

# HAM TIPS

from



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

VOL. 1—No. 4

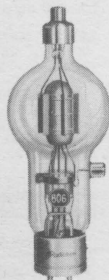
CAMDEN, N. J.

DECEMBER, 1938

## ONE-TUBE XTAL RIG GIVES 150-WATT OUTPUT ON C-W

### RCA 806 IS TOPS FOR HIGH-POWER HAM TRANSMITTERS

New enclosed plate increases power at 30 megacycles

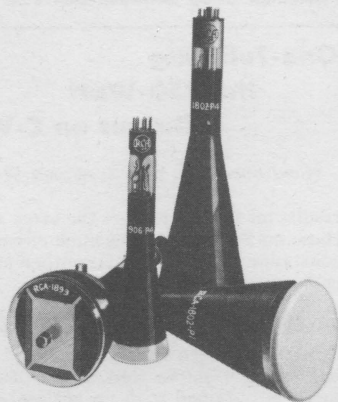


RCA-806

Always a leader with amateurs for high-powered transmitters, the RCA 806 is finding even greater favor because of numerous design improvements. A totally enclosed tantalum plate conserves power by eliminating losses from bulb bombardment and stray electrons. At 30 megacycles, this provides the user with 75 watts of additional useful power per tube. As a plate modulated r-f power amplifier, the RCA 806 has a power output of 390 watts per tube with a driving power of only 32 watts. As an r-f power amplifier and oscillator in Class C telegraph service, the power

(Continued on page 2, column 1)

### For Television Experimenters



Again RCA gives Television Experimenters new tools for working out their problems. Two of the new Kinescopes have white screens for reproducing black and white pictures. The other one has a green screen and may be used for either television or oscillographic work. The RCA-1899 Monoscope is used for producing test signals.

### HIGH-POWER CRYSTAL OSCILLATOR A REALITY WITH RCA-813 TETRODE

May be plate-modulated with 60% efficiency for carrier output of 100 watts

The long-cherished amateur dream of a one-tube crystal-controlled 'phone or cw transmitter comes very close to being realized with the new RCA-813 beam power tetrode. In plate-modulated service, 100% modulation can be obtained with good linearity, low distortion, and a carrier output of 100 watts! In cw telegraphy service, excellent keying can be accomplished in the screen circuit and a power output of 150 watts can be obtained! In neither case is the r-f crystal current excessive.

The circuit used to achieve these truly remarkable results is the Reinartz tetrode crystal oscillator arrangement, shown in diagram UC-14. The data given above for plate-modulated operation was obtained at a frequency of 3990 kcs. The data for cw telegraphy was obtained at frequencies of 3510 kcs. and 7150 kcs., with 80- and 40-meter crystals, respectively.

(Continued on page 2, column 3)

### FOUR TELEVISION TUBES ANNOUNCED TO EXPERIMENTERS

Two Kinescopes provide black and white pictures

Three new Kinescopes and an improved Monoscope have just been made available to Amateurs and experimenters by all RCA Power Tube Distributors. These new tubes are:

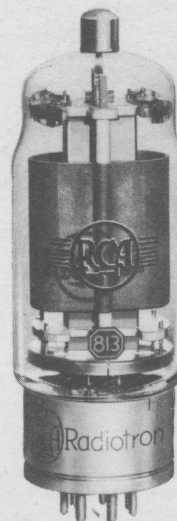
Amateur Net

- RCA 906-P4 KINESCOPE (3-inch Electrostatic-Deflection Type with White Phosphor) . . . . . \$15.00
- RCA 1802-P1 KINESCOPE (5-inch Electrostatic-Deflection Type with Green Phosphor) . . . . . 23.75
- RCA 1802-P4 KINESCOPE (5-inch Electrostatic-Deflection Type with White Phosphor) . . . . . 27.50
- RCA 1899 MONOSCOPE (Electromagnetic-Deflection Type) . . . . . 95.00

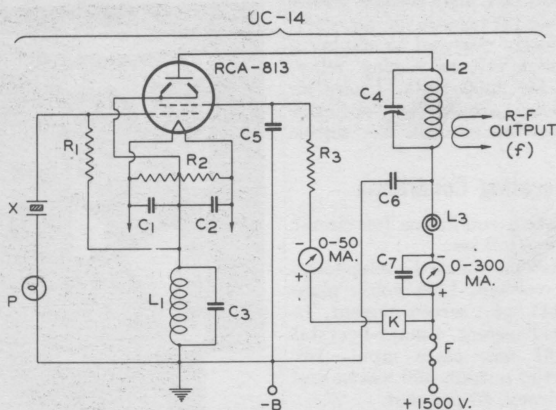
Kinescope 906-P4 (similar to the well-known type 906) is a 3-inch cathode-ray tube which features a white fluorescent screen material for the black-and-white reproduction of television pictures. In addition to its low initial cost, this new type permits

(Continued on page 2, column 1)

### Beam Tetrode



High-Power Sensitivity and a power output in Class C service of 260 watts make the RCA-813 an excellent tube for medium power rigs. Elimination of neutralization in adequately shielded circuits and a driving power of less than 1 watt are other important features.



### One-Tube CW or 'Phone Transmitter

Plate-Modulated Telephony Power Output 100 Watts  
CW Telegraphy Power Output 150 Watts

- C<sub>1</sub>, C<sub>2</sub>, C<sub>7</sub> = 0.002 μf, MICA
- C<sub>3</sub> = 0.0001 μf, MICA
- C<sub>4</sub> = 1.5 μf, PER METER
- C<sub>5</sub> = 0.001 μf, 2000V. MICA
- C<sub>6</sub> = 0.002 μf, 5000V. MICA
- R<sub>1</sub> = 30,000 OHMS, WIRE-WOUND
- R<sub>2</sub> = 50 OHMS, C.T., WIRE-WOUND
- R<sub>3</sub> = 50,000 OHMS, 25 WATTS
- L<sub>1</sub> = 100 TURNS No. 24 D.C.C. on 1 1/4" Diameter Form

- L<sub>2</sub> = FOR FREQUENCY "f"
- L<sub>3</sub> = R-F CHOKE, 250 MA. D.C.
- F = 1/4 A. HIGH-VOLTAGE FUSE
- K = SEE NOTE
- X = CRYSTAL, FREQUENCY "f"
- P = 2.0-VOLT, 60-MA. PILOT LAMP

NOTE: "K" is a high-voltage keying relay, insulated for 2500 Volts. Do not use an ordinary key in this position under any circumstances.

# HAM TIPS from RCA

## Four Television Tubes Announced To Experimenters

(Continued from page 1, column 3)

of low circuit cost due to the low voltage at which its Anode No. 2 can be operated—only 600 volts. This feature is the result of improved electron-gun construction and the use of a conductive inner-bulb coating. The conductive coating minimizes deflecting-plate loading and prevents drifting of the pattern with changes in control-grid bias.

## Two 5-inch Kinescopes

Kinescopes 1802-P1 and 1802-P4 are 5-inch cathode-ray tubes of the double-electrostatic-deflection type. These tubes are similar except for their fluorescent screens. The 1802-P4 has the new white-fluorescent screen, while the 1802-P1 has the standard green screen. Both types have an improved electron-gun construction and a conductive inner-bulb coating. The 1802-P1, being designed for television as well as for oscillographs, is especially good for the latter application due to the brilliant pattern and small spot-size it produces. In either tube, the deflection sensitivity is such that the beam may be deflected across the entire screen with no more voltage than is required for full deflection on 3-inch cathode-ray tubes.

## Improved Monoscope

Monoscope RCA-1899 is a special form of cathode-ray tube used mainly for testing the performance of television equipment. In the operation of this tube, an electron beam is made to scan a test pattern printed on an electrode located in the screen end of the bulb. As a result of secondary-emission effects produced by the scanning of the pattern, the tube generates a video signal. This signal, after amplification, is useful for testing television equipment and for demonstrating television principles.

## RCA 806 Is Tops For High-Power Ham Transmitters

(Continued from page 1, column 1)

output is approximately 450 watts per tube with 20 watts driving power.

Supplementing its fine performance is the mechanical design of the RCA 806. The filament structure and grid assembly are both double collar mounted, while rugged supports prevent possible glass fractures. Every precaution has been made to make the RCA 806 an outstandingly sturdy high-powered tube. It's tops in performance and tops in construction.

The low net price of \$22.00, plus the many fine features of this tube, is making it a great favorite for replacement use. Your RCA Parts Distributor will be glad to give you further details pertaining to this fine RCA tube.

## Uses Pair RCA 813's

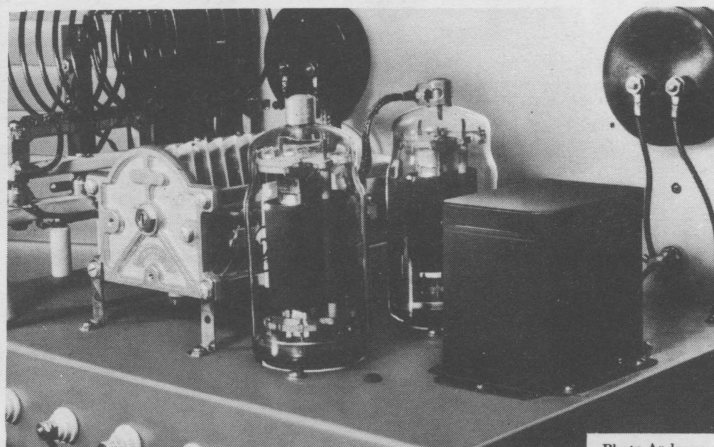


Photo Adressen

First prize winner in "Ham Tips" 100% RCA Tubed Transmitter photo contest is Richard T. Parks, Jr., of Alameda, California, owner of amateur radio station W6PHS. The illustration shows the final amplifier using push-pull RCA-813's.

## V-CUT CRYSTALS

Greatly Reduce Frequency Drift



Unusually high-power output, plus an extremely low temperature coefficient, make the RCA V-Cut Crystals ideal for amateur use. Crystals are supplied within 0.1% of specified frequency and are calibrated to an accuracy of 0.005% at calibration temperature. Temperature coefficient is 4 cycles

or less per million per degree of centigrade on all bands. They are ideal for operation at the edge of amateur bands where extreme stability is required. RCA V-Cut Crystals are not to be confused with the usual amateur-type crystal and are supplied and calibrated on order only. Your RCA Amateur Equipment Distributor will be glad to furnish these units at the following prices, which include holder and calibration. (Allow two weeks for delivery after your distributor has placed order with us.)

Amateur Net

160, 80 and 40-meter band crystals . . . . . \$18.00  
20-meter band crystals (up to 15 megacycle for doubling to high frequency end of 10-meter band) . . . . . 22.00

## RCA SOCKETS

Sturdy, well-built RCA sockets are available for many Transmitting tubes. These sockets are manufactured by RCA and are built to the same high standards employed in RCA Transmitting Tubes.

Amateur Net

UT 541-A for RCA 203-A, etc. 1.75  
UT 103 for RCA 833 only 12.50  
UT 102-A for RCA 803 only 2.25  
UT 1085-6 for RCA 204-A, etc. 4.65  
UT 104 for RCA 813 only 1.25

## One-Tube Rig Has 150-Watt Output on C-W

(Continued from page 1, column 4)

results on 40 meters were the same as those on 80 meters. The same circuit constants can be used for either cw or head 'phone operation.

## Easily Keyed Without "Chirping"

When the screen circuit is keyed, a receiver test shows that a clean-cut signal is obtained with no noticeable "chirping." This excellent keying characteristic is due to the fact that, with the key open, the crystal continues to oscillate feebly; thus, when the key is closed, the crystal starts off on the same frequency without causing chirps. The antenna load should not be coupled too tightly, as this may cause the crystal to stop oscillating when the key is up. Proper loading can be obtained, with correct circuit adjustments, without stopping the key-up oscillations. In order to key the high-voltage screen circuit safely (as regards the operator), it is absolutely essential to employ a suitable high-voltage keying relay, insulated for 2500 volts. Under no circumstances should an ordinary manual key be used in the screen circuit.

## Operating Conditions

The operating conditions for circuit UC-14 are as follows:

For plate-modulated telephony; d-c plate voltage, 1500 volts; plate current, 111 ma.; screen current, 15 ma.; d-c grid current, 5 ma.; r-f crystal current, 61 ma.; plate input, 167 watts; carrier output, 100 watts; and plate efficiency, 60 per cent.

For cw telegraphy; plate voltage, 1500 volts; plate current, 162 ma.; screen current, 18 ma.; d-c grid current, 7 ma.; r-f crystal current, 14.2 ma.; plate input 244 watts; carrier output, 150 watts; and plate efficiency, 61.5 per cent.

The 813 as a high-power crystal oscillator can be used to drive a plate-modulated one-kilowatt final amplifier stage directly—for example,

two 806's in push-pull. Thus, the design of a high-power, band-switching transmitter for operation on the three lowest-frequency amateur bands (160, 80, and 40 meters) is greatly simplified, through the use of only two r-f stages.

## TYPE RCA-813 CHARACTERISTICS AND RATINGS

Filament Voltage (AC or DC) . . . . .	10.0	Volts
Filament Current . . . . .	5	Amps.
Transconductance, For plate cur. of 50 ma. . . . .	3750 approx.	Micros.
Direct Interelectrode Capacitances:		
Grid-Plate (With external shielding) . . . . .	0.2 max.	μf
Input . . . . .	16.3	μf
Output . . . . .	14	μf
Bulb . . . . .	T-20	
Cap. . . . .	Medium Metal	
Base . . . . .	Giant 7-Pin Bayonet	

## MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

As R-F Power Amplifier and Oscillator —Class C Telegraphy

Key-down conditions per tube without modulation\*\*

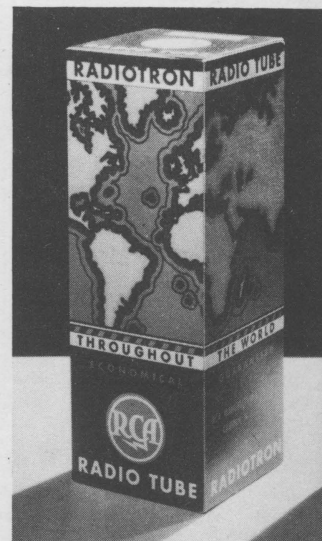
DC Plate Voltage . . . . .	2000 max.	V		
DC Screen Voltage (Grid No. 2) . . . . .	400 max.	V		
DC Grid Voltage (Grid No. 1) . . . . .	300 max.	V		
DC Plate Current . . . . .	180 max.	Ma		
DC Grid Current . . . . .	25 max.	Ma		
Plate Input . . . . .	360 max.	W		
Screen Input . . . . .	22 max.	W		
Plate Dissipation . . . . .	100 max.	W		
Typical Operation:				
DC Plate Voltage . . . . .	1250	1500	2000	V
DC Screen Voltage . . . . .	300	300	400	V
DC Grid Voltage* . . . . .	-60	-70	-90	V
Peak R-F Grid Voltage . . . . .	145	150	160	V
Beam-Forming Plate Voltage# . . . . .	0	0	0	V
DC Plate Current . . . . .	180	180	180	Ma
DC Screen Current . . . . .	23	20	15	Ma
DC Grid Current . . . . .				
(Approx.) . . . . .	7	6	3	Ma
Screen Resistor . . . . .	42000	60000	107000	Ω
Grid Resistor . . . . .	8500	11700	30000	Ω
Driving Power . . . . .				
(Approx.) . . . . .	1	0.8	0.5	W
Power Output . . . . .				
(Approx.) . . . . .	155	190	260	W

\* Grid voltages are given with respect to the mid-point of filament circuit operated on AC. If DC is used, each stated value of grid voltage should be decreased by 7 volts and the circuit returns made to the negative end of the filament.

# Beam-forming plates should be connected to the mid-point of filament circuit operated on AC, or to the negative end of the filament when a DC filament supply is used.

\*\* Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

## Colorful Carton



The new carton for RCA Power and Special Purpose Tubes is an unusually attractive four-color job. Look for it the next time you buy tubes for your amateur rig.