Frequency Meter Doubles As SSB And C.W. Detector

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MANY of us have attempted to receive SSB signals on the conventional type of ham receiver but the results were far from satisfactory. As a matter of fact, this situation has prevented many of us from "reading the mail" on the multitude of single-sideband "QSO's" found on the ham bands today. A surplus LM or BC-221 type of frequency meter used as an SSB detector will, to a great extent, overcome the difficulties usually encountered with the average b.f.o. and second-detector circuitry found in most ham receivers.

If you have an LM or BC-221 heterodyne frequency meter available, it can be converted to serve as a reliable detector. The conversion can be performed in minimum time and with little effort. Basically, the heterodyne frequency meter consists of a stable local oscillator, a mixer, a high-level grid detector, and a stage of audio amplification. It is only necessary to feed the i.f. signal from the station receiver to the antenna terminals of the frequency meter, plug in the phones, turn on the power, and you are in business. The beautiful part of it all is that the frequency meter is used "as is"—no internal modifications are required!

First it will be necessary to take the i.f. signal from the plate of the last i.f. stage in the receiver, through a .004 μfd., 500-volt mica capacitor, and connect it to the r.f. "CPLG" terminal on the frequency meter. Any suitable length of good coaxial cable may be used between the receiver and the frequency meter. Next, set the LM or BC-221 to the receiver's i.f. frequency. In case of double-conversion superhets, this must be the second i.f. frequency. Generally in most station receivers, this frequency will be in the range of 200 to 500 kc. Advance the "R.F. Coupling" control on the LM series frequency meter to the maximum position (clockwise rotation). The "Crystal" and "Modulation" switch must be in the "Off" position otherwise the detector will not function. Insert the phones in the "Phones" jack on the frequency meter and turn on the power to the receiver and the LM or BC-221.

After an appropriate warm-up period, disconnect the antenna from the receiver, turn off the a.v.c., and set the r.f. gain control on the receiver to maximum. A loud rushing noise should be heard in the phones when the frequency meter is correctly adjusted to the i.f. of the receiver. A touch-up of the last i.f. trimmer capacitors or tuning slugs may be required; however, in most instances, this should not be necessary.

To insure that the frequency meter is adjusted correctly, rock the dial on the LM or BC-221 back and forth slightly until a peak or maximum noise is obtained. This should be the correct i.f. frequency for your particular receiver. To preclude setting the frequency meter on a harmonic of the receiver i.f. frequency, jot down the exact dial setting of the frequency meter and turn the dial on the LM or BC-221 several hundred dial divisions on either side of the referenced dial setting as noted. Next reconnect the antenna to the receiver, turn on the a.v.c., and tune in an SSB signal. If the signal sounds distorted, back down on the r.f. gain control slightly to keep the detector from overloading. If the SSB signal becomes intelligible on the "high" side of the receiver's tuning capacitor, the received station is transmitting the lower sideband and *vice versa* if the station is transmitting the upper sideband.

After a few SSB and c.w. signals have been tuned in and you have the "feel" of the receiver, it becomes quite apparent why these detectors work so well for the reception of SSB and c.w. signals. If, for some reason or another, the received signal gets out of synchronization with the detector, a slight adjustment of the tuning dial on the frequency meter will bring the signal "back into the fold" again. Generally, most corrections may be compensated by retuning the receiver only. The frequency meter tuning dial may also be used as a pitch control during the reception of c.w. signals. If it is desired to operate the receiver for the reception of AM signals, it is only necessary to turn the "Freq. Band" switch on the frequency meter to "High."

For those who wish a more sophisticated installation, the output from the "Phones" jack on the frequency meter may be fed back into the normal audio system available in the station receiver. This will permit the use of existing audio and tone controls as before.

The electrical and mechanical stability inherent in the LM and BC-221 series of frequency meters makes them ideally suited as an SSB and c.w. detector. The few minutes of your time that it will take to try this project will more than repay you in operating pleasure and the results are clean SSB, AM, and c.w. signals. —30—