

DEVELOPING THE R107

By W. FARRAR, B.Sc. (G3ESP)*

The R107 is one of the few ex-Service receivers currently available which can be used without modification or addition to provide c.w. and 'phone reception on 160, 80, 40 and 20 metres—hence its widespread popularity among amateurs. In this article G3ESP describes how the equipment may be easily modified to expand its usefulness, providing complete send-receive action by the operation of one switch, and using part of the receiver as a microphone pre-amplifier.

THE modification to the R107 to be described consists of the nineteen systematic steps listed below, and entails re-routing of some of the wiring, the addition of a jack and two resistors, and replacement of a panel switch. When complete, the receiver audio stages can be used as a microphone pre-amplifier, and receiver-muting, plus control of transmitter units is achieved. The modification in no way affects the performance of the receiver.

The modified circuit is shown in Fig. 1. Tagboards C and D are located at the rear of the i.f.-a.f. and power-unit chassis respectively, linked together by a bunch of wires. For the purposes of comparison, the circuit is drawn in a similar way to the original circuit as printed in the official R107 handbook, to which the reader may refer, if necessary.

Modification Procedure

The following instructions are given in the order of practical convenience:

(1) Disconnect the loudspeaker and remove it from the panel. Remove completely the black wire which is connected to chassis.

(2) Disconnect the *Sidetone* switch S5b and remove it from the panel, leaving in place the green-white wire which goes down through the chassis.

(3) Remove the *Muting and Sidetone* socket, unbolting from it the tag panel with the 100 ohms resistor (R1c) which is left connected to the large 4 μ F. condenser (C22a) just behind. The black wire from socket to chassis should also be removed.

(4) In place of S5b fit a d.p.d.t. toggle-switch (S8a). Depending on the type available, it may be necessary to file the rectangular panel hole to

* "Stanton," Hemsworth Road, Ackworth, Pontefract, Yorks.

$\frac{1}{2}$ -inch round. Refer to Fig. 1 for the labelling of this switch, which will perform the send-receive action.

(5) Connect the green-white wire (see 2 above) to tag "e" on this switch. Connect resistor R1c to tag "c," and connect tag "b" to a convenient chassis point.

(6) Cut a small metal plate to mask the hole previously occupied by the *Muting and Sidetone* socket, and mount on the plate a microphone jack.

(7) Across the jack connect a 1 megohm resistor (R19a). The sleeve contact of the jack should be connected to tag "b" of the send-receive switch.

(8) Soldered to one tag of the *A.F. Gain* control (VR2a) will be found a number of black wires. They should be disconnected from the tag, but left connected to each other. Using screened wire with the outer braiding earthed, connect the now vacant tag of the gain control to tag "a" of the send-receive switch, thence to the tip contact of the microphone jack.

(9) Disconnect the wires from both tags of the *Lamp* socket (top centre of main front panel), then connect the upper tag to the "+" tag behind the test panel, and the lower one to the junction of R1c and the 4 μ F. condenser (C22a).

(10) Turn the receiver up so that it rests on its panel handles. Disconnect the links between tags 5, 8 and 9 on tagboards C and D. These are to be reconnected differently at a later stage.

(11) From tag "d" of the *Send-Receive* switch run a wire through a chassis grommet and under the power unit chassis to tag D12. Disconnect the wire going to tag D5 and reconnect it to tag D11.

(12) Disconnect the red wire from the *R.F. Gain* control (VR1a) and reconnect it in series with a 50,000-ohm resistor (R20a). Connect wires from each side of this resistor to tags C11 and C12 (it does not matter which wire goes to which tag).

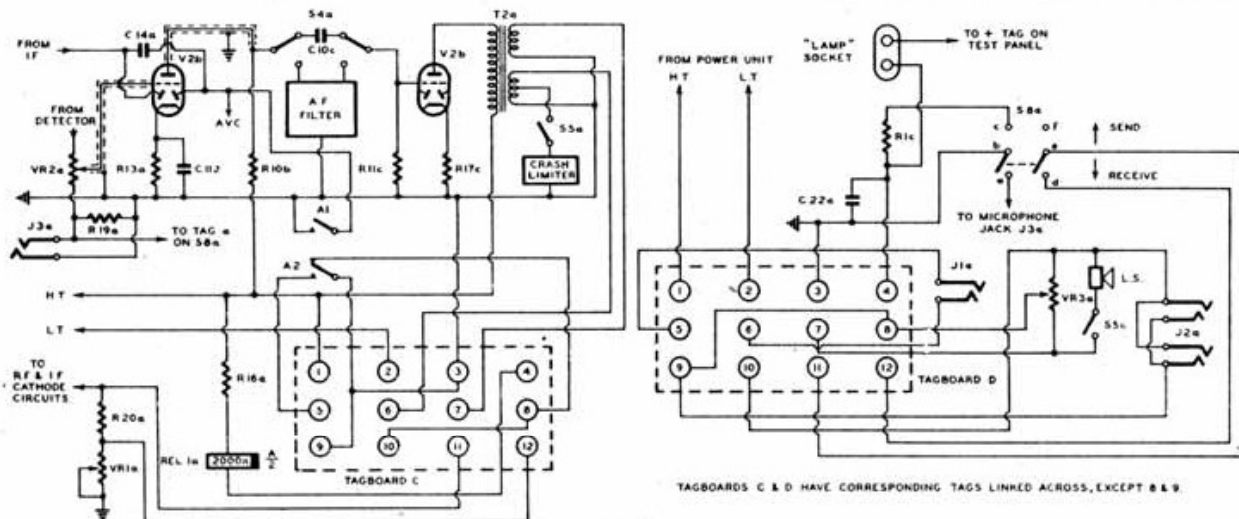


Fig. 1
Simplified circuit diagram of modified section of receiver. (Tagboards are as seen from the rear of the i.f.-a.f. and power unit chassis.)

The loudspeaker can now be replaced and the wire from the adjacent on-off switch connected to it.

(13) Under the power-unit chassis will be found a wide braided screen running from front to rear. A black wire passes through this from tag D3 to *Tel. Output* volume control (VR3a) and thence to chassis. Disconnect this wire from tag D3 and reconnect it to tag D10. D3 should be earthed to the nearest tagboard fixing screw.

(14) Remove the black wire between VR3a and chassis. Run a wire from the vacant loudspeaker tag through one of the chassis grommets and connect it to the tag on VR3a to which black wires are connected.

(15) Connect together the following pairs of tags: D8 to D9; C10 to C8; and C9 to C3.

(16) Disconnect the *Line* jack (J1a) from chassis (near VR3a), extend the wire, and connect it to tag D5.

(17) Disconnect and remove the wire running from tag C5 to a tag on the output transformer (T2a).

(18) A section of the underside of the i.f.-a.f. chassis is shown in Fig. 2. Remove the wire from the relay contacts A1 to the grid circuit of valve V2b. Connect the same relay contact to tag 3 of the valveholder V2b.

(19) Link the following pairs of tags: C5 to D5; C10 to D10; C11 to D11; and C12 to D12.

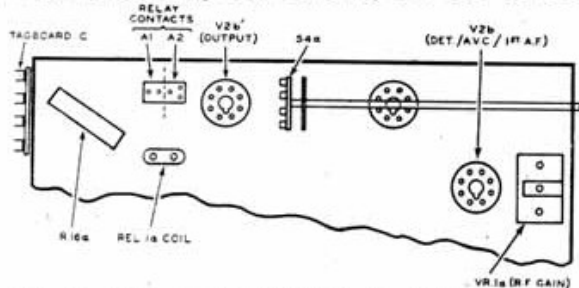


Fig. 2. Diagram of underside of i.f.-a.f. chassis.

Modified Operation

The modifications are now complete, and the result of the changes is as follows. When the send-receive switch is in the "receive" position (*i.e.*—down) the receiver functions normally, with output obtainable from either the loudspeaker or 'phone jacks, but not from the line jack. With the switch in the "send" position (up), the loudspeaker and headphones are disconnected by the internal relay, the output being transferred to the line jack. The microphone jack is connected in series with the a.f. gain control, and a 50,000-ohm resistor is brought in series with the r.f. gain control, which biases the r.f. and both i.f. valves to cut-off. This mutes the early stages of the receiver, but to prevent any possibility of breakthrough by strong signals, the detector diode is

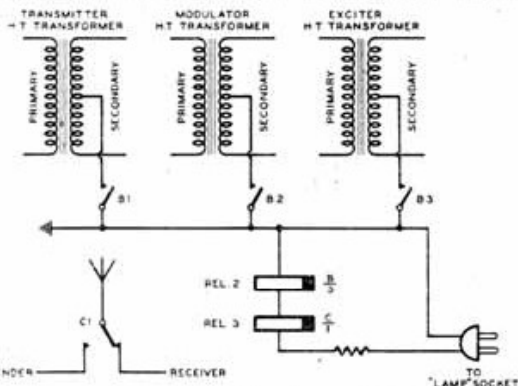


Fig. 3. Method of connecting external relays for send/receive switching of transmitter and aerial.

COMPONENT LIST

C10c: .01 μ F. mica.	R1c: 100 ohms $\frac{1}{2}$ -W.
C11j: .1 μ F. tubular	R10b: 20,000 ohms $\frac{1}{2}$ -W.
C14a: 100 μ F. mica	R11c: 100,000 ohms $\frac{1}{2}$ -W.
C22a: 4 μ F. paper	R13a: 1,000 ohms $\frac{1}{2}$ -W.
J1a: Line jack	R16a: 15,000 ohms 3-W.
J2a: Phone jack	R17c: 500 ohms $\frac{1}{2}$ -W.
*J3a: Microphone jack	*R19a: 1 megohm $\frac{1}{2}$ -W.
L.S.: Loudspeaker	*R20a: 50,000 ohms $\frac{1}{2}$ -W.
S4a A.F. Filter (D.P.D.T.)	Rel. 1a: Internal relay,
S5a: Limiter (S.P.S.T.)	2,000 ohms
S5b: Sidetone (S.P.S.T.)	T2a: Output transformer
S5c: Loudspeaker	VR1a: R.F. gain 4,000
(S.P.S.T.)	ohms
*S8a: Send/receive	VR2a: A.F. gain
(D.P.D.T.)	$\frac{1}{2}$ -megohm
V2b: AR21 (EBC33)	VR3a: Tel. output 500

* Components added in modification.

earthed by means of the internal relay.

In use, the line jack is connected to the modulator input either through a step-up transformer (line output impedance is 600 ohms), or into the cathode circuit of the first modulator valve. A gain control will be needed in the main modulator.

The cutting-off of the r.f. and i.f. valves on "send" saves some 15 mA. of h.t. current, which can be used, if desired, to operate high-resistance low-current relays for switching on and off the transmitter, exciter and modulator, and also for changing over the aerial from transmitter to receiver. One multi-pole relay should suffice for transmitter switching, with a change-over type for aerial switching. These should be wired in series with each other and with a resistor of suitable value and wattage rating, and be connected to a plug which is inserted in the former *Lamp* socket on the test panel (Fig. 3). Putting the send-receive switch to "send" will cause these relays to operate.

If the built-in 3-inch speaker is not required for reproduction, it can be disconnected and wired through a suitable step-up transformer as a moving coil microphone, in place of the microphone jack described earlier.

The modification can be completed in a few hours. The only tricky part (if it can be so called) occurs in modifying the wiring at the a.f. gain control—but a pencil-bit soldering iron may be used here to advantage. The time and effort spent is amply repaid by the simplified station control provided, and the saving in expense of a pre-amplifier and power supply.

In conclusion, the writer's thanks are due to G3FFZ for kindly lending the R107 manual, as it was in studying this that the idea and method of modification originated.

Mr. W. A. Scarr

THE Immediate Past President (Mr. W. A. Scarr, M.A., G2WS) has been appointed British Council Representative for North-East India and expects to sail for Calcutta on September 27.

During his tour of duty abroad Mr. Scarr hopes to have many opportunities of furthering the work of the Society and of Amateur Radio generally. He also plans to continue his v.h.f. activities.

Mr. Scarr takes with him the best wishes of all members.

Congratulations

MEMBERS who know them, will wish to join in congratulating Past President E. Dawson Ostermeyer, G5AR, and Mrs. Ostermeyer, of South Woodford, London, E.18, on their Golden Wedding, celebrated on July 23 last.

Mr. Ostermeyer was Honorary Treasurer of the Society for many years and was President in 1937. He was elected an Honorary Member in 1938.