uency to the IF frequency, either upper or lower sideband. All IF amplification is accomplished at this frequency, nominally 5174.5 kc, and in the Product Detector V10A, the IF frequency is heterodyned with carrier frequency generated by Carrier Oscillator, V15, to result in detection of the same sideband used to generate the transmitted signal. It is thus not possible for the transceiver to receive a signal on any frequency other than that to which the transmitter is tuned, nor to detect the wrong sideband. This simple single conversion design results in an extremely stable signal, and an image response down more than 80 db. Since the VFO frequency from the Frequency Control Unit is determined by circuit elements which are far removed from any heat source, and the voltage regulation is very precise to the transistor oscillator, frequency stability is extremely good.

Automatic Gain Control, (AGC) is provided by the AGC Amplifier/Detector, V11, which provides an AGC signal for control of the gain of V6, Receiver RF Amplifier, V7, Receiver Mixer, and V9, Second IF Amplifier.

TRANSMIT AND RECEIVE SWITCHING

All transmit and receive switching is performed through K1, the transmit-receive switching relay. In TRANSMIT position, only those tubes that operate in the transmit mode are operative, all others being biased to cutoff through the relay contacts. In the RECEIVE position, with the relay de-energized, the tubes that are normally used only in transmitting are cut off in the same manner. Relay K2, which when de-energized feeds signals from the output pi-network to the receiver, controls the S-Meter switching, also. In the TRANSMIT position, the meter indicates the combined cathode current of the two Power Amplifiers. In the RECEIVE position, it indicates the voltage across R902 in the cathode of the Second IF Amplifier, V9, which is inversely proportional to the AGC voltage used to control the gain of the tube. Thus the S-Meter reads left to right on transmit, and right to left on receive.

POWER RATING

The Swan 400 is capable of 400 watts, PEP input under steady two-tone test conditions, when operated with any of the recommended power supplies. The peak envelope power, when voice modulated, is considerably more, typically 500 watts, or more.

Recommended power supplies produce a no-load plate voltage of approximately 925 volts. Under TUNE conditions, or CW operation, this voltage may drop to as low as 720 volts. Under steady state two-tone modulation, the voltage will drop to approximately 750 volts. If Power Amplifier idling current is 50 ma, and two tone plate current, just before flat-topping, is 375 ma, the peak two-tone current will be 560 ma. The PEP input will then be 750 volts x 560 ma = 420 watts. Under voice modulation, because average power is considerably less, the Power Amplifier plate and screen voltages will be maintained higher, even during voice peaks, by the power supply filter capacitors. Peak voice plate current will therefore also be higher than with two-tone test conditions. Under typical operating conditions, peak plate current before flat-topping will be 625 ma at 800 volts, to result in a peak envelope power input of 500 watts.

Readings of cathode current would not reflect this 500 watt power input, however, because of the damping in the cathode current meter. The meter damping is such that the meter is unable to respond to variations of cathode current in the audible range. Cathode current readings under normal voice input, should not exceed approximately 150 to 200 ma.

POWER AMPLIFIER PLATE DISSIPATION

There is often a misunderstanding about the plate dissipation of tubes operated as AB$_1$ amplifiers under voice modulation. In the Swan 400, while in the transmit position, and with no modulation, the plate voltage will be 890 volts, the plate current 50 ma, and the power input will be 50 watts.

Authorities agree that the average voice power is 10 to 20 db below peak voice power. Normally some peak clipping in the Power Amplifier can be tolerated, and a peak-to-average ratio of only 6 db may sometimes occur. Under such a condition, the average power input will be 125 watts, and plate current will be about 156 ma. With an average Power Amplifier efficiency of 55 percent, plate dissipation will be 57 watts, or 28.5 watts per tube. The 6HF5 is rated at 28 watts continuous duty cycle in normal TV service. Thus it can be seen that under normal operating conditions the PA tubes in the Swan 400 are not being driven very hard. Only during the tune up is there any need to exercise caution by limiting the length of time the unit is held in the TUNE position to about 30 seconds at a time.