

Modifications to the 'Trio' 9R-59DE Communications Receiver

by

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A deservedly popular communications receiver amongst amateur operators is the imported 'Trio' model 9R-59DE, which provides continual coverage from 550kHz to 30MHz. The manufacturers of this receiver make provision for possible changes and additions by the owner, and this article describes a series of modifications which can improve an already acceptable receiver performance

BEING IN NEED OF A GENERAL COVERAGE RECEIVER the writer purchased a 'Trio' Model 9R-59DE. The specification appeared to be what was desired and the price was right. Experience during operation confirmed that this choice was a good one, the receiver being both sensitive and selective. The workmanship is of a very high standard. For about twelve months the temptation to carry out modifications was resisted, but there was some distortion when the receiver was used for broadcast stations and also a fairly high level of hum. It was decided to tackle the distortion and hum problems in the first instance; and then, having done this, to see what other modifications could be carried out with a view to improving an already good performance.

POWER SUPPLY SECTION

On examination of the circuit it was noted that resistance-capacitance smoothing was used in the main h.t. line. (See Fig. 1.) In addition to being a cause of hum, the 2.2k Ω smoothing resistor also gave rise to a fairly large change in h.t. rail voltage on operation of the r.f. gain control. It was therefore

proposed to substitute an l.f. smoothing choke in place of the 2.2k Ω resistor. The choke chosen was 10H 90mA. There was room for this to be mounted on the side of the chassis, underneath and close to the existing smoothing components. This necessitated drilling two small holes in the chassis to receive the 4BA fixing bolts. The choke was then wired into circuit in place of the main 2.2k Ω smoothing resistor and the anode of the output valve taken to the further side of the choke.

The output valve, a 6AQ5, seemed rather large for the amount of power necessary in a set of this type and after examination of valve tables it was decided to use an EL95 as a substitute; there being no need to alter the wiring to the valveholder. This valve takes a smaller heater current and the bias resistor installed in the receiver is of the correct value. The output transformer matching (7k Ω) is a little on the low side for the EL95 which requires 10k Ω . However, this was not considered to be serious and in practice the new valve proved to be satisfactory. When measurements of gain were taken on the audio side, it was found that with the EL95 fitted there was a

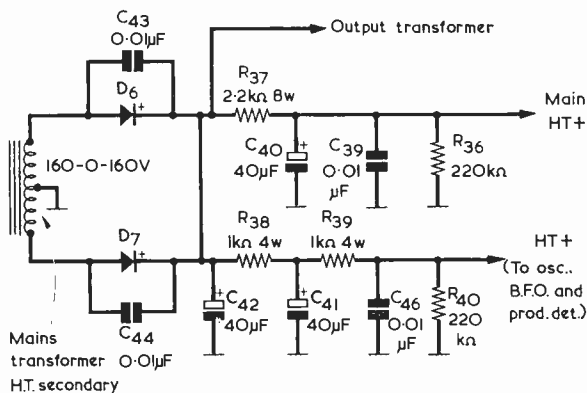


Fig. 1. The existing power supply circuit

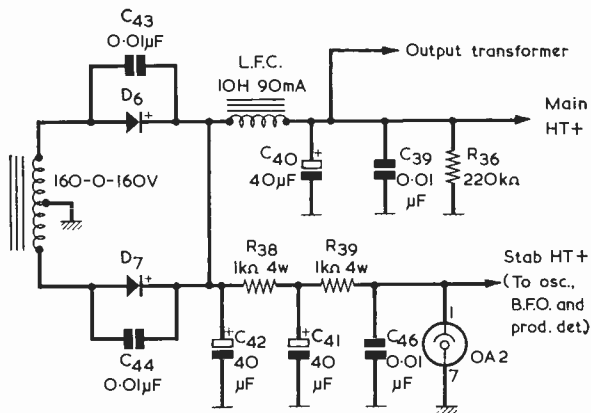


Fig. 2. The power supply circuit after modification

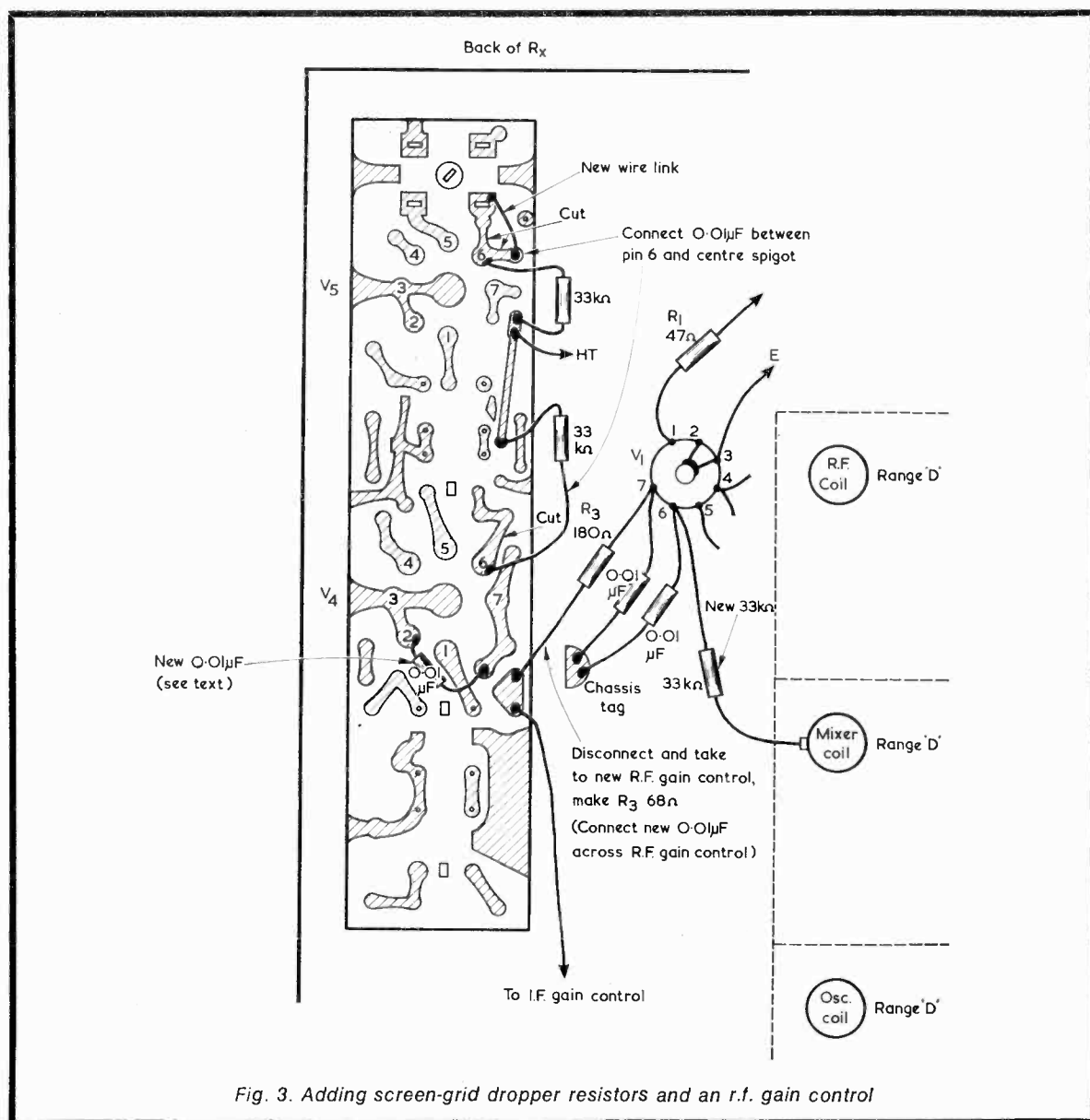
THE RADIO CONSTRUCTOR

voltage gain of 5.5dB over the original 6AQ5. The distortion had now been removed and the hum reduced to a satisfactory level. The reason for the distortion was that with the r.f. gain control at maximum, the screen-grid of the output valve had only 150 volts. When the r.f. gain control was turned towards minimum, the level of distortion decreased as the voltage on the screen-grid of the output valve increased to 200 volts. The regulation of the power supply now being considerably improved, it was felt that it would be worthwhile to add a stabiliser valve to the supply for the oscillator, b.f.o. and product detector. The addition of such a valve is described in the manual for the receiver and a valveholder is provided, already wired up, for its use. All that is necessary, then, is to insert the valve, this being an OA2. Fig. 1 shows the original smoothing circuit and

Fig. 2 the circuit after the foregoing modifications have been carried out. (Fig. 2 also shows R40 deleted, this point being dealt with later in this article.)

SCREEN-GRID RESISTORS

It was next decided to use screen-grid resistors for the r.f. and both i.f. valves; these being the more necessary in view of the higher voltage available. Accordingly 33kΩ resistors of ½ watt rating were installed on the printed circuit board for the i.f. valves and between the coil unit and the r.f. valve. In the case of the i.f. valves this required the cutting of the printed circuit and the provision of additional 0.01μF capacitors. The r.f. valve already has this capacitor wired to the valveholder. Fig. 3 should be referred to in order to see how the printed circuit



pattern was cut and amended.

Having made this alteration it was noted that there was a trace of instability at the first i.f. valve. This was cleared by wiring an additional $0.01\mu\text{F}$ capacitor across the bias resistor. No attempt was made to alter the bias resistors of the i.f. valves as it was thought that this would alter the working of the "S" meter. Further, it was feared that trouble with instability might result if more gain were attempted with these valves.

R.F. GAIN CONTROL

It was next decided to separate the r.f. and i.f. gain controls which in the original are common. On examination it seemed that the best way to effect

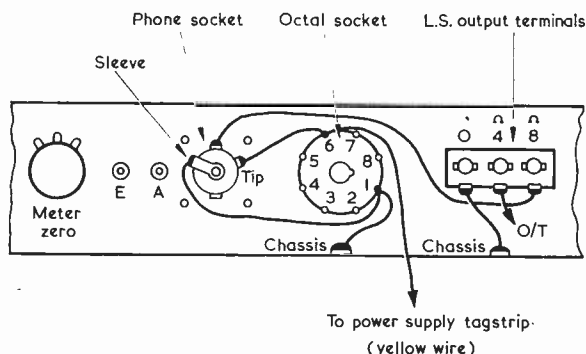


Fig. 4. Connections to the phone socket when this is mounted at the rear

COMPONENTS

Resistors

(All fixed values $\frac{1}{2}$ watt 10%)

68 Ω	1 off
330 Ω	1 off
22k Ω	1 off
33k Ω	3 off
100k Ω	1 off
470k Ω	1 off
10k Ω	potentiometer, linear, 1 off

Capacitors

30pF	silver-mica 1 off
$0.01\mu\text{F}$	400V wkg. 6 off (possibly 7, see text)

Choke

10H 90mA 285 Ω . Radiospares 'Hygrade', Cat. No. CLF25 (Home Radio)

Valves

OA2
6BA6

Sockets

B7G valveholder
Crystal holder

Crystal

2-pin crystal (frequency as required)

Miscellaneous

Knob (to match 'Ant. Trim') (Eagle Products)
Connecting wire, etc.

this would be to transfer the phone socket to the small plate at the back of the chassis and in its place to substitute the a.f. gain control. The r.f. gain control was moved to the place previously occupied by the a.f. gain control and was labelled 'I.F. GAIN'. A new 10k Ω control was then fitted in the upper position to form the r.f. gain control. It should be noted that the hole has to be enlarged slightly by means of a round file as the original controls are not of standard $\frac{1}{8}$ in. fixing. This operation is best carried out with the set turned on its side in order that filings do not fall into the receiver. On studying the printed circuit panel and Fig. 3 it will be apparent how the connection to the new r.f. gain control should be made. The lead from R3 connects to the end of the potentiometer track which has zero resistance to the slider when the spindle is turned fully clockwise, and the slider connects to any convenient chassis point. A new $0.01\mu\text{F}$ capacitor connects across the new r.f. gain control. The opportunity should also be taken to reduce the bias resistor, R3, for the r.f. valve from 180 Ω to 68 Ω .

A small square piece of aluminium is shaped and drilled to take the phone socket already referred to and reference should now be made to Fig. 4 for the new connections to this socket.

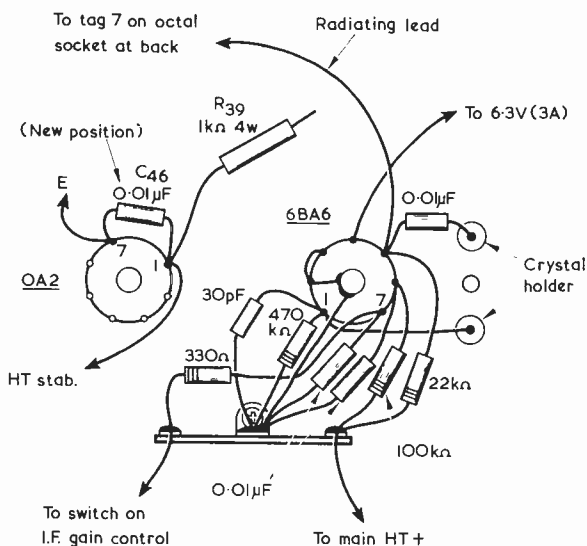


Fig. 5. Layout of components around the added OA2 stabiliser and 6BA6 crystal calibrator stage

OSCILLATOR STABILITY

It was found that only a slight jar was needed to alter the pitch of the b.f.o. and this proved to be an annoyance when receiving s.s.b. signals. Accordingly, an examination was made of the oscillator section of the receiver. It was noticed that the wiring to the switch wafer associated with the oscillator was such that it could take up differing positions from time to time. A few minutes spent with a pair of tweezers in rearranging the wiring enabled this disadvantage to be overcome. The red lead carrying the stabilised h.t. across the receiver should also be anchored to the chassis flange by means of adhesive at the same time.

THE RADIO CONSTRUCTOR

CRYSTAL CALIBRATOR

Lastly, it was decided to install a crystal calibrator, for which provision is made in the receiver in the form of a cut-out for the crystal and valveholder. On mounting these two components it was noticed that the 220k Ω bleed resistor R40 and 0.01 μ F capacitor C46 were standing foul. There being another bleed path via R36, it was decided to remove the resistor and to rewire the capacitor clear of the valveholder. The circuit adopted for the crystal calibrator was that recommended in the handbook for the receiver and reference should now be made to Fig. 5 for the wiring to the tagstrip which is already installed in

readiness by the manufacturer. The writer used a 1MHz crystal, and it was found necessary to extend the radiating lead across to a spare tag (No. 7) on the socket at the rear of the receiver in order to obtain a satisfactory marker at 30MHz.

These modifications by no means exhaust the possibilities with this receiver, but if they are carried out it is hoped that owners will find that they have improved performance and given more convenient control. The Components List gives details of the new parts required when *all* the modifications are carried out. Obviously, not all the components listed will be needed if only some of the modifications are undertaken. ■

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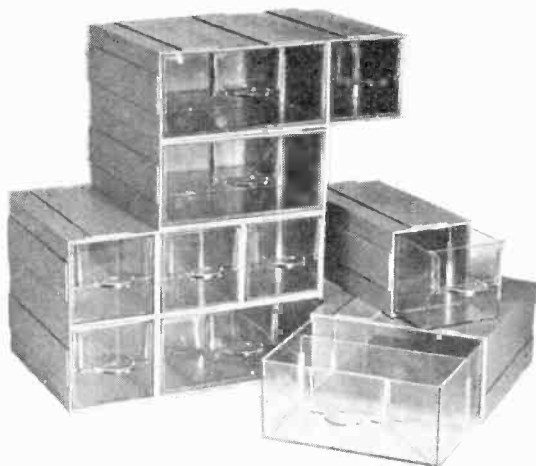
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