

28MHz PRE-AMPLIFIER

Over the years the members of 10-UK have noticed the falling-off in performance of many amateur receivers and transceivers on the 28MHz band. This simple f.e.t. pre-amplifier has been used with a wide variety of equipments and found very useful.

When used with a receiver it is possible to switch the pre-amp in or out of circuit with a simple switch but used in conjunction with a transceiver, a relay or solid-state

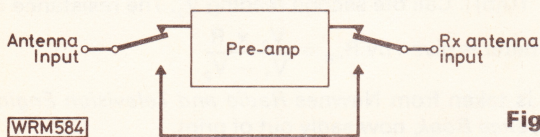


Fig. 1

switching will have to be used. In many modern amateur transceivers a switched output is readily available and the circuit shown has been used with a Trio TS-120V. No doubt a similar switched line can be located in other transceivers.

Construction

The construction of the pre-amp is simple, using v.h.f. techniques and keeping all leads as short as possible. Remember to ground the plain copper side of the printed circuit board. All the components are soldered directly to the copper pads, ensuring that the transistor is mounted correctly orientated. The coils are wound on suitable formers fitted with ferrite cores.

Two prototypes were built using different transistors and coil construction techniques. The two spectrum analyser plots show the differences in performance and the drawings of component placement (Fig. 3) show the version using a 3N201 f.e.t. and coils wound directly onto ferrite screw cores. Tuning is by moving the cores and also by adjusting the trimming capacitors. If the pre-amp decides to oscillate at u.h.f., ferrite beads on the leads of Tr1 should tame it, but this was not found necessary on either of the prototypes which showed no signs of instability up to 1200MHz.

The second prototype used Toko coil formers and cans with fixed capacitors of 68pF instead of the trimmers C1,5. Tuning in this case is by the adjustable ferrite cores. It can be seen that this version is very 'peaky' compared to the other version and will not cover the whole band without re-tuning. The coils have the same number of turns as the other version but, by necessity, of a much finer wire. The same p.c.b. is used for both versions.

Other f.e.t.s which are suitable for use in this circuit are BF961, BF900, and 3SK88. The first two are in a plastic "pill" package while the 3SK88, like the 3N201 is in a TO72 can.

If the gain is too great it is preferable to reduce the output by using a resistive attenuator rather than alter the resistor values shown in the circuit.

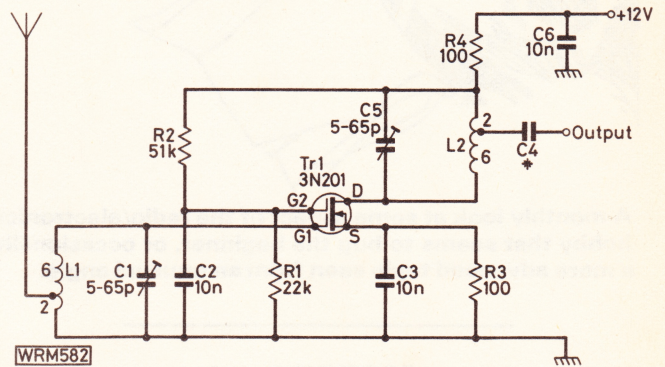
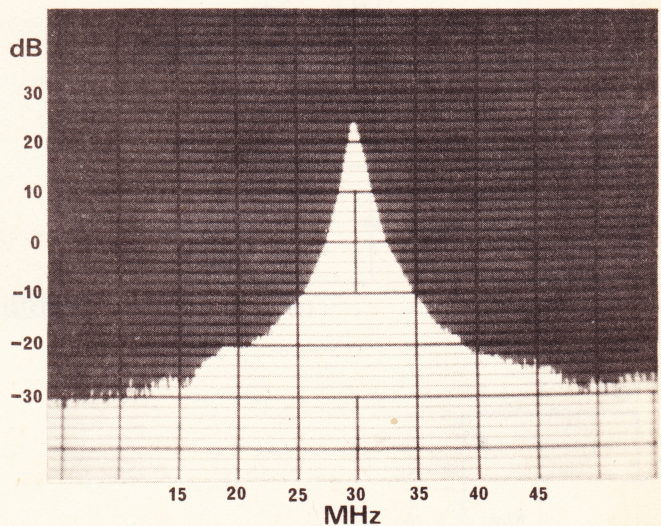


Fig. 2: Circuit diagram of the pre-amplifier. Capacitor C4 is not on the p.c.b. and its value is not critical. R4 can be ignored and C6 soldered directly onto the 12V pad on the board



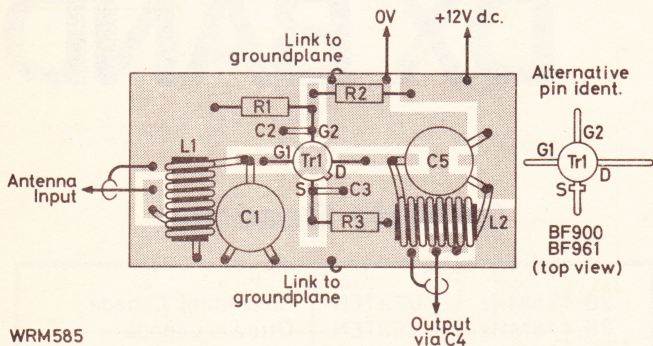
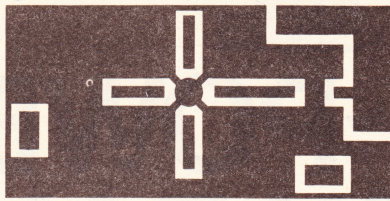
The alternative pre-amp design using a BF961 transistor and Toko coil formers with fixed tuning capacitors



The spectrum analyser plot of the alternative design

The capacitor C4 shown on the circuit diagram is not mounted on the p.c.b. and its value is not critical. Resistor R4 and the supply decoupling capacitor C6 are also not on the board. The prototypes used a 0.1µF polyester capacitor for C6 mounted on the board with R4 replaced by a wire link.

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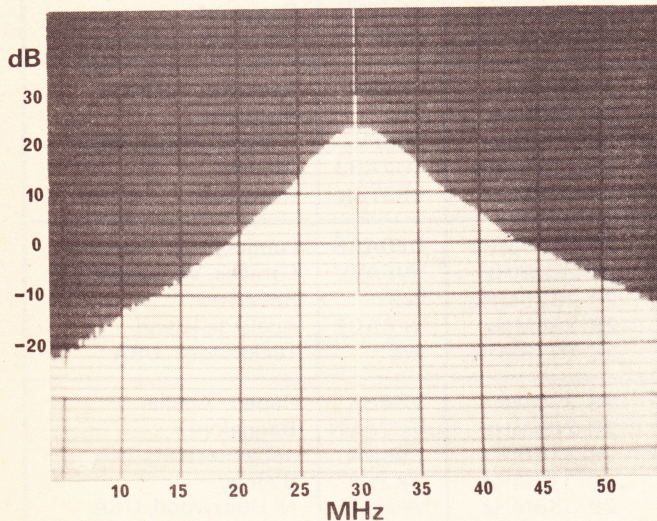


WRM585

Fig. 3: Printed circuit board track pattern and component layout shown full size. Note that the p.c.b. is double-sided and the plain copper ground-plane is connected to the ground-plane on the component side by short wire links. There are no holes drilled for components



The first prototype showing the coil construction and the mounting of the metal canned transistor



Spectrum analyser plot of the first prototype

Practical Wireless, August 1982

★ components

PRE-AMPLIFIER

Resistors

$\frac{1}{4}$ W Metal film

100Ω	2	R3,4
22kΩ	1	R1
51kΩ	1	R2

Capacitors

Monolithic ceramic

10nF	3	C2,3,6
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Miniature trimmers

5-65pF	2	C1,5 (see text)
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Semiconductors

Transistors

3N201	1	Tr1 (see text)
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Miscellaneous

Ferrite cores 6mm dia × 1mm thread pitch (2); 24 s.w.g. enamelled copper wire; Printed circuit board; Alternative coils—Toko 7mm coil formers (2); 7P ferrite cores 10-20MHz (2); 7kN/kP cases (2) (see text).

TRANSCEIVER SWITCHING CIRCUIT

Semiconductors

Diodes

1N4001	1	D1
Red l.e.d.	1	D2 (with appropriate series resistor)

Miscellaneous

Relay 12V 3c.o. contacts; Min. toggle switch s.p.s.t.

Coil details

L1,L2 8T 24 s.w.g. on 6mm dia. × 1mm pitch ferrite screw core tapped at 2T (see text).

Transceiver Switching

For use with the Trio TS-120V or similar rig with an aux 12V d.c. supply available on transmit, the circuit shown in Fig. 4 is recommended.

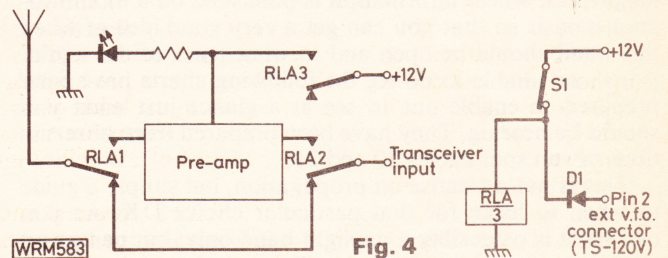


Fig. 4

With S1 closed the pre-amp is inoperative on both transmit and receive. This will allow the transceiver to be used on other bands as well as 28MHz without the pre-amp in circuit. Note that in this state the relay is operated and the l.e.d. is off. With S1 open the pre-amp is on during receive and the l.e.d. is also on. The pre-amp is switched out of circuit when the TX/RX is placed in the transmit condition. In the transmit mode the l.e.d. is off. Diode D1 is required as a blocking diode to prevent the 12V relay supply voltage getting back into the TX/RX. This circuit has been used in this instance but many other control circuits are possible to suit individual installations. ●