

SURPLUS sidelights

BY GORDON ELIOT WHITE*

ONE of the classics of the World War II surplus era, the Navy LM Crystal Frequency Indicator, is still with us. The LM, and its Army counterpart, the better-known SCR-211 (BC-221) are commonly found in most surplus stores and are often seen at hamfests. These little units were well enough designed back in the late nineteen-thirties that they are still very useful, and they were so ruggedly built that the years have taken very little toll on their accuracy. Light in weight and easy to use, they can hold their own with frequency meters costing far more today.

Fig. 1 is a photo of the LM front panel. The BC-221 is similar, though slightly larger. The Navy version was accompanied by a separate a.c. power supply, while the BC-221 had space in the case for batteries, and, later, for an optional a.c. power unit.

Figure 2 is the LM schematic. All of the LM models through LM-18 are quite similar, with the changes from model to model so slight as to be unnoticeable for the most part. The LM and LM-1 were designed for slightly lower plate voltages, and the units from LM

*5716 N. King's Highway, Alexandria, Virginia 22303.

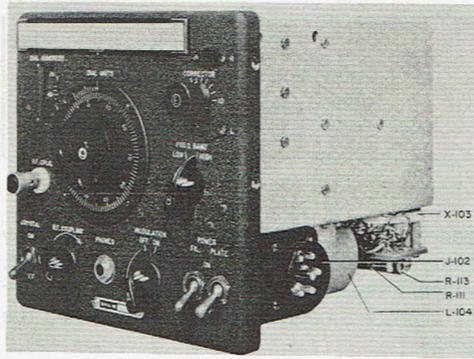


Fig. 1—A drawing of the LM front panel.

to LM-9 had low-frequency fundamental tuning range of 195-400 kilocycles. Starting with LM-2 a voltage regulator circuit was added, and plate voltages of 260/475 were used. Numbers starting with LM-10 had a low frequency range of 125-250 kc. All the LM units had a high frequency fundamental range of 2 to 4 megacycles.

The "odd" LM numbered units were provided for use with external battery power supplies, while the "even" numbers had an a.c. power unit provided.

Accuracies closer than two kc may be obtained at the upper end of the 20,000 kc high band, down to 25 cycles per second at the 125 kc point. Substantially better accuracy can be realized if the unit is left turned on constantly in a permanent position, so that it becomes stable. Since the accuracy is largely determined by the stability of the calibration crystal built in to the unit, trim-

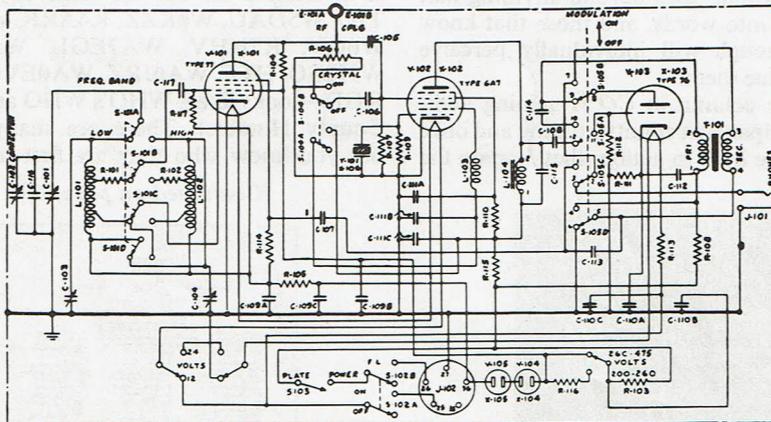


Fig. 2 Schematic diagram of the LM Unit.

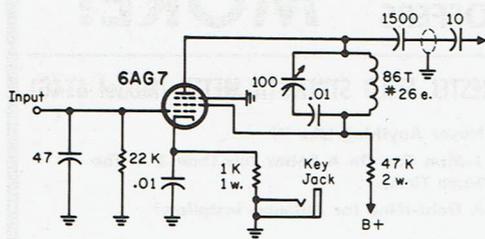


Fig. 3—A buffer stage for the LM frequency meter when it is used as a v.f.o.

ming of the crystal to zero-beat with WWV can essentially remove nearly all error.

There has been quite a bit written about the LM in the amateur literature, with the more significant articles appearing in *CQ*, October, 1965, covering calibration improvements, and April, 1956, covering the SCR-211. In *QST* there have been articles on the LM as a v.f.o., March, and January, 1950; as an audio generator, February, 1950, and as an injection oscillator for single sideband work, March, 1958. In *73* there was a power supply article in June, 1964.

The LM and SCR-211 lend themselves readily to use as a v.f.o. Generally it is well to add a simple buffer stage between the LM output and the transmitter, using, say, a 6AG7. Fig. 3 shows one suggested buffer circuit for this use. You may arrange to key this stage, allowing a constant-running oscillator for stability, with break-in keying. (The LM is well-enough shielded that it may be left running while receiving)

Figure 4 shows a circuit to add an eye tube for greater ease in determining zero beat. When a weak signal cannot be heard, the 6E5 will usually still show the zero point.

The signal to the 6E5 may be taken directly from the 'phones jack on the front panel of the LM, and the plate and filament power "stolen" from the unit itself. Tap the B+ ahead of the voltage regulator tubes so as to get a full 250 volts.

A couple of notes about the LM and SCR-211 that might be made here: the LM has audio modulation on all models, while several versions of the SCR-211 do not. Some LM models have a "crystal" switch position that shorts the r.f. output. Most of the SCR-211 units are found with their calibration books still attached, since they are screwed to the lid. Many LMs are found without the book, since it was fastened by a short piece of chain, and merely slipped into a clip under

the unit when not in use, and over the years the books have often been lost.

The calibration books are vital, of course, to using the LM as a frequency meter. It is possible to find a blank calibration book and calibrate the unit yourself, but the amount of patience required is beyond most of us. I tried that route, and was finally stymied by the fact that when I would come back after taking a break the small amount of thermal drift would have "lost" my signal, and I was never quite sure how to find it again without losing track of where I was in the calibrating process. My unit was worse than most, and my shack was drafty, but even under the best conditions, home calibration is a task for a masochist.

It should be possible to do a job of calibrating an LM sufficient to use it as a v.f.o. over a narrow band, or to spot band edges, if you find one in uncalibrated condition. Generally the meter will sell for a lot less without the book, for it is worth next to nothing to most buyers that way.

The associated power unit, CKB or CRR-10121, may be used with a.c. power mains that deliver from 100 to 130 volts, by using the compensating switches. Headsets to be used with the LM should be the common military low impedance type.

The manual on the LM sets through LM-18 is *NavShips 900, 002*.

In addition to the compensating switches on the power unit, there are links in the meter itself which may be set to allow for the voltages supplied. Markings on these are self-explanatory.

When using the LM, you will not hear beat notes from the crystal oscillator when the modulation is turned on.

The CORRECTOR control is used to set the v.f.o. in the LM precisely to frequency with the crystal oscillator, at a major calibration point. It compensates for temperature

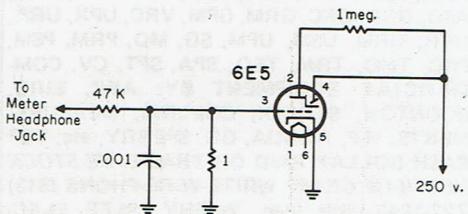


Fig. 4—A circuit for adding a tuning-eye making zero beat determination easier.

changes, and tube aging.

In use as a frequency meter, the LM is loosely coupled to a transmitter, and the transmitter is turned to give zero beat as heard in the LM headphones. To set a receiver, the LM output is coupled into the receiver, which is then tuned to pick up the frequency meter output. ■

USA-CA [from page 85]

Of course, wouldn't want to leave out ole K8YGU. •

It is truly a fine group of people on 14.336 and it has been a rare treat to have been associated with them and with Mr. W2GT.

See you from some county soon that I hope is a new one for you. P.S. Concerning my YWX-100 Georgia County Award, if anyone works me in all 159 Georgia counties I will send them an engraved plaque (NO charge). Endorsement stickers still available for 125 and 150. K1WQU got #1 for 125".

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303 Award: This unusual Award will be issued to anyone who had a contact with any of the many mobiles who were enroute to-at or enroute from The County Hunters Convention, Mountain Home, Arkansas, July 4th Weekend (See foto and Story October CQ). Send data and 25¢ to: Cleo J. Mahoney, WAØSHE, 6001 Blue Ridge Cutoff, Raytown, Missouri 64133. This unusual Award has on it the signatures of 37 of the County Hunters who attended the convention.

Notes

I want to apologize for the fact that I have a big backlog of Awards/Award Data due to space limitations, I will get to your Award as soon as possible.

Many thanks to Jim Fisk, Editor of *Ham Radio* and also to Tom, JA1HNO for sending me that very fine *Award Manual For Radio Amateurs*, published by *CQ Ham*

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