DEMOTHBALLING the BC-221

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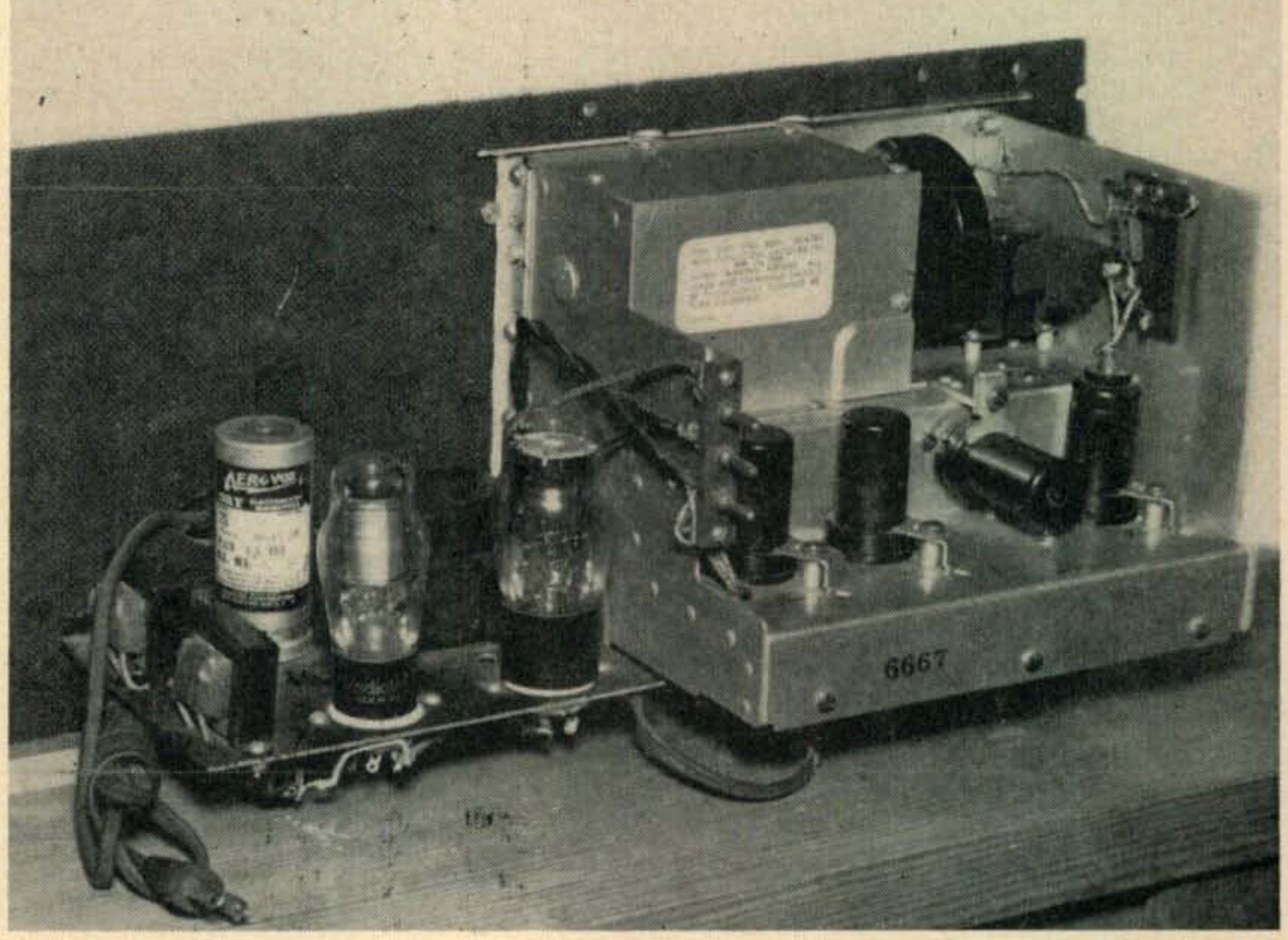

The rear view of the BC-221 with its attendant power supply.

MANY AMATEURS HAVE BEEN FORTUNATE in procuring one of the several types of the SCR-211 Frequency Meter available as World War II surplus. This unit is a wonderful and important addition to any ham station. The mechanical precision and electrical stability inherent in this instrument are such that it would be extremely difficult if not impossible to duplicate by amateur construction.

The nomenclature SCR-211 refers to the complete assembly: frequency meter chassis, batteries, earphones and calibration book contained in its cabinet. When the chassis is referred to alone it is known as the BC-221 and is followed by a letter or letters indicating the model and manufacturer. BC, incidentally, stands for Basic Component, therefore BC-221 is a basic component of the SCR-211.

It is believed that to date twenty five different models of this unit have been manufactured, each containing one or more minor or major improvements over the earlier models. It would thus be quite impractical to show schematics and details. Circuit diagrams will be found in the War Department Technical Manual TM 11-300, July 1944.

The most versatile model is the BC-221-AK made by Philco. This is the only type having a six position switch including "Warm-up" and "MODULATOR" positions. It is not known how many were available over the entire country but in the New York Metropolitan area approximately 800 hams made fortunate acquisitions. These units were packed in factory cartons and it is believed represented "contract termination" material. There were of course no cabinets or calibration books; the units had never been calibrated. All had been treated with fungicidal lacquer and dated.

Power Supply

The problem of power supply is one that must be solved according to the manner in which the instrument is to be used. If it is to be portable, batteries are of course the answer. Those who purchased only the BC chassis may obtain cabinets to fit from various radio dealers. Care must be taken to find the cabinet made for your particular model. Batteries

1104 Lincoln Pl., Brooklyn 13, N. Y.

are of course available. 135 volts of "B" and 6 volts of "A" are required.

In the writers own case, just the BC-221-AK chassis was purchased and was mounted on a rack panel together with a voltage regulated power supply as illustrated. A lighting fixture is mounted over the unit for convenience in a crystal-calibrating installation.

The power supply is of conventional design employing a VR-105 voltage regulator. It was found that 105 volts was sufficient to permit normal operation and this tube was used in preference to a VR-150 on the basis of "cooler operation, better stability". The power supply constants are shown in *Fig. 1.* Take note that if a higher voltage transformer is used the dropping resistor R_1 must be changed accordingly in order to prevent excess current through the VR-105.

The filament supply presented a bit of a problem but was solved by merely applying a.c. and putting up with the resulting hum in the earphones. If the instrument is to be used for long periods at a time the hum might prove to be annoying (depending upon the individual) but for short periods of use the incorporation of a rectifier and filter was deemed unnecessary. For those who would like d.c. on their filaments there are available as surplus small full-wave selenium rectifiers. There is absolutely no hum on the signal when tuned in on a communications receiver, using a.c.

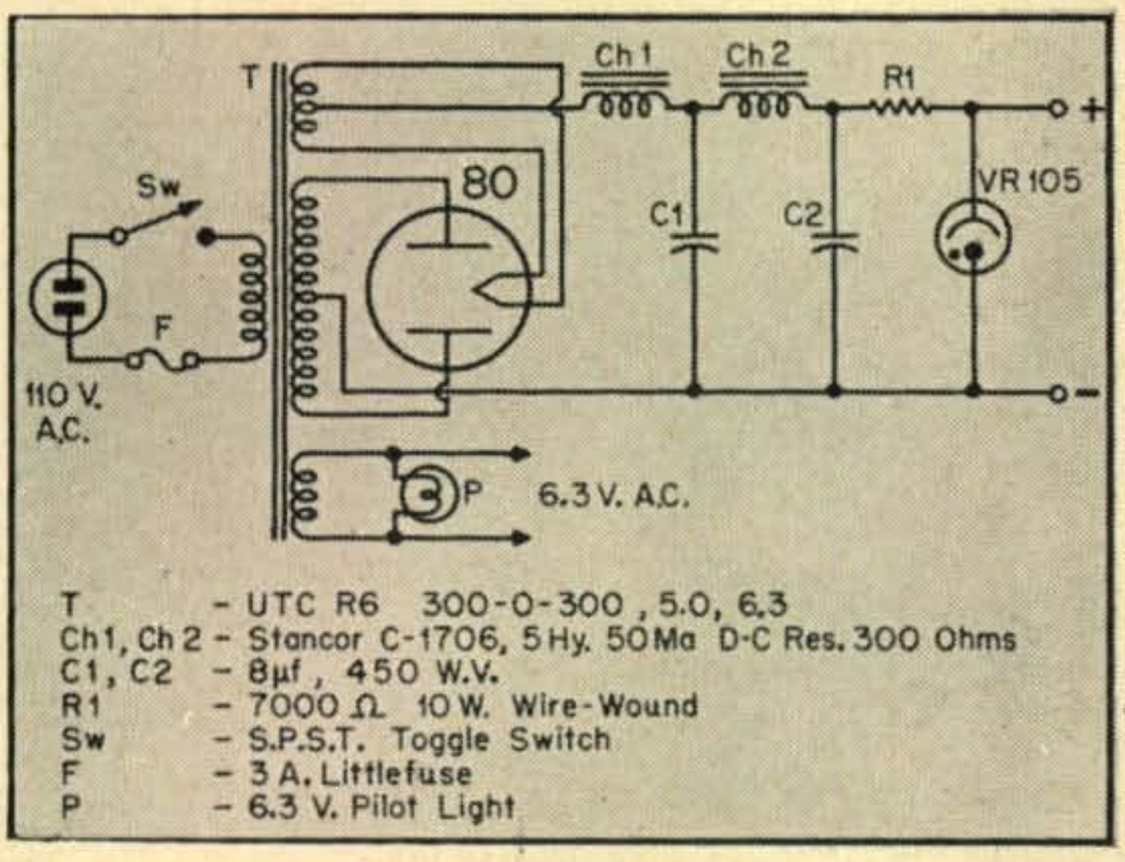

Fig. 1, the simple power supply for a.c. operation of the 221.

Calibration

Calibration presents the greatest problem to those who have purchased these instruments less calibration books. This was no stumbling block to the writer, however, who would have preferred to do his own calibrating in any case for greater overall accuracy.

Some users of this frequency meter were able to obtain blank calibration books but their utility is somewhat doubtful due to the small type that is used in the "frequency" columns. This makes it necessary to possess artistic ability to enter the dial readings neatly, perhaps we should say to enter them at all! We made our own book.

Perhaps it should have been stated earlier that an

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MEASURING FREQUENCY with the BC-221

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ALL OWNERS of the BC-221 frequency meters can benefit greatly by followly the procedure outlined herein. You can determine, almost instantly, the exact frequency of a given reading of your frequency meter—without the usual interpolations.

Here's how it works, using my BC-221-J meter as an example. On the 75-meter band the calibration book states that there are "2.5 dial divisions per kc." Since I can read the 221 dial to within 0.1 dial divisions, I break that "2.5 divisions" down into tenths of a division, as follows:

Dial Divisions	Cycles	Dial Divisions	Cycles
.1	40	1.4	560
.2	80	1.5	600
.3	120	1.6	640
.4	160	1.7	680
.5	200	1.8	720
.6	240	1.9	760
.7	280	2.0	800
.8	320	2.1	840
.9	360	2.2	880
1.0	400	2.3	920
1.1	440	2.4	960
1.2	480	2.5	1000
1.3	520		

Now here's how you use this table. Say that the 221 frequency dial setting is 4099.1 for the frequency you are checking. Assume the calibration book value nearest that setting is 4098.5, and that this

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MEASURING FREQUENCY

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value indicates 3909 kc on the frequency meter. Subtract 4098.5 from 4099.1, and you should get .6. Refer to the chart and you will see that .6 represents 240 cycles, so the exact frequency being read is 3909.240 kc.

Thus this method makes is an easy matter to make frequency checks by a simple subtraction. The chart above is, of course, only good for my particular model 221, but the system can be applied to any model.

The making of charts for other amateur bands is simplicity itself, requiring only the multiplication of the chart values by 2 for use in the 7-mc band; by 4 for the 14-mc band, and by 8 for the 28-mc band.

By making a chart for each ham band you'll be able to give anyone a frequency check in less than ten seconds which will be as accurate as is possible to get with the BC-221.