SIGNAL GENERATION (cont)

On 20, 15, and 10 meters, where operation is generally on upper sideband, the signal is generated with the same carrier crystal used in generating the lower sideband on 40 and 80 meters. The five crystal filter used in the transceiver results in an improved response characteristic on the low frequency end of the bandpass, and advantage is taken of this effect to provide better sideband suppression on the most used sideband for each frequency range.

Q1, the VFO 2N706 Oscillator, operates in the common base configuration as a Colpitts oscillator. Capacitors, C1712, C1713, C1714, and C1715,which are used for temperature compensation, are switched in series with the main tuning capacitor C1706 across the coil being used for the particular band. Capacitors C1701, C1710, and C1703 form a voltage divider, and effectively tap the oscillator across only about 10 percent of the oscillator tank circuit to give exceptional stability. Q2, the Emitter Follower is used primarily for impedance matching purposes, not to increase stability. The extremely good regulation achieved through using the Zener diode regulator D1601 across the bias supply voltage, also contributes to the stability. Bandswitching is accomplished by changing the tank circuit coil, and double slug tuning adjustments are used to set the low and high ends of the tuning range. Although no variable frequency oscillator will approach "rock" stability, the VFO in the Model 350 exhibits extremely good stability after the initial warm-up period. Drift from a cold start should not exceed 1 kc for the first hour on 80-, 40-, and 20-meter bands, and 2 kc on 10 and 15 meters. After the initial warm up period, drift will be negligible.

The single sideband, suppressed carrier signal from the First IF Amplifier is fed to the Transmitter Mixer, V2, where signals from the VFO Amplifier are mixed, and the resultant signal at the final transmitted frequency is amplified through the Transmitter Mixer, the Driver, V3, and the Power Amplifiers, V4 and V5. The signal from the VFO Amplifier is initiated in the transistorized VFO-Emitter Follower circuit Q1, Q2. The signal from the VFO is routed to the VFO Amplifier, and on 40 and 80 meters, is subtractively mixed with the single sideband signal from the IF Amplifier to result in LSB operation. On 20, 15, and 10 meters, the frequencies are additively mixed, resulting in output on the opposite sideband.

When in TRANSMIT, the gain of the First IF Amplifier is controlled through the Automatic Level Control network D401-D402, etc., to control the gain of the stage in response to the average input power to the Power Amplifiers. This ALC system will compensate for any extremely strong input signals, but does not completely eliminate the necessity of proper adjustment of the Mic. Gain Control. Although this feature will prevent the transmitter from flat-topping and spurious emissions, considerable distortion may occur if the Mic. Gain. Control is not properly adjusted. Refer to Operating Instructions.

TUNE AND CW OPERATION

Normally, the frequency of the carrier oscillator is approximately 300 cps outside the passband of the crystal lattice filter. In TUNE position, to enable the transmitter to be tuned to the maximum power output condition, the frequency of the carrier oscillator is moved approximately 500 cps to place it well within the passband of the crystal lattice filter. At the same time, one deflection plate of the balanced modulator is grounded, unbalancing the modulator and allowing full carrier input for tuning purposes. A similar procedure is followed for CW to allow full carrier output during CW operation. During CW operation, the cathode of V15A is opened from ground, cutting off the tube. This allows CW operation with no danger of pickup of audio through an open microphone. Attempts to operate on CW by keying the microphone jack, and inserting carrier, are not recommended.

RECEIVE

In RECEIVE position, or at any time when the transmitter is not in TRANSMIT, all circuits used in transmitting are disabled through the relay controlled circuits, K1, K2. The relays are energized for transmitting and de-energized for receiving. Relay K2, when de-energized, allows signals from the transmitting tank circuit and antenna to be fed to the Receiver RF Amplifier, V6, where they are amplified and then fed to the control grid of the Receiver Mixer, V7. The local oscillator signal from the VFO Amplifier is now used to heterodyne the received frequency to the IF frequency, either upper or lower sideband. All IF amplification is accomplished at this frequency, nominally 5174.5 kc, through V8 and V9 IF amplifiers. In the Product Detector V10A, the IF frequency is heterodyned with carrier frequency generated by Carrier Oscillator, V14, to result in detection of the same sideband used to generate the transmitted signal. It is thus not possible for the transceiver to properly receive a signal on any frequency other than