network that establishes the time the relay stays closed after being tripped. The length of time is determined by the setting of the VOX Delay control.

ANTI-TRIP CIRCUIT

Because the VOX stages operate on both transmit and receive, the speaker signals during receive must be kept from tripping the relay when receiving. This is done by taking a portion of the audio signal from AF output stage V12A, rectifying it with diode D100 to produce a positive voltage, and feeding this voltage to the grid of V10 from the VOX SENS control. This voltage tends to increase the plate current of V10; signals from the microphone (picked up from the speaker) tend to decrease the plate current. Therefore with both signals present at the grid of V10, the signals cancel each other, preventing the speaker from tripping the VOX circuit. Speaking into the microphone produces signals not present in the speaker circuit, permitting the VOX circuit to function normally. The VOX SENS control not only adjusts for proper anti-trip voltage, but also determines the sensitivity of the VOX circuit.

PUSH-TO-TALK CIRCUIT

With the Function switch in the PTT (push-to-talk) position, V10 is disabled by grounding its grid, and V2B is made to operate and close the relay when its grid is grounded (shorting the bias) by the push-to-talk switch in the microphone. The Function switch, in the PTT position, also makes the VOX delay circuit inoperative by removing C105 from ground. Push-to-talk operation with the Function switch in the VOX position uses the VOX delay circuit, causing the receiver to "delay" before coming on after the microphone button is released. The Function switch in the Tune position turns the transmitter on by grounding the grid of V2B.

RECEIVER SECTION

Radio Frequency Amplifier V8A And Receiver Mixer V8B

The incoming signal is connected to RF amplifier V8A through coil L3. The amplified signal from V8A is then coupled through coil L2 to receiver mixer V8B. During receiving, cutoff bias is removed from the receiver section to permit tubes V8A, V8B, V9, and V12A to operate. V8A is controlled by bias from the AVC (automatic volume control) circuit. AVC in the receiver is similar to ALC in the transmitter, in that it maintains a constant receiver output (gain) even though the incoming signal level may vary considerably. The cutoff voltage on the bias line is controlled by section C of the relay.

The RF ATTN control varies the cathode bias on RF amplifier V1, to permit receiver gain to be reduced to prevent overloading on very strong signals. This reduction in RF gain will also be reflected in lower meter indications. Operating at a reduced RF gain, however, does not disturb the AVC circuitry, nor will it cut off the receiver completely. It simply reduces strong signals to a level that can be handled by the receiver to provide minimum cross modulation or desensitization.

Crystal Filter

The signal is coupled from mixer V8B to the crystal filter through C80, which is small in value to avoid upsetting the input impedance of the filter. The crystal filter exhibits the same characteristics in receiving as in transmitting; it shapes the IF passband to have steep sides, a flat top, and a narrow bandwidth. This permits good selectivity for SSB reception in crowded amateur bands.

Common IF Amplifier V3 And Receiver IF Amplifier V9

Signals from the crystal filter are amplified by common IF amplifier V3 and then fed to receiver IF amplifier V9. The cathode and screen of tube V9 are connected directly to those of tube V2A. The meter, which is connected in this circuit, indicates received signal strength in S units, as the AVC voltage changes the current in V9. The meter functions as an ALC indicator when transmitting, without any switching. The gain of V9 is controlled by the AVC voltage applied through resistors R91 and R92.

Product Detector V11A And Audio Frequency Amplifier V12B

The amplified signal from V9 is coupled through IF transformer T3 to the grid of product detector V11A. Also, a signal from carrier oscillator V11B is fed to the cathode of V11A. A heterodyne mixing action takes place in V11A, resulting in an output signal which is the difference