# A High Power Radiophone Transmitter

## Power Supply

When the 20B Transmitter is operated at 750 watts output, the load on the 2500 volt power supply varies from 1.3 kilowatts at zero modulation to 2.6 kilowatts with 100% modulation. This fluctuation in load imposes severe requirements on the design of the main power supply as to regulation and maintenance of low ripple values over fluctuating load conditions. Because of the difficulty in obtaining polyphase power circuits in many locations, it was necessary to design a power supply for operation on single phase current. Of course, mercury vapor type rectifiers were employed because of their economy and their low voltage drop. The type 575 rectifier tubes are used. A special high voltage transformer having a nominal rating of 4.4 KVA is used in connection with two special filter reactors having a relatively high value inductance and very low D. C. resistance. A 2-section filter circuit is employed with choke input and a high value of output capacity to accomplish good transmission of the bass frequencies. The percentage of ripple is very low so that the amount of carrier noise is less than common among broadcast stations. The regulation of power supply is good (approximately 5%) over the range of load values which obtains during modulation.

## The Radio Frequency Circuits

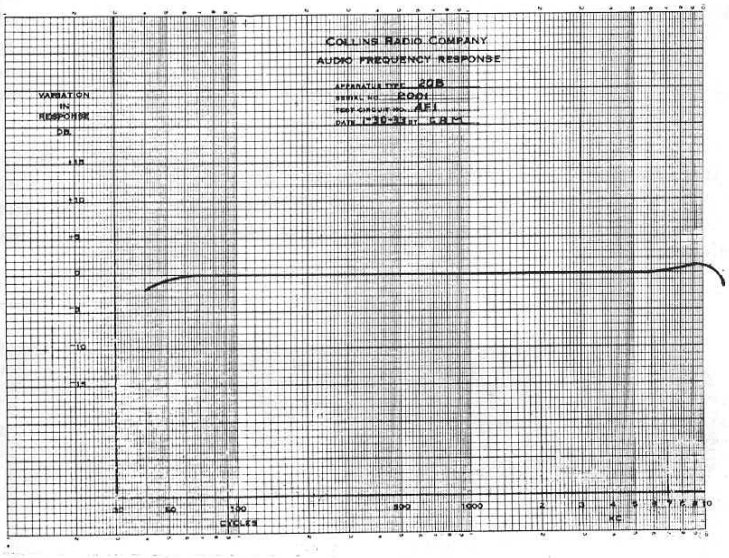
Two '04A's in push-pull are used in the final modulated stage. By careful design of the radio frequency circuits, it is possible to operate the transmitter with excellent stability and efficiency on frequencies as high as 15 mc. Very careful attention has been paid to insulation, reduction of stray RF fields, and the avoidance of high circulating currents. Insulation is chiefly Isolantite. A split stator variable capacitance is used in the plate tank circuit which has several unusual features of construction including Mycalex insulation and an effective air gap spacing of approximately 0.6 inch. This condenser has a relatively low maximum capacity and it is used alone only on the highest frequencies. As the frequency is reduced, low loss fixed condensers are cut into the tank circuit. The tank circuit is maintained at quite low C on all frequencies to obtain maximum efficiency. Standard Collins "E" series inductances are used in both the plate and grid tank circuits. The output of the transmitter is designed for a 2-wire transmission line having a characteristic impedance of from 400 to 600 ohms. Low pass filters can be provided for insertion in this transmission line when a large attenuation of harmonics is required. Parasitic suppressors are used in the grid circuits of the 204A's making their operation entirely stable on all frequencies.

## Frequency Control and Excitation

No buffer stages are included in the 20B unit itself. The Collins 150A Transmitter is used for crystal control and excitation and is coupled to the grid circuit of the '04A's by a short 2-wire transmission line. If precision frequency control is required, an additional relay rack is provided for this equipment. This type of construction permits the 20B Transmitter to be added to an existing 100-watt unit.

## Provisions for Changing Frequency

Changing the frequency of the transmitter is accomplished by varying both the inductance and the capacity in the final tank circuit. Standard plug-in inductances are used and various values of fixed capacity are cut in or out by bus connections. Exact tuning of the final tank circuit is accomplished by means of the variable condenser Plug-in inductances are also used in the grid circuits and in the preceding buffer stages. All of the tuning controls are provided with a new type of dial lock and a complete tuning chart is furnished which makes it possible to place the transmitter on any predetermined frequency within a few seconds by inserting the proper inductances, setting the dials to the correct position, and locking them in place.




The overall audio response curve (above) was measured from transmitter input to antenna. RF modulation voltages at the various frequencies were measured on cathode-ray oscillograph in order to avoid introducing errors by the use of a linear rectifier.

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Safety devices and control circuits are not shown in the circuit diagram (right). Following usual Collins practice, the D. C. Plate current to the modulated stage is carried through the modulation transformer windings.