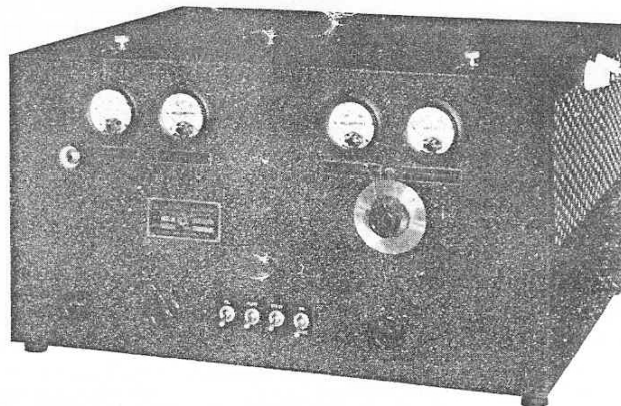


● 45A Continued

sistent and stable oscillation. The C-100 oscillator may be keyed during telegraph operation so that full break-in reception is possible. Difficulties with erratic starting of oscillation, common with other types of tubes, are avoided. The succeeding r-f stages use a 46, an RK-23, a C-830B and a C-211D in the order named. The 46 is a frequency doubler and is automatically connected in the circuit only when required to reach the higher frequencies. The RK-23 pentode is operated as a straight buffer on all frequencies. This tube and its associated circuits are carefully shielded so that the oscillator is completely isolated from the output section of the transmitter on all frequencies. The power level at the output of the RK-23 buffer is approximately 12 watts, and the final amplifier is excited directly from this stage on the lower frequencies. The C-830B is a special power doubler tube which is automatically connected in the circuit following the RK-23 on the higher frequency bands. This tube is designed to give high efficiency as a doubler, and when it is used it delivers 15 to 18 watts of r-f excitation power to the final amplifier. Thus, while it has been usual for the excitation power to fall off on the higher frequencies where it is most needed, in the 45A the available excitation actually increases with frequency. The final stage uses the C-211D, which is a tube especially designed for use as a high frequency class C amplifier, or as a control grid modulated amplifier. The C-211D is characterized by a 150 watt dissipation graphite anode, low interelectrode capacity, high filament emission and a plate connection on top of the envelope. The C-211D is similar to the 211 only in that it has the same base, mu and Rp. The operating conditions of this tube in the 45A transmitter are established according to the criteria for high efficiency and high output set up by W. L. Everitt.*

A new Collins' development, low-loss inductive neutralization, is employed in the 45A transmitter. It has been well

known that the usual neutralizing windings and neutralizing condensers associated with triode amplifiers introduce circuit losses which reduce the over-all efficiency of a transmitter. The new inductive neutralization eliminates the additional circuit elements necessary with ordinary types of neutralization and allows a triode amplifier to be operated with the same circuit efficiency and convenience as a shield grid amplifier. At the same time, the disadvantages of shield grid tubes, such as high tube cost and low tube efficiency, are avoided. Inductive neutralization can be considered as a very significant contribution to the transmitter art, and will probably find extensive use in other Collins models in the future.



The improved system of control grid modulation as developed by the Collins Radio Company has been applied to the 45A transmitter.* Serious consideration was given to other types of efficiency modulation, such as suppressor modulation, before control grid modulation was finally adopted. The only advantage which suppressor modulation would have, as applied to the 45A transmitter, would be the elimination of neutralization circuits and, of course, the new inductive neutralization system gains the same advantage for the C-211D triode. Control grid modulation with the C-211D in actual comparative tests showed superiority over suppressor modulation from the standpoint of higher plate efficiency, higher power output, lower total power consumption, lower harmonic distortion,

increased modulation capability, and greater uniformity of adjustment.

In addition to a full complement of instruments, the 45A is equipped with a modulation indicator calibrated both in per cent modulation and in decibels. This instrument gives a constant indication of the average level of modulation during transmission. The meter is not connected in the speech input circuit after the manner of ordinary level indicators, but is arranged to show the actual audio frequency variation in the r-f output. Therefore, if for any reason the transmitter is not adjusted so that full output and full modulation can be obtained, the modulation indicator will indicate only the actual degree of modulation, and a constant check of the modulation capability is possible. Another instrument on the transmitter gives an instant indication whenever any modulation peak exceeds 100 per cent, so that the equipment can be operated at all times in accordance with the new regulations of the Federal Communications Commission.

The speech amplifier in the 45A transmitter is of new design, with the new high fidelity Collins transformers. These transformers have a new coil and core structure, which not only eliminates inductive pick-

up from external magnetic fields but also provides an extended frequency range. This type of transformer was developed for use in low-level broadcast studio circuits, and although the construction is considerably more expensive than that of ordinary transformers, its use was felt to be justified in the 45A since reduction of noise and increase in fidelity are always helpful in increasing intelligibility under adverse conditions. Also, the operator of an amateur station always gets considerable satisfaction from knowing that his voice is being reproduced at the receiving station in a clear and lifelike manner. The speech amplifier has two stages employing 57 tubes connected as triodes and a 2A3 as an output stage. The latest diaphragm type crystal microphone is used with the 45A, the jack for the shielded microphone plug being conveniently located on the transmitter panel. A gain control knob is also on the

*W. L. Everitt—"Optimum Operating Condition for Class C Amplifiers." Proc. I.R.E., Vol. 22, No. 2, Feb., 1934, pp. 152-176.

*Control Grid Modulation; Wirkler & Collins, QST March, 1935.