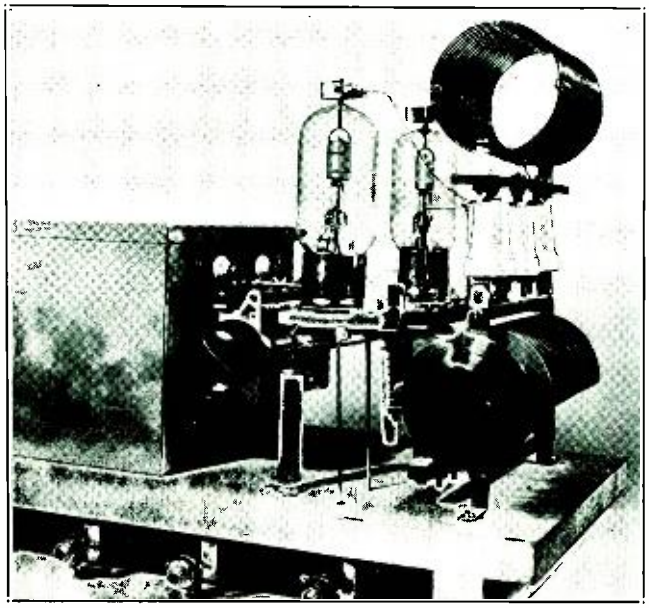
Putting the 35-T to Work

The new 35T looks to be somewhat similar to the 834 physically, with characteristics resembling the type 30B. The rated interelectrode capacities are slightly lower than anything on the market excepting acorn 955. This makes the tube particularly useful at the ultra high frequencies, and very respectable outputs can be obtained clear up to 250 megacycles. The advantages inherent in a low voltage, high current filament at the utra high frequencies are not generally known. At 250 megacycles the filament in a transmitting tube is usually long enough to be a noticeable portion of a quarter wave in length. Thus, there usually is considerable inductance in the plate and grid r.f. returns to ground, which makes the tube unstable and inefficient as an oscillator and quite difficult to neutralize as an amplifier. In some tubes this effect is bothersome as low as 60 megacycles. The use of a short filament in the 35T materially reduces this effect and helps to increase the highest frequency at which the tube is useful. The μ and plate resistance are about the same as the 30B, which makes the tube easy to excite both class B and class C. A stranded plate lead has been avoided which cuts down the losses at the ultra high frequencies and the use of a Tantalum grid and plate prevents momentary overloads from damaging the tube. The 35T uses a Nonex envelope, which allows high heat dissipation through the rather small glass envelope. The elimination of the getter and metallic deposits from inside of the glass also improves the heat radiating ability of the glass and allows a smaller envelope to be used.

The physical dimensions are smaller than a standard 210 except for overall height, which is about the same as a 210. This allows very short grid and plate leads to be used.

The extremely close grid to filament spacing which made the 53 so popular as a crystal oscillator is a characteristic of the 35T. This feature allows high power output from a triode crystal oscillator to be obtained without excessive r.f. crystal current.

When the 35T is used as a class B modulator it will run without grid bias at all plate voltages up to 650 volts. Above 650 volts enough bias should be used to keep the resting plate loss below the rating of 35 watts per tube.



"Hopping up" a 210 transmitter with 35T's

The high μ (30) indicates that class B bias requirements will be low, and the high transconductance means that the d.c. grid current will also be low, which simplifies the bias problem.

When low level modulation (operation as a linear or grid bias modulated amplifier) is used the limitation of carrier output above 750 volts plate voltage is the maximum permissible plate loss of 35 watts per tube. Assuming 100% modulation capability, the maximum carrier power output for one 35T will be between 10 and 20 watts, using low level modulation. When used as a crystal oscillator, extreme care should be used to keep the oscillator heavily loaded when plate voltages in excess of 650 volts are used.

Practical Operation

The 210's yere taken out of the final stage of the transmitter described by Martin Brown in the January and March issues, and replaced with a pair of 35T's to see how they would perform. It was found necessary to adjust the

plates of the neutralizing condensers till the plates were nearly all the way out before neutralization was accomplished. The fixed bias was dropped from 90 to 45 volts, and the grid leak left at 2500 ohms. Cranking the plate voltage up to 1200 volts gave quite a husky output when the tubes were loaded up to 200 ma. This was about as high as the voltage could be raised without the tank condenser flashing over. When modulated, it was necessary to drop the plate voltage to about 900 to keep the condenser from flashing, but even that voltage represented 180 watts input at 200 ma., nearly twice the input used on the original transmitter.

No changes were made in the physical layout when the tubes were tried in the transmitter, but it is unnecessary to mount the 35T's "up in the sky" like the 10's because the plate lead on the 35T comes out the top of the envelope. In fact, the leads could actually be made shorter if the 35T's were lowered a bit. Neutralizing condensers with lower minimum and maximum capacity would be advisable. These are the only changes advisable or necessary, other than provision for a 5 volt filament supply. The grid leak on the final stage could be reduced to about 1500 ohms, but little difference in operation will be noted. Lowering the bias will make it necessary to clip down on the buffer coil with the excitation clips to keep excessive plate current from being drawn on the buffer. The 10 buffer could also be replaced with a 35T, with an increase in grid drive to the final stage. But the 35T's in the final stage seem to get along fine on the excitation provided by the type 10, and it is doubtful if the substitution of a 35T for the 10 in the buffer stage would be justified.

CHARACTERISTICS

Filament Voltage	5 Volts
Filament Current	4 Amperes
Amplification Factor	30
Normal Maximum Plate Loss	35 Watts
Normal Maximum Plate Current (Average d.c.)	100 milliamperes
Grid-filament Capacitance	2.5 $\mu\mu$fds.
Grid-plate Capacitance	2. $\mu\mu$fds.
Plate-filament Capacitance	0.3 $\mu\mu$fds.
Envelope	T14 Nonex
Overall Height	5½ inches
Maximum Diameter	1¾ inches
Plate Voltage	200-1500 volts
Normal Maximum Grid Current (Average d.c.)	20 milliamperes
Base (Isolantite insulation)	UX 4 pin.

PERFORMANCE

Plate Voltage	*Class B Audio Output (Two tubes)*	*Class C Output 75% eff. (Single tube)*
500 volts	60 watts	38 watts
750	80	56
1000	115	75
1250	135	94
1500	150	112

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OPEN FORUM

Wheeling, West Va.

Sirs:

Question: "What is your QRA, o.m.?" Answer: "W8BOW." This sounds silly; but it really isn't. Look up the international "Q sigs".

However, the question: "What is your QRF?" or just, "QRF?" would be answered: "Wheeling, West Va." Look this up too if you are skeptical. Where am I from? Naturally I'm from somewhere; at least my signals are! Aren't they going to the station I'm working? Then they must certainly come from someplace.

Why change now that QRA has come to generally mean "address"? Well, QRF sounds to me more logical. Anyhow, it has the advantage of being correct. If you don't want to change from QRA, why not change the definition of QRA? That's something that can be changed at the next International confab, when we get all those new kilocycles.

WILLIAM W. MCLAIN, W8BOW.

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To Protect Brass from Tarnish

Thoroughly cleanse and remove the last trace of grease, by the use of potash and water. The brass must be carefully rinsed with water and dried; but in doing it, care must be taken not to handle any portion with the bare hands nor anything else that is greasy. The preservative varnish is made by mixing two parts of shellac to nine parts of alcohol. Put on with a brush as thin and smooth as possible.—*W6DOB.*

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Nature, beating radio engineers by a few hundred thousand years, has provided the human ear with automatic volume control, the body with temperature control, and "seeing equipment" which is a highly compact television system.

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The radio alarm used on ships is something of a radio safe combination in that it causes a bell signal to sound only after the proper sequence of signals has been transmitted from the signalling station.