscellaneous

Speaker 8Ω; min. switch s.p.s.t. (S3); diecast box 172 × 120 × 55mm; crystal filter Toko CFT455C; Toko YRCS12374ACS (L3); Toko 10K coil formers (3); knobs (3); slow motion dial; printed circuit board.

BUYING GUIDE

Most of the components used are readily obtainable from advertisers in *PW*. The TAD100 can be obtained from Watford Electronics. The p.c.b. is available from the usual suppliers or from the author QTHR. Toko coils and formers can be obtained from Ambit International. A suitable "vernier slow-motion drive" is available from Maplin Electronics as RX39N vernier dial small.

Approximate Cost £40

Construction Rating Intermediate

action as per the manufacturer's intentions. The author's prototype still uses the TAD100 i.c.; however the TAD110 is pin compatible and may be easier to obtain.

The system now runs from a nominal 12V supply so that the audio i.c., an LM380, can give a reasonable output, the supply to the rest of the set being about 6V either by using a 78L05 regulator or a resistor and Zener diode system so that the TAD100/110 behaves as in the companion d.f. set. Alignment is as previously described but without the sense-amplifier; the audio stages need no alignment. If a.g.c. is added then the marked components in the layout should be changed accordingly. All components can be mounted on the p.c.b. as shown except the tuning controls and gain control. Coil winding details and detail layouts are given in Figs. 2 and 3. ●

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peak of the modulation envelope is called the **peak envelope power (p.e.p.)**. You can calculate the p.e.p. by taking 0·707 of the peak voltage read from the oscilloscope screen, squaring it and dividing by the load impedance, in just the same way as I described for average power.

The second reason for using the two-tone test signal is that, as the drive level is increased, it is easy to see the peaks of the waveform begin to flatten, a sign that the amplifier is being overdriven and is generating intermodulation distortion products. The waveform envelope should be a clean sinewave at lower drive levels of course. If not, you have distortion somewhere that must be cured.

A speech signal driving the amplifier to the same peak height on the oscilloscope display as the two-tone test signal will give the same p.e.p. as that two-tone signal. If you watch your s.s.b. output on an oscilloscope during normal operation, having checked the maximum peak height you can get without peak-flattening on the two-tone signal, you can safely turn up the microphone gain to give the same height on loudest speech, knowing that you're not overdriving the transmitter and splattering all over the band.