

Dural or hard-aluminium masts—when the sections are properly bonded electrically—make ideal vertical aeri-als. The insulation of the base is simplicity itself: Get two small Pyrex oven dishes and plant the foot of the mast in one dish, which rests on the other, placed upside down—in other words, the dishes have their bottoms in contact, the lip of the lower one taking the weight and resting across a couple of bricks, a slab of stone, or whatever, and the upper one containing the foot of the mast itself. Even if the upturned dish does fill with water, it will not matter because the fact that it is resting on the other (which is upside down) will result in a long, high-resistance leakage path, entirely adequate for any current-feed system; actually, Pyrex dishes used in

this way will show infinite resistance under almost any conditions. These dishes are extremely strong, and there is no fear of them collapsing under direct pressure, even if your mast is 50 ft. high.

And if you already have a dural mast in position, and have ideas about insulating it at the foot, it is still quite easily done (provided you are using either insulated guys or nylon cord for the mast supports): Simply slack off the guy lines till you can lift the mast, vertically, far enough to slip the insulating dishes underneath the foot. With some intelligent assistance, the whole job can be done in a few minutes. But, obviously, it is no use carrying out these operations at the foot of the mast unless insulating guys are being used.

## THE R.109A SURPLUS RECEIVER

### GENERAL DESCRIPTION — MODIFICATIONS FOR MAINS OPERATION AND TOP BAND WORKING

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THE R.109A receiver was designed as a general-purpose "Army Reception Set" for use with a vehicle-station or at a fixed location, and is fairly generally available on the surplus market, at varying prices.

It is designed to tune over two wave-bands: (1) 2.0-4.9 mc, and (2) 4.9-12.0 mc. Both these bands are directly calibrated on a very good slow-motion dial. An internal speaker is fitted and can be switched out when headphones are being used. In addition, the Rx has a BFO for CW reception and also a crash-noise limiter of the simpler type. A panel socket for a plug-in lamp is provided, for use when working in the dark. The power supplies are incorporated in the receiver, which is designed to run from a 6-volt accumulator; it therefore has a vibrator-HT pack, giving a well-smoothed and filtered 150v. HT. With a 6-volt battery supply, the load is 2 amps.

The valve sequence is as follows: RF, ARP38 (KTZ73); mixer, ARP12 (VP23); oscillator, ARP12; 1st and 2nd IF amp., ARP12; det. and audio, AR8 (HL23DD); output amp., AR8; BFO, AR8. Thus, the receiver uses three different valve types, of which only the KTZ73 is obsolescent, no longer listed. Except for the ARP38, all valves are directly heated. (When the writer obtained his R.109A, it was complete with a spare set of valves and a spare vibrator.)

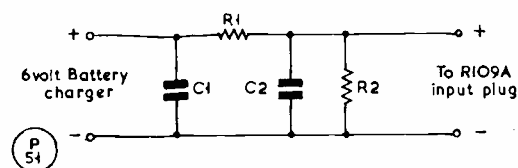
An obvious source of trouble with an otherwise undamaged R.109A is the vibrator, which after long storage (as many of these receivers must have had) becomes inactive. If when first switching on the pilot light shows up but no buzz is heard from the vibrator,

then try the spare, if available; should this also not buzz, then clump it on the palm of the hand until it does! Of some twenty R.109A's that have passed through the writer's hands for testing and adjustment, 16 vibrators went off all right, and the remaining four were started by the "clump-it" technique. The only other fault encountered in this quite large number of R.109A's has been a few valves with broken filaments, and this occurred most frequently in the mixer stage.

Vibrator hash is very low, due to the well-filtered power unit, although noise can be caused if the vibrator contacts are excessively worn (as could be the case with an old, well-used receiver). The only remedy is to try another vibrator.

### Top Band Conversion

In its original condition the R.109A is good only for the 40 and 80-metre amateur bands; therefore, it was decided to get it going on 160m. This conversion is quite simple and takes only a few minutes. The first step is to remove the Rx from its case and place it on the bench, right way up. Set the tuning dial to read 2 mc, with the band-switch in the 2.0-4.9 mc position. Inject a 1.8 mc signal, from any convenient source (such as a crystal oscillator if no sort of signal-generator is available), to the aerial socket, and switch on the Rx BFO; now adjust the oscillator coil for this band, which is the second coil unit from the front panel, on the right-hand side of the chassis. Adjust by turning the core further down into the coil; this should be done gently until the 1.8 mc beat is heard to come in on the speaker; zero this signal to read exactly 2 mc on the Rx dial. Switch off the 1.8 mc



As it stands, the R.109A cannot be operated direct from a mains supply; however, the internal power pack, as fitted, is intended to work from a 6v. DC source, such as a car battery. Hence, this battery can be replaced by a mains-connected 6v. supply, obtained from an ordinary 6/12v. battery trickle charger. But such a unit would require adequate smoothing as shown above, before being fed to the R.109A power input socket. Values are given in the text.

input and turn up the Rx gain control so that hiss can be heard in the speaker.

The next move is to adjust the RF and mixer coils to bring them into correct IF alignment. First set the mixer coil, which is found between the ARP38 RF stage and the ARP12 mixer on the right of the chassis; turn the slug down into the coil until hiss in the speaker is at a maximum. The same adjustment is carried out on the RF stage coil, which is mounted at the far back of the chassis underneath the ARP38. The Rx is then ready for testing on Top Band signals.

It will be evident, of course, that the dial reads 200 kc out all the way along the 2.0-4.9 mc frequency range; it will also be found that the tracking of the oscillator remains linear over the band. To make this clear: The 2 mc mark on the dial is actually 1.8 mc in the Rx, while 2 mc, the HF end of Top Band, reads 2.2 mc on the dial. At the other end of the wave-range, 80m. starts at 3.7 mc on the dial. The 4.9-12.0 mc range is not affected by these re-adjustments.

On 160 metres, the performance of the R.109A is very good and, in fact is found to be better than the writer's CR-100. And the R.109A also has the advantage of being an extremely useful Rx for /P work, because it can be run from a 6-volt car battery.

#### Operation Off Mains Supply

Due to the fact that all but one of the valves in the R.109A are directly-heated types it is not possible to connect a normal AC power supply to the set. What is required to get the Rx working from the mains is a power pack giving 6 volts at 2 amps. of very well-smoothed DC—in other words, a battery eliminator of this rating.

The best way to meet this requirement is obtain a battery charging unit as sold in the emporia of Messrs. Woolworths! These are standard items giving either 6v. or 12v. at about 4 amps. The tapping to use is that for 12v., because the DC output from the charging rectifier must be passed through a smoothing filter, which will cause a voltage drop to around 6 volts. The necessary smoothing circuit (see p.315) can be very easily built into the battery charger container. It is a conventional arrangement with large-capacity smoothing condensers, readily available in these low voltage ratings. The choke or smoothing resistor R1 is, in the writer's case, no more than a DC bell coil with a resistance of about 5 ohms; whatever sort of choke is used, it must be capable of passing 2 amps. and should be wound with heavy gauge wire, of 16g. or so, as the rating is of the order of 20 watts. The resistor R2 is necessary to ensure that the voltage output remains constant under the varying vibrator load; it should be rated at 15w. Condensers C1, C2 are of 1000-1500  $\mu$ F, 15v. working.

#### Conclusion

Those who go in for an R.109A will find that it is a very useful and robust receiver, capable of giving excellent results on the three LF amateur bands (when modified for 160m. as described here) and suitable for either portable or mobile work with a 6-volt battery, or off the mains with a battery-eliminator type of DC supply, as explained.

#### PAST QUESTION PAPERS—R.A.E.

Those taking the next Radio Amateurs' Examinations, in November or May, are reminded that sets of question papers for the three years 1960-1962 can be obtained from: Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1, price 2s. post free—and be sure to quote "Subject No. 55" when ordering.

#### SOME CITY & GUILDS STATISTICS

In a recent report on its activities, the C. & G. shows that, for the examination year 1961-62, more than 185,000 students were examined in about 200 different subjects, ranging over the whole field of technology. The diplomas and certificates issued by the City & Guilds are accepted as professional qualifications throughout the Commonwealth, and in many other countries as well. The latest entry figures for the various examinations not only show a large increase on the previous session, but also prove that a great deal of hard work is being done part-time in local technical colleges and evening institutes up and down the country. In addition to Subject No. 55 (R.A.E.), the other radio courses include Electronics Servicing (No. 47); Radio & Television Servicing (No. 48); and the Telecommunication Technicians' Course (No. 49).

#### DIFFICULTY IN SUPPLY

Anent the note "No Difficulty in Supply," on p.256 of the July issue, several people have written in to say that, in fact, it is not as easy as all that—they have trouble in getting SHORT WAVE MAGAZINE on time through their local newsagent. So far as we are concerned, there is no excuse for this, as bulk supplies to order are despatched in ample time for appearance on the due date in the U.K. (Foreign delivery is another matter.) If your newsagent has an order in with his wholesaler (or with us) by about a fortnight before the date of publication (the first Friday in the month), there should be no difficulty. If there is, get him to refer to his source of supply. In every case investigated in the last ten years, it has been shown either that no order has been put through, or that it has been late, or has not been repeated.

#### SIR JOHN HUNT AT THE ARMY APPRENTICES SCHOOL

When recently Sir John Hunt (of Everest) visited the Army Apprentices School, Harrogate—which trains boy-entrants as radio, telegraph, line and radio-relay technicians, as well as operators—he saw the apprentices' Club station G3HKR in action. As it happened, they were in a three-way QSO with G3OIX, also of Harrogate, and G3MUM (Redcar), the hook-up impressing Sir John very much. G3MUM's suggestion that his expedition might have left a two-metre rig "on the top of that hill" went down very well!

G3FGN

For Mobile Rally Programme  
— see pp. 298-299