MODIFYING THE GC1U RECEIVER. Part 2.

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In this concluding article constructional details are given of the added product detector.

THE ARTICLE PUBLISHED IN LAST MONTH'S ISSUE described a new stabilized mains power supply unit for the popular GC–1U receiver and covered the replacement of the existing fixed resistors with high stability types. The additional product detector circuit was next discussed and a Components List showing the new parts required was published. In the constructional details for fitting the product detector which now follow it will be necessary to refer to Fig. 5, which appeared in the previous issue.

CONSTRUCTION

The construction of the product detector is quite straightforward, the complete circuit, except for C8, being mounted on a piece of Veroboard. Component layout, dimensions and bracket mounting details for the Veroboard are given in Fig. 7. No extra controls or holes are required on the front panel and no drilling of the chassis is necessary.

The completed Veroboard is mounted vertically by means of two U-shaped brackets fitted to the inside edge of the receiver i.f.–a.f. printed board. The existing 6BA screws which fasten this board to the chassis are used. An aluminium bracket along the bottom of the Veroboard fixes the board to the two mounting brackets. Full details are given in Fig. 7. As will next be described, S1 and R47, the latter with its new value of 1kΩ, are mounted. The existing b.f.o. frequency control is removed, the wiring on the control and rear switch being first unsoldered.

To make room on the front panel for S1 the aerial trim control is removed. This means that the aerial trimming capacitor has now to be pre-set for optimum matching with the particular aerial used. This control was of little practical use, particularly if an aerial coupling unit was used and, due to its position in the circuit, caused a noticeable frequency shift on the h.f. bands. The removal of its variable function is, in some respects, something of an advantage. The ¼in. fibre spindle is removed from the capacitor coupler and the brass bush set in the front panel is unscrewed. S1 is mounted in place of this bush.

The 4.7pF b.f.o. coupling capacitor (C60) is removed from under the receiver i.f. printed board. R54, the

The new function switch, S1, is fitted in place of the panel bush for the aerial trim control

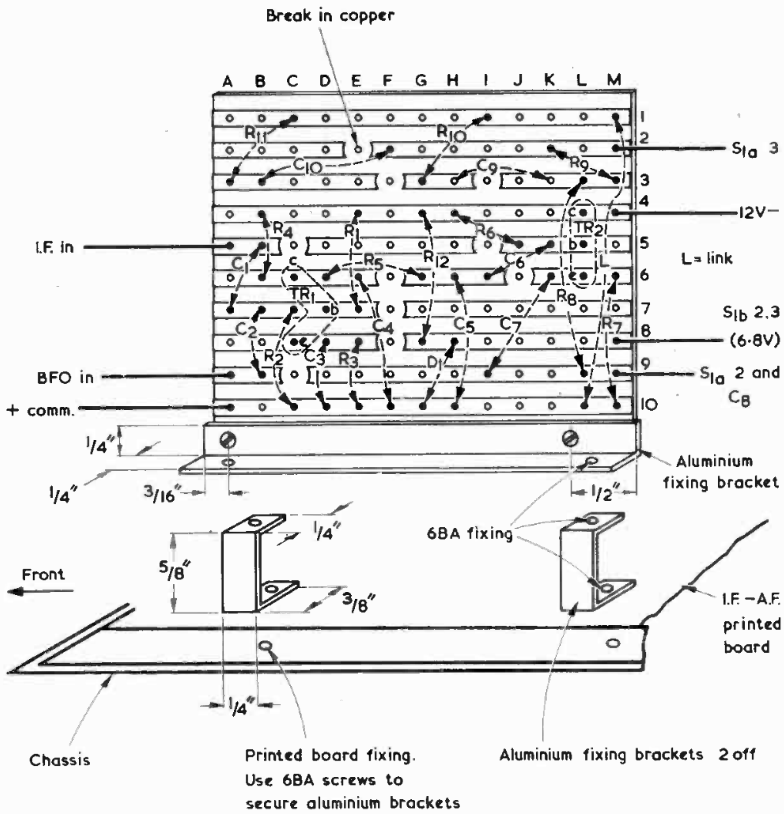
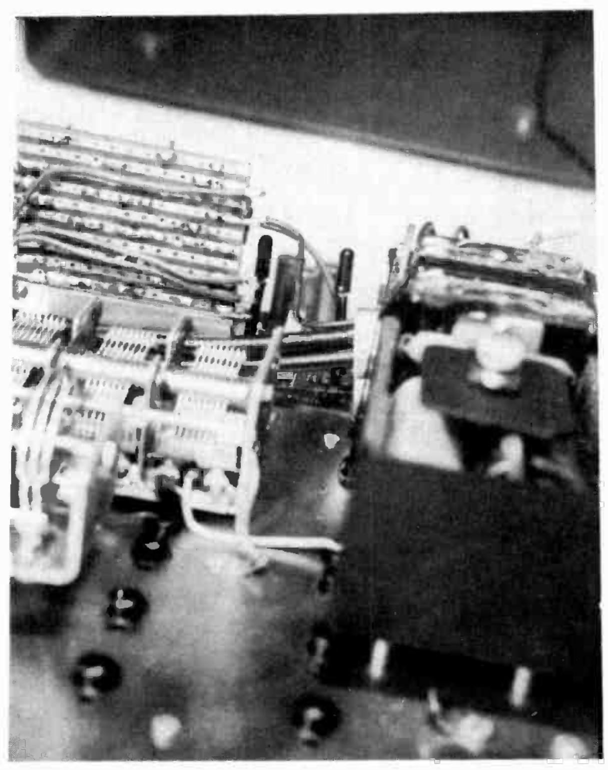


Fig. 7. The copper side of the Veroboard on which the product detector components are fitted. Also shown are fixing details and the mounting brackets required

1.5kΩ resistor which is wired between the b.f.o. potentiometer R47 and an earth tag on the rear of the front panel is replaced by the new 2.2kΩ resistor. The new 1kΩ potentiometer which replaces the old 2kΩ R47 is mounted at the same time. Next, the output from I.F.T.2 (a.m. detector output) which passes to one end of the a.f. volume control is disconnected from this control and wired to the appropriate point on S1(a). The output from S1(a) arm is then wired to this same point on the a.f. volume control. This completes the receiver modifications, leaving only the few interconnection wires to be put in.

The i.f. input to the product detector is taken from the emitter tag of transistor X6 on the top of the i.f. printed board. The b.f.o. input to the detector is taken from the b.f.o. output tag, one end of which can be found on top of the i.f. printed board adjacent to the top-right hand corner of the b.f.o. coil (L16), as seen looking from the front panel. It is next to the 62kΩ resistor (R55) and labelled 'B.F.O.3'. These leads should be short, direct and kept away from other components.

The 12 volt supply is now wired to the Veroboard and the appropriate outputs, including the 6.8 volt b.f.o. supply, taken from this board to S1. The replacement R47 b.f.o. control is also wired in. The wire carrying the old b.f.o. d.c. supply which was disconnected from the old b.f.o. switch is cut short and taped up. The other supply lead from the original switch is extended so as to reach the appropriate point on S1(b). C8 is wired between S1(a) and the adjacent earth tag on the rear of the front panel. (See Figs. 5 and 7.) This completes the additional wiring.



A view of the copper side of the Veroboard panel. Also visible to the right is the new power supply fitted in the battery box

SETTING UP

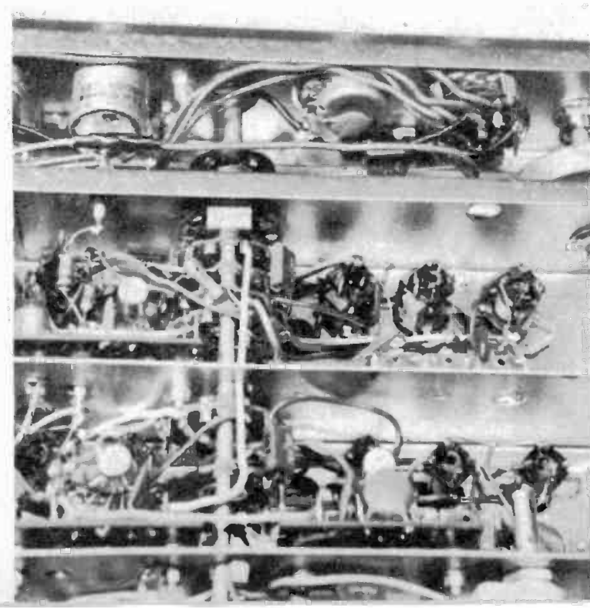
The receiver can now be set up, no instruments being required for this process. Switch on and set S1(a)(b) for a.m., tune in a known station and note that the signal level has not changed compared with pre-modification level. Next switch to the h.f. band most used and adjust the aerial trimmer (which is now pre-set) for maximum output. This should be done using either the internal whip aerial or the external aerial normally employed with the receiver. The tuning indicator meter can be used for signal strength comparisons during these tests.

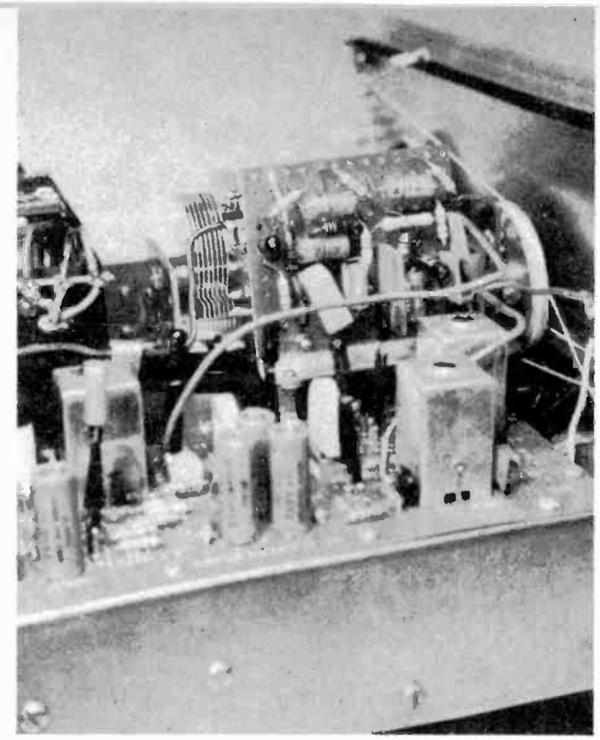
Now, using the tuning meter, tune in a station with a strong carrier for maximum output. It is essential that this signal be tuned in exactly and not slightly off to one side or the other. Next, set S1(a)(b) to position 2 and reduce the r.f. gain. Set the b.f.o. control (R47) to mid-point and adjust the core in the b.f.o. coil (L16) for zero-beat. This should be done with great care, removing the trimming tool at intervals to ensure there is no shift in frequency due to external stray capacitances. This coil should be tuned for exact zero-beat with R47 in the centre position.

The receiver can now be tried out on some s.s.b. signals. These should be tuned in with R47 in its centre position, a.v.c. off, a.f. gain at or near maximum and r.f. gain adjusted to suit signal strength. With the required station exactly in tune on the main and bandspread controls, the final tuning is resolved by slight adjustment of the b.f.o. control. In practice the writer found that in many cases the b.f.o. control could be off-set and the various stations resolved simply by tuning across the band by means of the bandspread control. Under these conditions the r.f. gain control can be adjusted to suit each signal without appreciable effect on the received signal intelligibility.

The circuit allows for some adjustment if the performance is not quite up to expectations. The overall apparent sensitivity can be increased for s.s.b. and c.w. signals by reducing the value of C8. Values as low as 0.1μF can be tried if required. Due to differences which could occur between various receivers, it might be found necessary to increase or decrease the amount of

The fibre spindle for the aerial trim capacitor is removed, and it now becomes a pre-set component





The added product detector Veroboard in position. The relatively bulky rectangular capacitor C7, can be seen near the left edge of the board

i.f. signal input. This is done by increasing or decreasing the value of C1. This capacitor can be safely increased in value to 200pF without having any noticeable loading effect on the i.f. circuit. Increasing C1 too much will, of course, mean that the b.f.o. injection will be insufficient. If it is thought necessary to experiment a little with C1, it should only be increased sufficiently to allow a strong s.s.b. signal to be resolved with the existing b.f.o. injection. Generally speaking, however, C1 should require no adjustment.

OTHER RECEIVERS

As was mentioned at the beginning of the previous article, the product detector circuit of Fig. 5 offers scope for experiment to the interested constructor having another communications receiver which falls into the 'older' category. The circuit should be added to many receivers where s.s.b. facilities are required, though the i.f. and b.f.o. injection levels would have to be adjusted to suit individual sets. Changes in the values of C1 and C2 would effect this. A suitable matching point into the i.f. circuit would also be required, though this should not necessarily prove an insurmountable problem. The other point which is also of importance with any such conversion is frequency stability of both local oscillator and b.f.o. This can often be largely catered for by the use of zener diodes in transistor receivers and neon stabilizers in valve receivers. Any components in these circuits which are temperature sensitive should also be replaced if at all possible.

In conclusion, the modifications described offer a relatively cheap and simple method of up-dating a basically good receiver at a modest cost. The overall improvement in performance is, in the opinion of the writer and several others who have tried the modified GC-1U under operating conditions, well worth the time and expense involved. ■