The ZL2BMI DSB TRANSCEIVER.

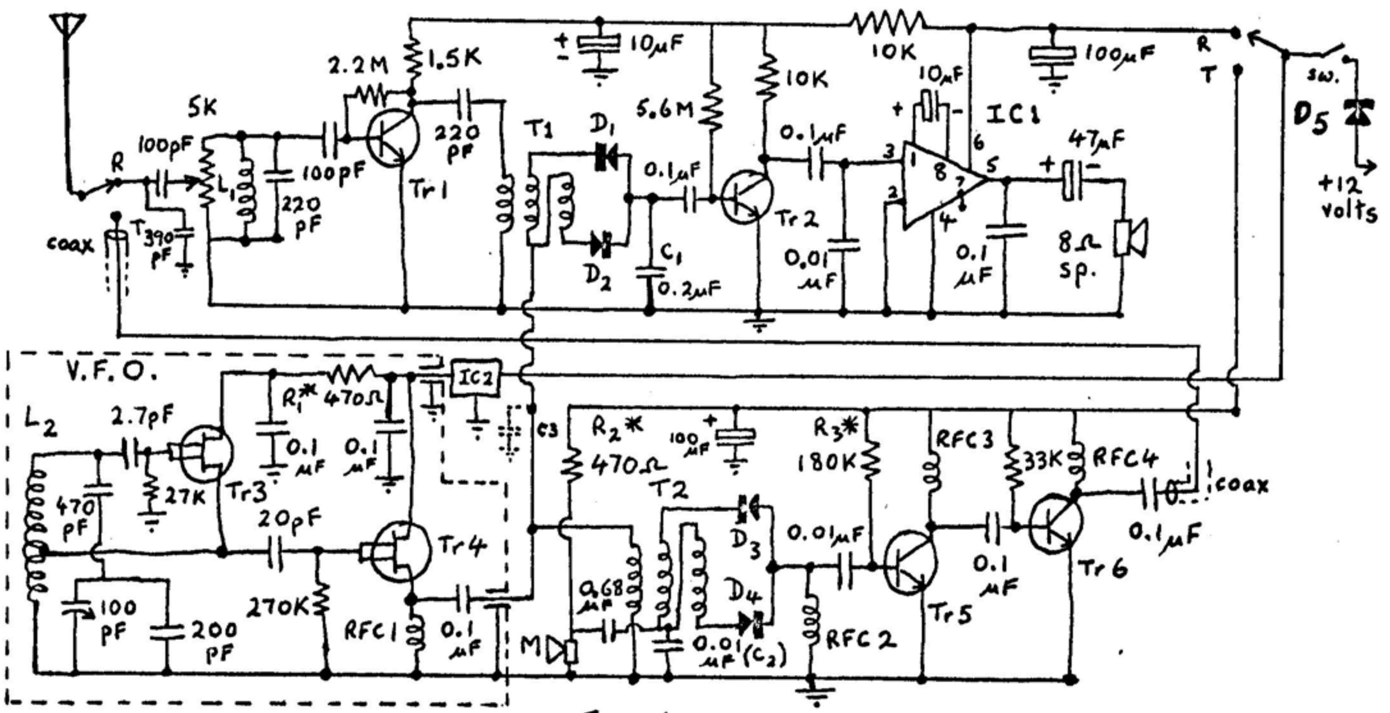


Fig 1.

Components :

- L_1 - 45 turns on small iron dust toroid. (A T50/2 with 40 turns may be better)
- L_2 - 50 turns, tapped at 8 turns, on 5mm slug-tuned former.
- T_1/T_2 - 7 trifiliar windings, approx 35 swg enam. wire on 6mm bead, 2.5mm hole, (Neosid F7 ferrite)
- $RFC_1/RFC_2/RFC_3$ - 10 turns thru' ferrite bead (approx 150μH)
- RFC_3 - 2½ turns thru' 6-hole bead (approx 15μH). M - Carbon mike insert.
- D_1-D_4 - BAT 81 (H.C.D's) D_5 - 1N4001 (reverse polarity protection)
- Tr_1, Tr_2, Tr_5 - BC338. Tr_3, Tr_4 - BF960 dual gate FET. Tr6 - BD139.
- IC1 - LM386N/3. IC2 - 78L08 (8V, 100mA regulator)

NOTES

V.F.O.

The reason for using UHF dual-gate FETs is simply that they were available cheaply. Other dual-gate FETs should work; J-FETs would also probably work but may require changing the value of the 2.7pF capacitor or the tapping point on the coil.

R_1 was originally specified as 100Ω but was altered to 470Ω or even 820Ω (in one case) to reduce the current drain of the oscillator. Effectively, Tr 3 operates on about 2 - 3 volts. The capacitor on the drain of Tr 3 may be a lower value than 0.1μF in some cases.
The value of the coupling capacitor to the buffer, may also vary.

Capacitor C_3, from the output of the V.F.O. to ground, may be included to reduce the VFO drive to the correct level. C_3 would be a value up to about 2000pF. It may also have in parallel with it, a resistor of 15 - 50 Ω.
The feedthru' for VFO power is 1000pF type. The output feedthru' is 0pF.

Receive Board

The front end tuned circuit is very simple and not particularly selective. A 50Ω aerial, especially a dipole or balanced type, will not usually cause trouble with B.C. breakthrough. Some spurious signals from 40m and higher may be heard, but these are not usually troublesome at the time when 80m is best for QRP work.

There is plenty of space to experiment with a better front-end if you wish. Alternatively, a simple pi-net filter at the aerial socket would benefit both receive and transmit. (See fig. 2).

Note that the VFO port of T_1 requires a d.c. path to earth, which is normally provided through a winding of T2. If T_2 is disconnected, it would be necessary to add a small R.F.C. to replace it, in order for the receive mixer to work

C_1 may be raised in value to reduce the audio 'highs'. The lower tone may be more pleasant, but will also reduce sensitivity slightly.

Microphone, Balanced Modulator and R.F. Amplifier

While the carbon mike is simple, it is *quite* effective. R_2 may vary in value, depending on the particular mike. If you wish to experiment, there is a circuit (fig. 3), which I have used as a direct replacement (all components in the mike case), for a carbon mike. It still needs some refinement, and it is possible that R_2 should be raised to about 10K with a circuit such as this. The 0.68μF capacitor feeding the bal. mod. may also be altered to increase or decrease the modulation.

Note that D_1 - D_4 could be replaced by 1N914s, (matched pairs), but the carrier null may not be quite so good.

R_3, the bias resistor for Tr5, can be reduced to 100K. This will give up to 50% extra output; however Tr5 will run quite hot is this case (though generally they will stand this O.K.)

When run on 14-15 volts, the transmitter will put out significantly more power than on 12 volts, possibly up to about 3 watts.

Raising the output power with another amplifier is not advisable unless a good deal more filtering is provided.

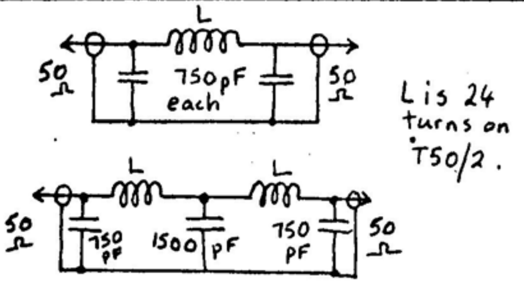


Fig 2. Pi-net filters

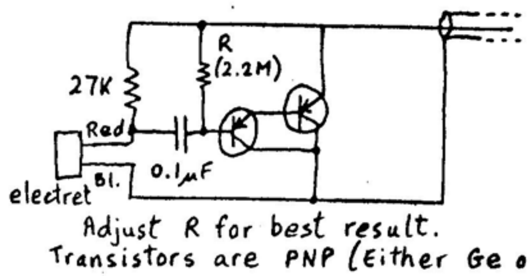


Fig 3. Carbon mike replacement.

Other Notes

This transceiver is of very simple design and cannot be expected to perform to the standard of more complex commercial designs. Nevertheless, under reasonable conditions it performs remarkably well, and contacts with VK's are not impossible when conditions are right.

The power supply should be of low impedance, preferably lead-acid or ni-cad cells. Dry cells may require 1000 - 2000μF capacitor across them if there is sign of the receiver becoming unstable.
A mains power supply would need to be well filtered.

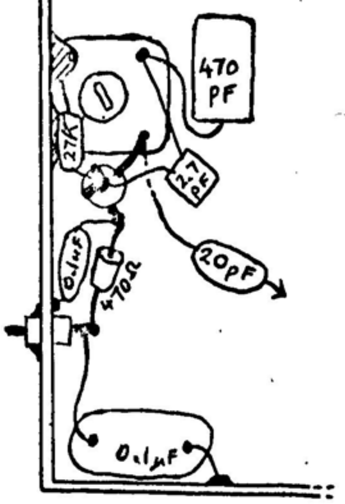
While tuning is a bit tricky without a reduction drive, it is a 'learned art' which comes with practice. Sometimes it is easier to ask the other operator to tune to you with their main tuning.

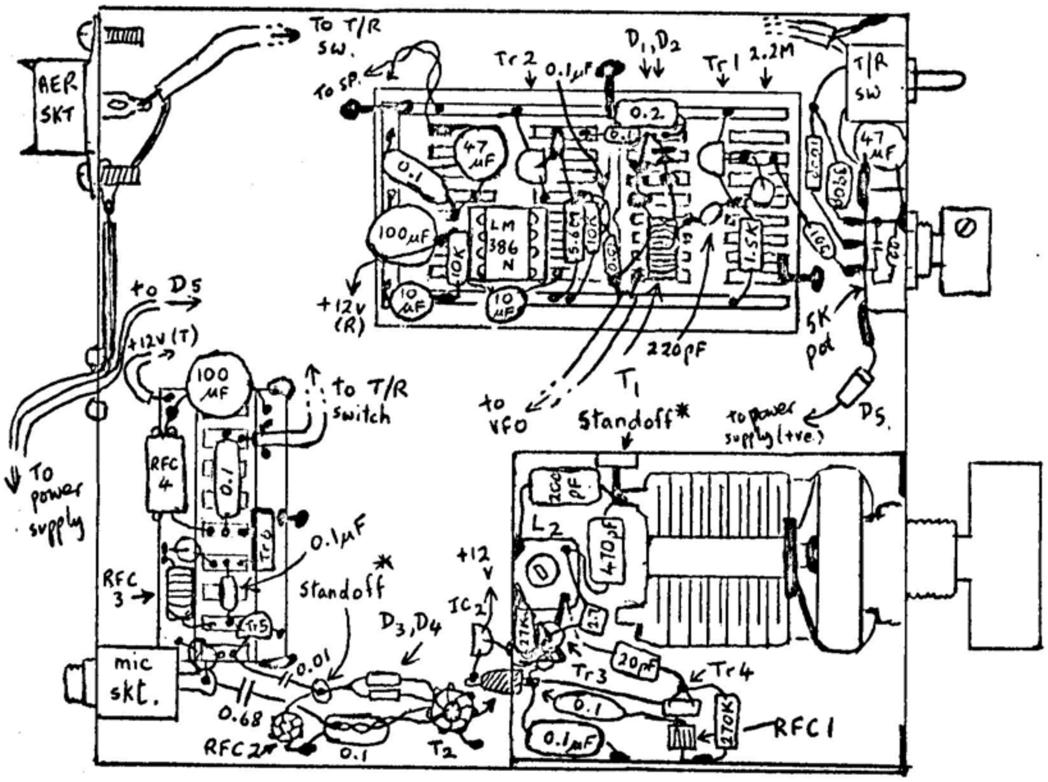
The VFO lid may be removed if necessary by unsoldering the 'solder tacks' on each side. The slug in the VFO is accessible through the hole in the lid to re-calibrate the dial (beware! - the slugs are fragile!)
A simpler recalibration is to loosen the grub screw on the tuning knob and re-adjust the knob before re-tightening.

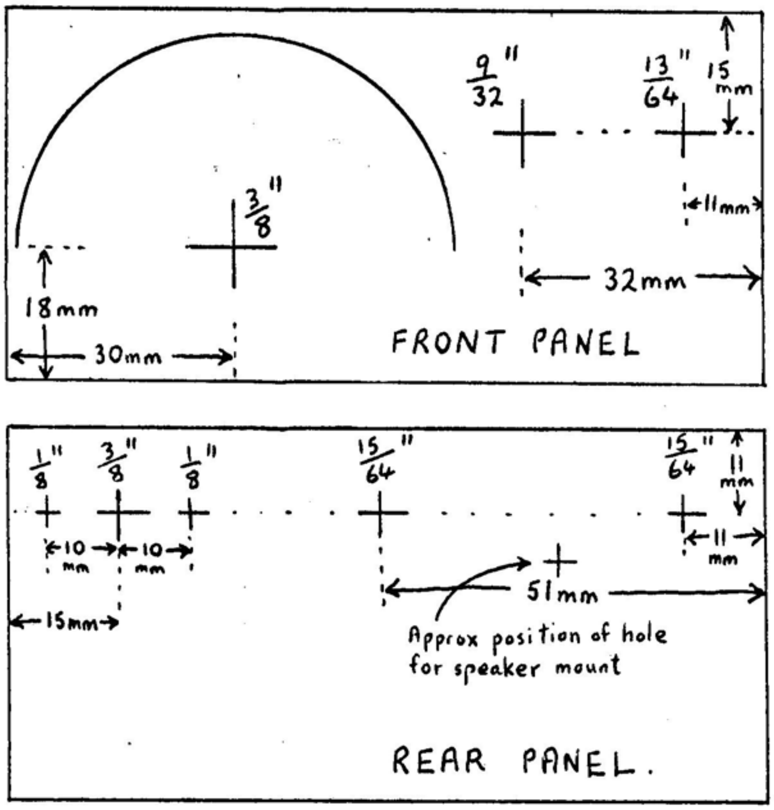
C.W may be obtained by applying +12volts to the audio port of the balanced modulator, through a 1K resistor. However, beware of overheating the BD139 by long key-down periods. A PNP switching transistor could be used, if you require to key to earth.

A P.T.T. mike would require replacing the front panel switch with a d.p.d.t. relay.

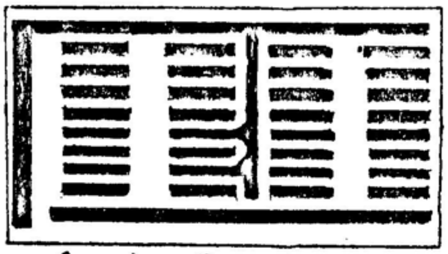
OSCILLATOR FET CLOSE-UP.



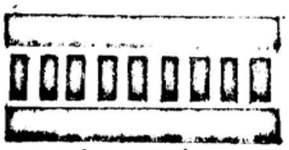




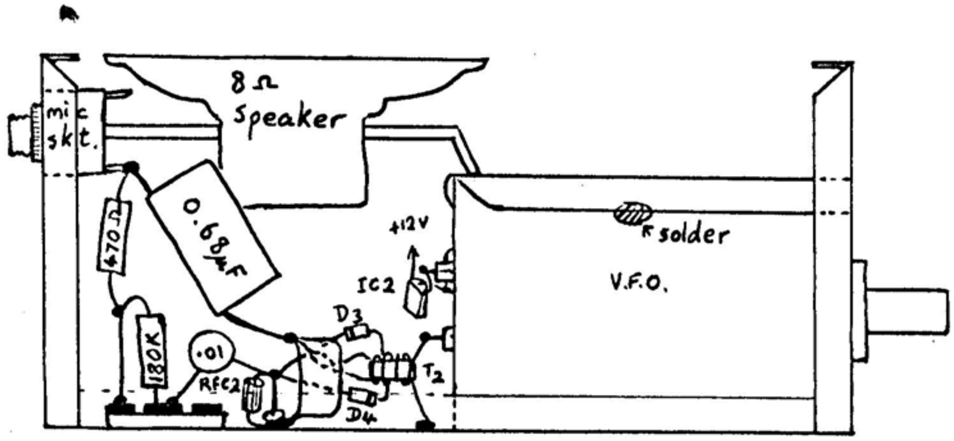
Drilling Layouts (to scale)

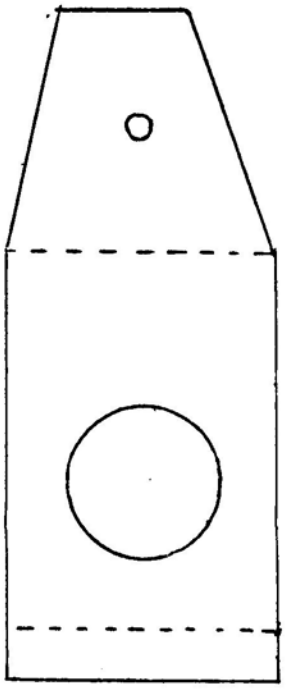


Receive Board.

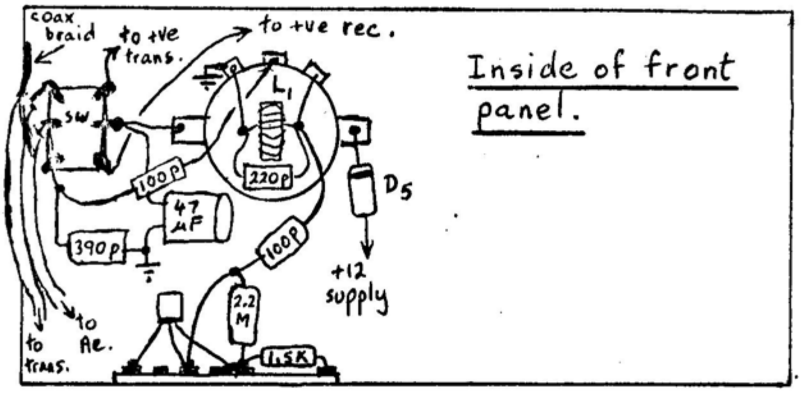


r.f amp board.





Speaker bracket
(Vinyl floor covering) material



Inside of front panel.