

HAM TIPS

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NEW RCA-1847 MAKES HAM TELEVISION PRACTICAL

LOW-PRICED ICONOSCOPE OPENS NEW FIELDS FOR AMATEUR PIONEERS

Acclaimed at Chicago Parts Show where it was demonstrated in typical equipment

The fond dream of transmitting and receiving pictures via Ham Television on Ham bands is now a reality.

June 11 to 14 were banner days for Ham Television when, for the first time, RCA engineers demonstrated really practical amateur television transmission and reception at the Chicago Radio Parts Show. The equipment used will be described. Running continuously for 10 to 12 hours at a stretch under the call of W10XEL, this gear clearly demonstrated to hundreds of enthusiastic amateurs, engineers, dealers, and distributors the practicability of good quality television communication with simplified and economical apparatus. Demonstrations were conducted on the 12th floor of the Blackstone Hotel overlooking Lake Michigan where it was possible not only to televise indoor subjects but also to pick up panoramic scenes

from off the lake and along the boulevard as well. Even skeptics and those "in the know" on television were frankly amazed at the faithful reproduction and stability of the pictures along with the simplicity of the complete equipment.

"MINI-IKE" PAVES THE WAY



Amateur iconoscope RCA-1847 is the famous television camera "eye" that changes light variations into electrical variations. It is 7 $\frac{3}{8}$ " long and has a 2-inch face on which the images are focused. Amateur net price for the 1847 is only \$24.50. This pick-up tube—engineered by the same men who produced the larger Iconoscopes—completes the tube line required to get started in Ham Television.

Small Brother to Big "Ikes"

The advent of the new amateur Iconoscope RCA-1847 now makes it possible to construct at a cost within the price range of a present-day amateur transmitter a complete television system. This "Mini-Ike" is a smaller, much simplified version of the larger and more familiar Iconoscope Television camera tubes used in large Television studio cameras. It is 7 $\frac{3}{8}$ " long, has a 2-inch face, and is capable of producing a clear, 120-line, 30-frame-per-second picture that is well suited for transmission in the 2 $\frac{1}{2}$ - or 1 $\frac{1}{4}$ -meter amateur band. RCA-1847 operates at relatively low voltage, employs inexpensive electrostatic deflection circuits, does not require keystone correcting circuits, and can utilize low-cost, short-focal-length lenses. The tube is now available through RCA Transmitting Tube Distributors at the amateur net price of \$24.50.

How the 1847 Works

The principal parts of the 1847 are its mosaic, signal electrode, collector, and electron gun. The position of these parts in the 1847 is illustrated

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NEW RCA HAM GUIDE RECEIVES WIDE PRAISE

Contains 48 Illustrated Pages of Xmtg-Tube Circuits and Data

Here is the transmitting guide amateurs from coast-to coast are acclaiming! Written specifically for the amateur, this new book contains forty-eight pages of authoritative technical data on RCA's most popular amateur tubes such as the 802, 806, 807, 808, 809, 810, 811, 812, 828, etc. Carefully proved circuits are shown with each tube in order to utilize the tube to its best advantage. Six complete pages are devoted to the general design and operation of amateur transmitters. Two complete transmitters are

described in detail from mike- and key-to-tank. These descriptions include pictures and complete circuits. One transmitter is a complete 5-band cathode-modulated 'phone/c-w rig working from 10 to 160 meters. Power input is 220 watts on 'phone and 450 watts on c.w. The other transmitter is a plate-modulated outfit with 310 watts input on 'phone and 450 watts on c.w. It also operates from 10 to 160 meters. The design of these transmitters is simple and straightforward.

All in all, this 8 $\frac{1}{2}$ " x 11" book contains over 70 illustrations and more than 30 up-to-the-minute transmitting circuits. It is easy to read and completely different in style. You can obtain a copy of the RCA HAM GUIDE from your RCA Transmitting Tube Distributor, or by sending 15 cents direct to the Commercial Engineering Section, RCA Manufacturing Co., Inc., Harrison, N. J.

HAM TIPS from RCA

New RCA-1847 Makes Ham Television Practical

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in the diagram below. The mosaic consists of a large number of small photosensitive particles deposited on one face of a transparent sheet of insulating material. The particles are spaced a very small distance apart so as to be insulated from each other. On the opposite face of the insulating sheet is the signal electrode, a transparent conductive film. This electrode makes contact with a band of conductive material on the inner surface of the bulb. Another band of conductive material is mounted on the external surface of the bulb, directly over the internal band. The capacitance between the two bands, in series with the capacitance between the signal electrode and mosaic, provides coupling between the mosaic and the signal-electrode terminal.

In the operation of the 1847, an image of a scene is focused on the mosaic and the beam of electrons provided by the electron gun is made to scan the image. As the beam moves over the image, there is generated across the signal-electrode load resistor a voltage whose magnitude at any instant depends on the image brightness at the point where the beam is striking at that instant. This voltage is used as the video signal for Television transmission of the scene viewed by the Iconoscope.

How Much Illumination is Needed?

The lighting equipment required for operation of the 1847 can be simple. Inside-silvered lamps are a convenient form of light source. When an f:2.3 lens is used, adequate lighting of photographs, drawings and other still subjects can be provided by a single 200-watt, inside-silvered, spot-

THORIATED-TUNGSTEN FILAMENTS REVIVED

Thoriated-tungsten filaments of RCA transmitting tubes possess the capability, in many cases, of being reactivated after their emission has dropped off as a result of temporary tube overloads. The reactivation treatment is not 100 per cent effective but is worth trying when your hopes for saving "low" tubes have faded. The reactivation schedule is as follows: Operate the filament at rated voltage for 10 minutes or more without voltage applied to any of the other tube electrodes. The process may be accelerated by raising the filament voltage above its rated value by a small amount for a few minutes. The maximum voltage that should be used is 7.5 volts for 6.3-volt types, 9 volts for 7.5-volt types, 12 volts for 10-volt types, and 13 volts for 11-volt types.

Receiver is Straightforward Super

The Television receiver itself is a superheterodyne and is designed to cover the 112-116 Mc amateur Television band. The output of the receiver terminates in a 3-inch Kinescope, type 3AP4/906-P4, which produces bright pictures in black and white. The tube line-up is as follows: A 956 Acorn type pentode is used as the first detector with a 6J5 oscillator. There are two i-f's using 6AC7/1852's. The second detector utilizes one diode section of a

*A foot candle is the amount of illumination produced by a standard candle at a distance of one foot.

"CALLING CQ-VIDEO"



This is a complete Ham Television station. It was constructed to illustrate the practicability of radio amateur Television transmission and reception on 2½ meters. Demonstrated in actual operation, this equipment was hit of the Chicago Radio Parts Show. Most amateurs already have many of the required components. But even though you start from "scotch," it is possible to duplicate this system for no more than the cost of an ordinary medium-power transmitter.

light bulb. A value of 1.5 focal lengths is generally suitable for the distance from the lens to the subject. For this spacing, the illumination on the subject should be not less than about 3,000 foot candles.* The 200-watt bulb described above can provide this illumination on the subject when the bulb is about 15 inches from the subject. For televising "living talent" it is generally desirable to have a larger spacing between the lens and subject so that the lens will have a larger field of view. When this spacing is approximately 10 focal lengths or greater, the necessary illumination on the subject is 1500 foot candles.

Gear Uses B. C. L. Parts

Major equipment required for the operation of an amateur television system includes a television receiver, a pick-up camera and monitor unit, and an ultra-high-frequency transmitter. Such equipment has been built in our laboratory by our engineers and described in detail in a series of articles recently published in the May, June and July issues of QST. A feature of all of this apparatus is that standard broadcast receiver parts are used almost exclusively throughout the circuits.

6H6 and is followed by one 6AC7/1852 video stage. The other half of the 6H6 is used as a detector for synchronizing purposes only. This diode feeds a 6SC7 double triode, the first half of which is used as amplifier and the second half as sync separator. Multivibrators containing one 6SC7 each are the scanning oscillators. The Kinescope anode potential of 1500 volts is obtained inexpensively from a small receiver power transformer with two 5U4-G's in a voltage-doubling circuit. The remainder of the tubes are operated from a low-voltage 5Y3-G supply.

Modulator Contains "Ike"

The modulator furnishes the complete television signal for modulating the r-f amplifier of the television transmitter. It consists of the RCA-1847 Iconoscope, a video amplifier capable of raising the initial signal to a level sufficient for modulation, a monitor Kinescope, scanning circuits for the Iconoscope and monitor, blanking and synchronizing signal generators, a high-voltage supply for the Iconoscope and monitor, and a low-voltage regulated supply. The scanning frequencies are 30 frames

per second and 3600 lines per second. The video channel width thus required is about 200 kc., which, of course, means 400 kc. on the air with double sideband modulation. Inasmuch as the entire 2½-meter amateur band (for which this equipment is intended) is only 4000 kc. wide, it is apparent that the channel width must be restricted to the minimum value needed for reasonable definition.

Xmtr Uses Twin Beam 829

The r-f transmitter proper is of simple and straightforward design. It has no frills or doodads. Although the rig employs a 40-meter crystal, only four r-f stages are required. The tube line-up begins with a 6L6 Tri-tet crystal oscillator, followed by a 6L6 5-meter doubler and then a 6L6 2½-meter doubler. Output from the last doubler is sufficient to drive fully an 829 twin beam power tube as a straight push-pull final amplifier on 2½ meters. This transmitter is capable of kicking out a carrier of 20 watts or better with video grid modulation and, incidentally, makes an excellent phone transmitter having considerably greater carrier output when used with conventional plate modulation.

Actual field tests conducted with this television gear have been made with the receiver located about 1½ miles from the transmitter. It is anticipated that distances of 10 to 15 miles can easily be covered with this same equipment.

We Scan the Crystal Ball

Television provides the next major development of amateur radio and once again the Ham is in an ideal position to go places. In this new art, amateur Television provides rich opportunity to gain new experience in circuit applications and to work with the fascinating principles of lighting, photography and optics—all thrown in one. For those who have felt that amateur radio is growing dull, here is the answer.

A new booklet, just off the press, contains complete data on how actually to build the complete Television station described in these columns. Get a copy from your nearest RCA Transmitting Tube Distributor, or write to the RCA Manufacturing Company, Inc., Commercial Engineering Section, Harrison, New Jersey.

FUNCTIONAL DIAGRAM OF THE 1847 MINI-IKE

