

HAM TIPS

from



Published by RCA Manufacturing Company, Inc., Camden, N. J., U. S. A.

VOL. 1—No. 3

CAMDEN, N. J.

NOVEMBER, 1938

PUSH-PULL RCA-810'S DELIVER 750 WATTS TO ANTENNA

50-WATT RIGS ARE EASILY MODERNIZED WITH NEW RCA-810

Only Minor Changes Needed in Transmitter

An important feature of the new RCA-810 is its suitability for the amateur who is now using tubes of the so-called "50-watt" class and who wishes to increase his power without completely re-building his transmitter, according to engineers of the RCA Commercial Engineering Division.

"In general," they explained, "this new tube can be used to replace a '50-watter' with only minor circuit changes, including the neutralizing adjustment. If the existing plate supply delivers only 1250 volts, but has ample current capacity, the higher plate-current rating of the RCA-810 can be used to increase the plate input from 220 to 310 watts. If the plate supply is changed so that it will deliver 2000 volts at 250 milliamperes, the power input can be increased from 220 to 500 watts, in class C telephony service.

"At the higher voltages, some additional driving power will be needed, but this can usually be obtained without any radical changes in the exciter and driver stages."

POWER TO SPARE!



The RCA-810 is a big, husky triode that has "what it takes." New design features give it outstanding performance while RCA manufacturing facilities bring it to you at the unusually attractive price of \$13.50, Amateur Net.

NEW HIGH-MU TRIODE REDUCES COST OF ONE K.W. AMATEUR TRANSMITTER

High Perveance Insures Excellent Plate Efficiency—Amateur Net Price \$13.50 Each

NEW TUBES

RCA-1616

The RCA-1616 is a high-vacuum, half-wave rectifier tube of the coated filament type. It is quick-heating and is particularly useful in high-voltage devices where plate and filament voltages are applied simultaneously under full-load conditions. In single-phase circuits, full-wave rectification is obtained by using two of these tubes. Net price \$5.75.

Tentative Ratings

Filament Voltage (AC)..... 2.5 Volts
 Filament Current..... 5 Amperes
 Peak Inverse Voltage..... 5500 max. Volts
 Peak Plate Current..... 0.8 max. Ampere
 Surge Current*..... 2.5 max. Amperes
 Average Plate Current..... 0.13 max. Ampere
 *Equipment should be designed so that this value is not exceeded during switching operation.

RCA-1623

The RCA-1623 is a three-electrode oscillator, r-f amplifier, and class B modulator tube having an amplification factor of 20. Except for a lower amplification factor, the RCA-1623 is similar to the RCA 809. The RCA-1623 employs a filament of the thoriated-tungsten type. As a self-excited oscillator in circuits which are subject to unusual conditions of wide plate-load variations, this tube is particularly useful because it is not critical to changes in grid excitation voltage. The 1623 has a maximum plate dissipation of 25 watts for class C telegraph and class B services and may be operated at maximum ratings at frequencies as high as 60 Mc. RCA-1623 has a ceramic base. Net price \$2.50.

Tentative Ratings

Filament Voltage (AC or DC)..... 6.3 Volts
 Filament Current..... 2.5 Amperes
 Amplification Factor..... 20
 Direct Inter-electrode Capacitances:
 Grid-Plate..... 6.7 $\mu\mu\text{f}$
 Grid-Filament..... 5.6 $\mu\mu\text{f}$
 Plate-Filament..... 0.9 $\mu\mu\text{f}$

A new high-power triode of traditional RCA quality and of unusually fine performance has just been announced by all RCA Power Tube Distributors. This tube, known as the RCA-810, is of the high-mu triode type and has a number of important design features that make it an exceptional value for the amateur who desires a high-powered rig.

Two RCA-810's in a push-pull circuit will deliver a 750-watt carrier for class C telephony and a 500-watt carrier for plate-modulated telephony. A feature of this new tube is its low driving-power requirements—a single RCA-809 operating as a frequency doubler will furnish ample excitation for one RCA-810.

Two RCA-810's in a class B modulator circuit operating at only 1500 volts, will deliver more than 500 watts of audio power—sufficient to modulate fully a final r-f stage running at an input of one kilowatt.

Has Thoriated Filament

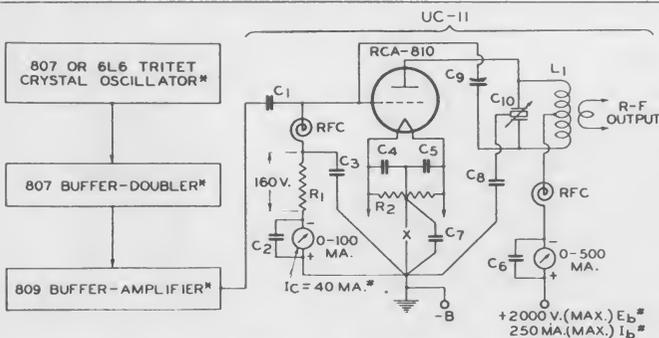
This new triode, economically priced at \$13.50, employs a number of new (Continued on page 2, column 1)

PRICES REDUCED!

Check the following reductions on RCA Power Tubes

| TYPE | OLD NET PRICE | NEW NET PRICE |
|-------|---------------|----------------|
| 203-A | \$15.00 | \$10.00 |
| 204-A | 97.50 | 85.00 |
| 211 | 15.00 | 10.00 |
| 803 | 34.50 | 28.50 |
| 837 | 8.50 | 7.50 |
| 838 | 16.00 | 11.00 |
| 845 | 15.00 | 10.00 |
| 849 | 135.00 | 120.00 |
| 866-A | 4.00 | 2.50 |
| 872 | 14.00 | 9.00 |
| 872-A | 16.50 | 11.00 |

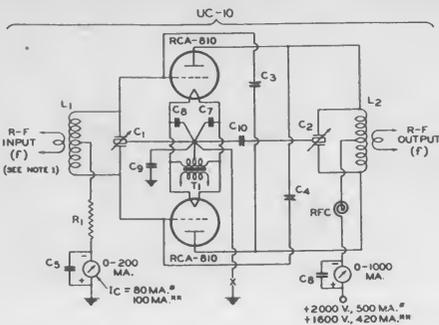
Here's your chance to get the finest quality in power tubes at new low prices. See your distributor at once.



MULTI-BAND CW TRANSMITTER
 Power Output 375 Watts*

C₁ = 0.0005 μf , MICA, 1500 V.
 C₂ TO C₄ = 0.002 μf , MICA
 C₅ = 0.002 μf , MICA, 2500 V.
 C₆ = 0.002 μf , MICA, 5000 V.
 C₇ = 4.8 $\mu\mu\text{f}$ (APPROX.), 7500 V.
 C₈ = 0.75 $\mu\mu\text{f}$ (METER/SECTION)†
 R₁ = 4000 OHMS, 20 WATTS
 R₂ = 50 OHMS, C.T., WIRE-WOUND
 L₁ = SELECT FOR BAND DESIRED
 RFC = R-F CHOKE

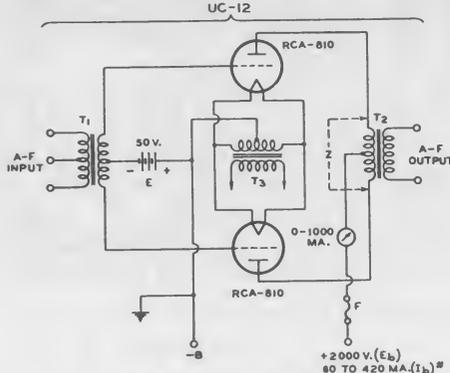
X = INSERT KEYING RELAY HERE
 * Approximate.
 † For this circuit, see "Ham Tips," Sept., 1938, or the RCA Transmitting-Tube Manual TT-3.
 ‡ Approximate capacitance in actual use at resonance.
 § For plate-modulated telephony service, reduce E_b to 1600 V., I_b to 210 Ma., and increase I_c to 50 Ma. The power output is approximately 250 watts.



R-F AMPLIFIER, PUSH-PULL RCA-810's
Class C Plate-Modulated Telephony Power Output 500 Watts*
Class C Telegraphy Power Output 750 Watts*

$C_1, C_3 = 1.5 \mu\text{f}/\text{METER}/\text{SECTION}$
 $C_2, C_4 = 4.8 \mu\text{f}$ (APPROX.),
 7500 V.
 $C_5, C_7, C_9 = 0.002 \mu\text{f}$, MICA
 $C_6, C_8, C_{10} = 0.002 \mu\text{f}$, MICA, 2500 V.
 $C_{10} = 0.002 \mu\text{f}$, MICA, 5000 V.
 $R_1 = 2000 \text{ OHMS}$, 50 WATTS
 $L_1, L_2 = \text{TUNE TO FREQUENCY}$
 "CY" "F"

NOTE 1: R-f power output of driver stage should be about 40 watts* or 60 watts.**



CLASS B MODULATOR
A-F Power Output 590 Watts*

$T_1 = \text{INPUT TRANSFORMER};$
 PLATE-TO-PLATE IMPEDANCE, 1500 OHMS(NOTE 2)
 $T_2 = \text{OUTPUT TRANSFORMER};$
 $Z = 11,000 \text{ OHMS}$
 $T_3 = 10\text{-V.}, 9\text{-A. C.T. FILAMENT TRANSFORMER}$
 $F = \frac{3}{4} \text{ A. HIGH-VOLTAGE FUSE}$

* From zero-signal to steady, full-signal conditions.
 NOTE 1: With $E_b = 1300 \text{ V.}$, $E_c = -30 \text{ V.}$, $Z = 6600 \text{ ohms}$, $I_b = 80 \text{ to } 300 \text{ Ma.}$, and the power output is 510 watts.
 NOTE 2: Four 2A3's in push-pull-parallel, Class AB₁, operating at $E_b = 300 \text{ V.}$ and $E_c = -62 \text{ V.}$ (fixed bias), are recommended for the driver stage.

Push-Pull RCA-810's Deliver 750 Watts To Antenna System

(Continued from page 1, column 4)

design features. One of these is the use of a heavy-duty thoriated-tungsten filament shielded at both ends, inside the graphite plate structure. This construction conserves input power by eliminating bulb bombardment and stray electrons. The grid lead is brought out to a husky metal cap at the side of the bulb. Such construction not only minimizes lead inductance and capacitance, but also improves insulation and simplifies grid-circuit wiring.

Has Graphite Plate

The sturdy graphite plate of the 810 shows only a barely perceptible red color at the maximum plate-dissipation rating for each class of service. Its neat mechanical structure makes this tube present that clean-cut appearance which adds to the eye-appeal of any transmitter and which is an inherent feature of all RCA Transmitting Tubes.

Circuit UC-11 shows two RCA-810's in a conventional class B modulator arrangement. This makes an economical modulator for a one-kilowatt amateur transmitter.

The new RCA-810 can also be used as a grid-modulated r-f amplifier or as a class B linear r-f amplifier, in which services it will deliver a carrier of about 60 watts.

Tentative Characteristics and Ratings

| | |
|-------------------------------------|-------------------|
| Filament Voltage (AC or DC) | 10.0 |
| Filament Current (Amperes) | 4.5 |
| Amplification Factor | 95 |
| Direct Interelectrode Capacitances: | |
| Grid-Plate | 4.8 μf |
| Grid-Filament | 8.7 μf |
| Plate-Filament | 12 μf |

DO YOU KNOW THAT—

—RCA tubes are used by broadcast companies because of their reliability? (The average useful life of receiving tubes used by the National Broadcasting Co. is more than 10,000 hours.)

Typical Circuits for RCA-810 Show Suitable Wiring Constants

Push-Pull RCA-807's or Single RCA-809 Give Ample Driving Power for Final Amplifier

Three circuits illustrating typical applications of the 810 are shown in diagrams UC-10, UC-11, and UC-12. Recommended circuit constants are given in the legends.

Circuit UC-10 shows a push-pull r-f amplifier capable of almost perfect electrical and mechanical symmetry. A final amplifier stage of this type can be driven by a single 809 operating as a straight amplifier, or by two 807's in push-pull. Keying is shown in the filament-to-ground return lead. If it is desired to key the oscillator for break-in operation, a partial fixed bias of -45 volts should be used, in conjunction with a grid leak resistor (R_1) of about 1400 ohms. This amount of fixed bias will protect the 810's against removal of grid excitation when the key is open.

A suggested tube line-up for a multi-band transmitter is shown in conjunction with circuit UC-11, employing a single-ended 810 final

amplifier. For 10-meter operation with an 80-meter crystal, the "Tritet" oscillator plate circuit is tuned to 40 meters, the 807 to 20 meters, and the 809 as a doubler to 10 meters. For 20-meter operation with a 40-meter crystal, the oscillator plate circuit can be tuned to 20 meters, the 807 used as a straight 20-meter amplifier to drive the 810, and the 809 stage "jumped" or omitted. Many other operating combinations are possible, depending on the crystal frequency and the desired output frequency.

The 809 stage is needed only for the 10-meter band where a 3.5-Mc. or a 7.0-Mc. crystal is to be employed. With a 10-meter crystal in a 6J5-G triode crystal oscillator, the 807 can be used to drive the 810 directly, thus providing a 3-stage, 10-meter transmitter of respectable power output.

RCA-810

Maximum Ratings and Typical Operating Conditions As R-F Power Amplifier and Oscillator—Class C Telegraphy

Key-down conditions per tube without modulation

| | |
|-------------------|-----------------------|
| DC Plate Voltage | 2000 max. Volts |
| DC Grid Voltage | -500 max. Volts |
| DC Plate Current | 250 max. Milliamperes |
| DC Grid Current | 70 max. Milliamperes |
| Plate Input | 500 max. Watts |
| Plate Dissipation | 125 max. Watts |

TYPICAL OPERATION:

| | | | |
|---------------------------|------|------|--------------|
| DC Plate Voltage | 1500 | 2000 | Volts |
| DC Grid Voltage: | | | |
| From fixed supply of | -120 | -160 | Volts |
| From cathode resistor of | 415 | 550 | Ohms |
| From grid resistor of | 3000 | 4000 | Ohms |
| Peak R-F Grid Voltage | 280 | 330 | Volts |
| DC Plate Current | 250 | 250 | Milliamperes |
| DC Grid Current (Approx.) | 40 | 40 | Milliamperes |
| Driving Power (Approx.) | 10 | 12 | Watts |
| Power Output (Approx.) | 275 | 375 | Watts |

RCA FILAMENT TYPE ACORN TUBES FB FOR U.H.F. UNITS

Three New RCA Tubes Ready for Experimenters



RCA-959

RCA-957, 958, and 959 are a new series of Acorn tubes having low-current filament cathodes. These tubes are designed particularly for use at the

ultra-high frequencies in compact portable and other battery-operated equipment where economy of filament and plate power as well as size and weight are important factors.

The filaments are designed for 1.25 volts and can be operated without series resistance directly from a single flashlight dry-cell. The excellent performance of these Acorn tubes at ultra-high frequencies is due to an unconventional structure having small size, close electrode spacing, and short terminal connections.

RCA-957 is a triode having a moderately high amplification factor. It may be used as a detector, amplifier, and oscillator. Amateur net price, \$3.00.

RCA-958 is a triode especially designed for transmitting service as an oscillator and radio-frequency amplifier. It may also be used as an audio power output tube to operate a sensitive loudspeaker. Amateur net price, \$3.00.

RCA-959 is a sharp cut-off pentode well-suited for use as an r-f amplifier and detector. It may also be used as a resistance-coupled a-f amplifier. Amateur net price, \$5.00.

Tentative Ratings and Characteristics

| | RCA-957 | 958 | 959 |
|---------------------------------|---------|----------|----------|
| Filament Volts | 1.25 | 1.25 | 1.25 |
| Filament Curr. | 50 M.A. | 100 M.A. | 50 M.A. |
| Max. Plate Volts | 135 | 135 | 135 |
| Max. Sc. Volts | — | -7.5 | 67.5 |
| Grid Volts | -5 | -7.5 | -3 |
| Plate Current | 2 M.A. | 3 M.A. | 1.7 M.A. |
| Screen Current | — | — | 0.4 M.A. |
| Plate Resistance (approx. ohms) | 24,600 | 10,000 | 800,000 |
| Transconductance (Micromhos) | 650 | 1200 | 600 |
| Amplification Factor | 16 | 12 | 480 |

STURDY SOCKET



Here's a real socket for all "fifty-watt" size four-prong tubes such as RCA-810, 203-A, etc. Has a heavy glazed porcelain base and large wiping contacts. Model UT-541-A, Amateur Net Price, \$1.75.