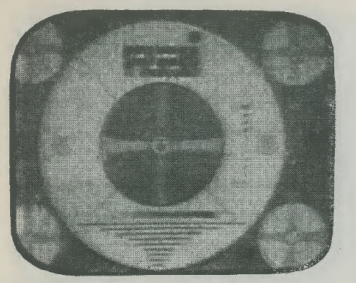


Test Card, Italy. 1960. 53.75 *Mc/s*

fitted approximately 8 feet above chimney level on a 2-storey house.

Camera

Photographs of received pictures are taken direct from the c.r.t. screen. The camera used is an Ilford "Sportsman" with "Vario" lens. Aperture and shutter speed settings are 2.8 and 1/50 sec. respectively. Focus is set to 3½ feet, from which distance all photographs are taken. The film is Ilford HP3. The camera is held in the hand whilst photographs are being taken, no tripod being employed. It is found convenient to have the room in which photographs are taken as fully blacked out as possible.

Picture Quality

The photographs accompanying this article have been chosen from a very large selection held by Mr. Beckett. Test and caption cards, rather than programme material, have been singled out, as these allow ready identification of source.

It will be seen that, in all the photographs reproduced here, horizontal definition is rather low, this being obviously the result of employing an unmodified 405 line i.f. strip. There is, also, foldover on the left hand side. This latter is due to the simple nature of the line time-base modifications. (A retrace time suitable for the British blanking period, after the leading edge of the line sync pulse, of approximately 16.5μS is too long for the equivalent 625 line blanking period of approximately 10μS.)

Patterning is evident on some of the pictures. The cause of this is not known.

Sound Reception

Although his receivers are not modified for f.m. sound reception, Mr. Beckett has still obtained reception of the sound accompanying the Continental video signals. The quality of such signals is surprisingly acceptable, discrimination presumably taking place on the skirts of the sound i.f. response curve. Since the Continental sound carriers are above the vision carriers in each channel (whereas British sound carriers are below), it is impossible to receive the sound and vision signals of a single channel simultaneously on the modified receivers.

Caption, Spain. 19*th July*, 1960. 48.25 *Mc/s*

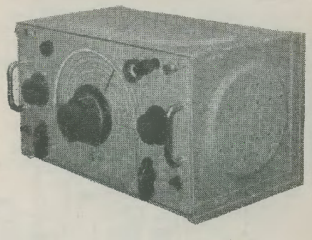
Programme, Italy. 9*th July*, 1960. 53.75 *Mc/s*

Television DX

This report has given details of what seems to be almost phenomenally good television Dx. And yet none of the equipment employed is in any way unconventional. Indeed, one of the receivers can be modified from 625 line back to 405 line operation merely by removing an adaptor.

The Radio Constructor would be interested to hear of any other instances of long distance t.v. reception. Where possible, brief details of such reception may be published in future issues.

The R1155 as a General Purpose Receiver



By D. Easterling **Part 1**

THE R1155 RECEIVER IS A COMPREHENSIVE communications set, used by the R.A.F. during the last war with some probably still in service. After the war many came on to the surplus market, rapidly becoming popular with Short wave listeners and filling a gap until new and more specialised equipment was available. Fifteen years later R1155's are still obtainable at various prices according to their condition, and although less suited to amateur band operation than the specialised types now in favour among enthusiasts, they are still a good buy for a workshop receiver; or, for the serious broadcast listener who wishes to supplement f.m., as a means of receiving foreign stations through all the clatter now inhabiting the bands, when conventional broadcast receivers fail miserably.

Unmodified, the R1155 receiver is a superhet having ten valves including the magic eye tuning indicator. The line up is as follows:

Pentode r.f. stage.
Triode-hexode frequency changer (oscillator-mixer).
Two pentode i.f. stages.
Double diode triode detector and a.f. output stage.
Double diode triode a.g.c. and b.f.o.
Three stage direction finding circuit.

No internal power supply unit is fitted, and the output stage is suitable for headphone use only; thus usual modifications concern the removal of the unwanted d.f. stages, and the introduction of suitable power and output stages. The simplest method of overcoming these problems is to construct a separate external unit which provides both the required facilities and which can be plugged into one of the Jones sockets on the front of the receiver, the unwanted d.f. circuits being simply ignored. This scheme was originally used by the writer, but recently some maintenance had to be carried out and it was then decided to remove all unwanted circuits (a source of spare components), using the space provided to mount the power and output sections. At the same time, the receiver's general appearance was improved by fitting a new front panel over the existing one and drilling only the required control apertures, some of these controls being moved to produce a more symmetrical layout. On completion of this work, results exceeded expectations, and it was decided that although the subject has been covered by other writers in the past, the modification might be of interest to constructors who have missed these previous articles.

Before proceeding with the process of modification it may be as well to discuss general circuit details.

Fig. 1 shows the circuit after modification. It will be seen that the aerial socket is connected to two leads, each going via a condenser to a separate wiper in the wave-change switch assembly. Originally, these leads were kept completely separate, with the lead from C_1 going to a fixed aerial on the aircraft, and used for the top three frequency ranges; while that from C_2, used with a long trailing aerial, connected to the two low frequency ranges. Connecting them together, therefore, enables one aerial system to be used for all bands. In addition to the above there was also provision for a low impedance d.f. loop, but this is now ignored.

Focusing attention to the tuning heart (shown enclosed by the broken line), it will be realised that in the receiver this is contained in the long rectangular metal housing below chassis at the rear, with associated valves and r.f. transformers mounted immediately above. The tuning heart circuit illustrated is, of course, a simplified one with the coils of only one range shown, with certain filters and coil shorting ci

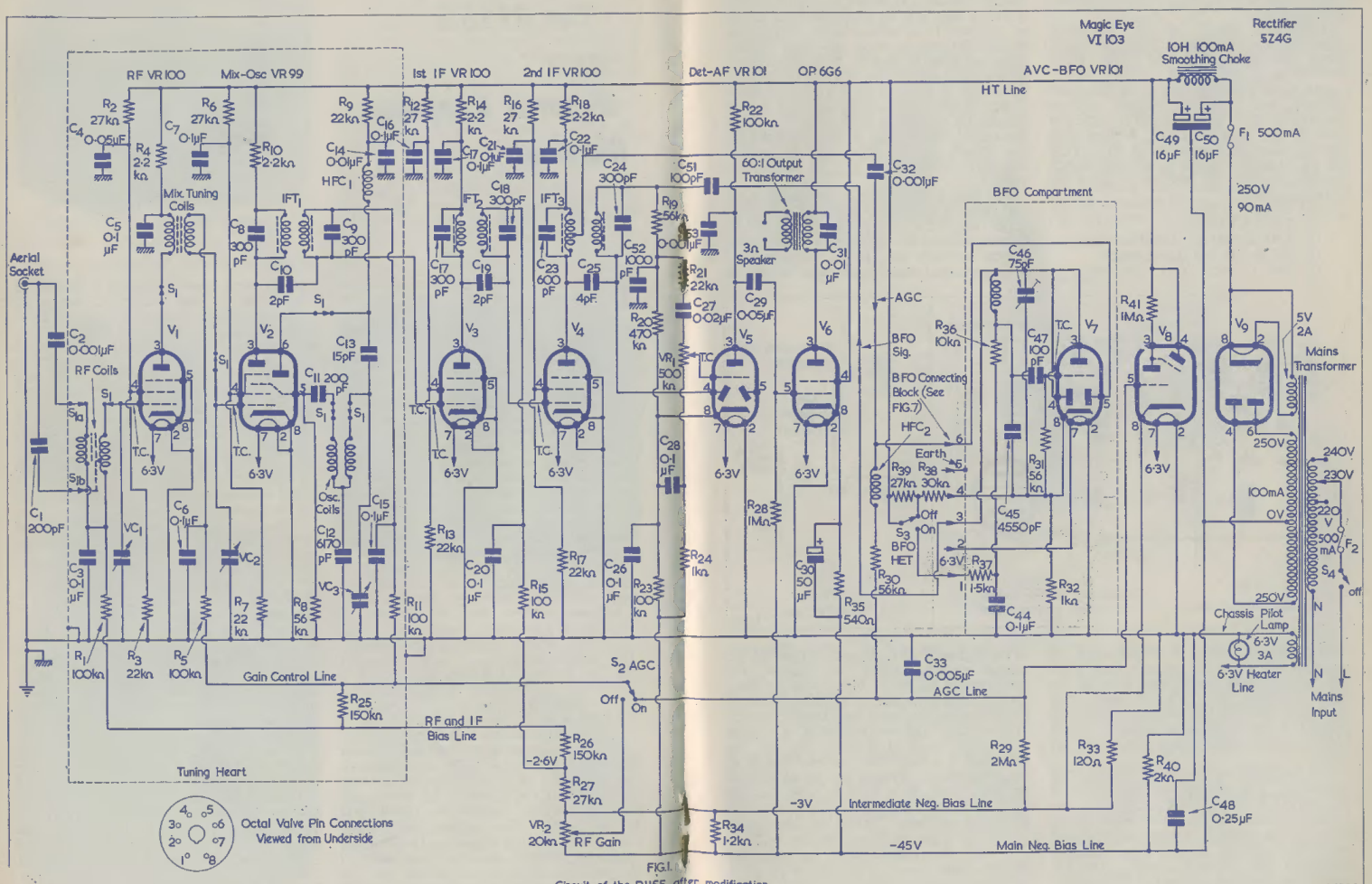


FIG.1. Circuit of the R1155 after modification

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..d. It is felt that a simplified circuit is justified in this case, as the interior of the unit plays no important part in the modification procedure.

Transformer input on low frequency ranges, and tapped grid coils on the higher ranges are features of the aerial input connections to V_1, the r.f. stage. The r.f. stage is transformer coupled to the frequency changer, V_2; with the hexode section functioning as a mixer-amplifier and the triode as the local oscillator. A three-gang tuning condenser, consisting of VC_1, VC_2, and VC_3, together with a wavechange switch assembly, enables the receiver to cover the following ranges:

(1) 18.5 to 7.5 Mc/s.
(2) 7.5 to 3.0 Mc/s.
(3) 1,500 to 600 kc/s (Medium wave).
(4) 500 to 200 kc/s (Long wave).
(5) 200 to 75 kc/s (Very Long wave).

being applied to the grid of V_5 triode acting as the first a.f. amplifier. The original system, however, is shown in Fig. 2, where it will be seen that an additional filter could be switched in to reduce audio frequencies below 300 c/s in order to limit locally generated noise in aircraft. With the original arrangement, also, the output was taken from the anode of V_5 via a small 1:1 transformer to one of the Jones sockets, and had a level suitable for headphone operation. The above mentioned transformer is now replaced by the anode load resistor R_{22} to permit capacitive coupling via C_{29} to the output valve V_6.

The 6G6 output stage is completely new, and replaces the double triode d.f. switching stage originally occupying the position. Output suitable for operating a loudspeaker is now available and, for an impedance of 3Ω, the output transformer ratio should be

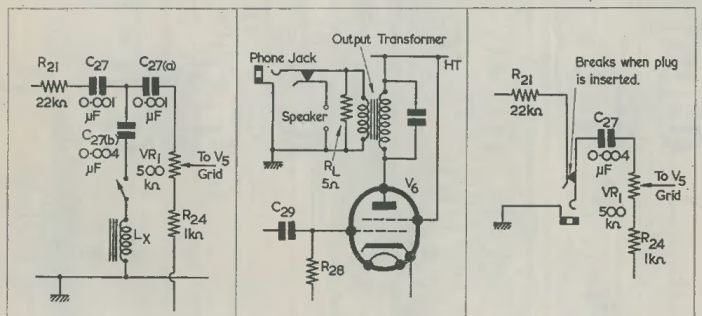

FIG.2 Bass Filter Circuit

FIG.3 Fitting a Phone Jack

FIG.4 Inserting P.U. Jack

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Of particular interest to constructors are receivers with the suffix letters L (steel case) and N (aluminium case) since, in these, the frequency range 200 to 75 kc/s which is of very little use to the average listener is omitted, a new range covering the 3 to 1.5 Mc/s (Trawler Band) being inserted in its place.

The remainder of the circuit is illustrated completely, and shows two i.f. amplifiers (V_3 and V_4) feeding, via i.f.t.3, the demodulator circuit of V_5 and the a.g.c. circuit of V_7. In the case of V_5 a single diode is used since the second diode was originally associated with the d.f. system. The a.f. output is developed across the filter circuit R_{19}, R_{20} and R_{21}. In the circuit illustrated in Fig. 1, the a.f. is fed via C_{27} direct to the volume control VR_1; the controlled output

jack may be inserted. Of course, the a.f. stages cannot be considered hi-fi, nor does the inclusion of this facility turn the receiver into a radiogram; nevertheless the facility does prove useful on occasion for test purposes.

Valve V_7 is another double diode triode, and is mounted with some associated components inside a screened box located above chassis to the left of the tuning dial. The double diodes, wired together, rectify the carrier to produce a d.c. voltage suitable for a.g.c. purposes. The triode section, in conjunction with the tuned circuit using L_{22}, operates as a series fed Colpitts oscillator, and when switch S_3 (HET) is on, a c.w. signal of about 280 kc/s is applied to the final i.f.t. Its second harmonic, beating with the signal

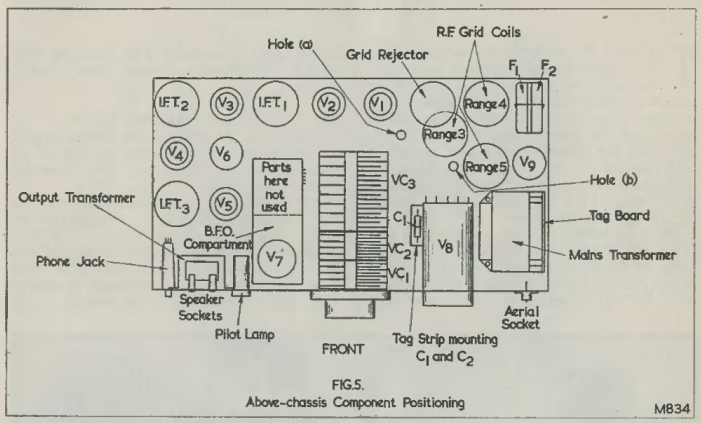

FIG.5. Above-chassis Component Positioning

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carrier (converted to i.f. at 560 kc/s), produces an audible note. The tone can be adjusted by the pre-set capacitor C_{46}.

The b.f.o. facility described above enables an unmodulated c.w. signal to be easily read. Even if the constructor is not interested in c.w. reception, however, the device is worth retaining since it is often useful when calibrating a signal generator or other r.f. oscillator.

The R1155 receiver is very sensitive, consequently the gain control circuits need to be fairly comprehensive. In the original arrangement, the master control switch allowed for two possible systems: automatic volume control, and manual control from the r.f. gain control VR_2. These alternatives were a part of the master control switching, but in the modified arrangement a simple two-way switch provides these two facilities only. Incidentally, in the original arrangement the r.f. gain control was ganged to the volume control VR_1 but, in the rebuild, separate controls are used, following normal communication receiver practice. As with the previous system, the a.g.c. voltage is also used to control the Magic Eye shadow; thus the reception of a signal will produce an a.g.c. voltage and close the shadow.

The power supply unit is a conventional transformer-fed full wave rectification h.t. arrangement; the mains transformer also containing two low voltage windings to provide current for the rectifier filament, and other valve heaters. Notice that the negative h.t. line from the centre tap on the transformer secondary is taken to a negative bias rail, not direct to the chassis. The potential difference across resistors R_{40}, R_{34} and R_{33} is used for the gain control and biasing circuits.

From the above circuit description it will be seen that the modification incurs the use of very few additional components; these being the mains transformer, rectifier and output valves, smoothing choke, output transformer, plugs and sockets, front panel; and condensers shown marked on the drawing as C_{49}, C_{50}, C_{30}, C_{48} and C_{29}. The last two condensers are paper tubular types, replacing the bulky canned types originally installed.

The insertion of a power output stage and power supply unit raises the operating temperature of the receiver. This problem is overcome by providing two rows of $\frac{1}{4}$in ventilation holes, spaced 1in apart, at the top and bottom of each side panel.