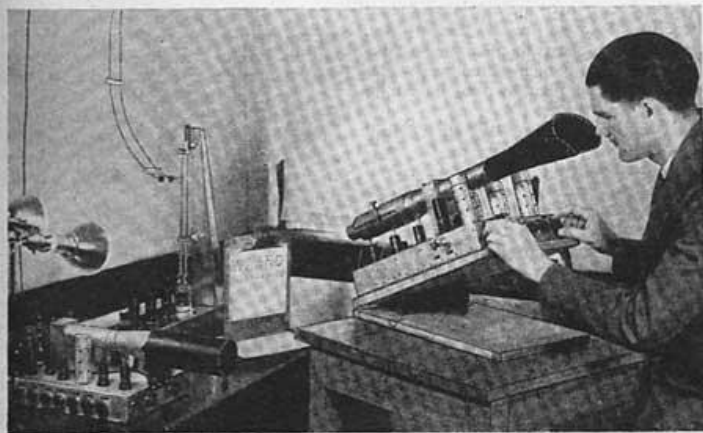


Amateur Television Made Practical By New Image Pick-up Tube



New 2-inch iconoscope opens new field to the radio amateur and the electrical experimenter. Images may be sent by radio or wire.

• have been available in sizes as small as three inches.

It is believed that the opening of the electronic television field to amateurs will serve to widen existing popular interest in the new art, and at the same time accelerate

• Photo at left shows amateur television transmitter and receiver for 2½ meter operation. Pictures below show applications of amateur television, using the new 2" iconoscope tube. Wire transmission will appeal to the general experimenter, no license being required for such transmission.

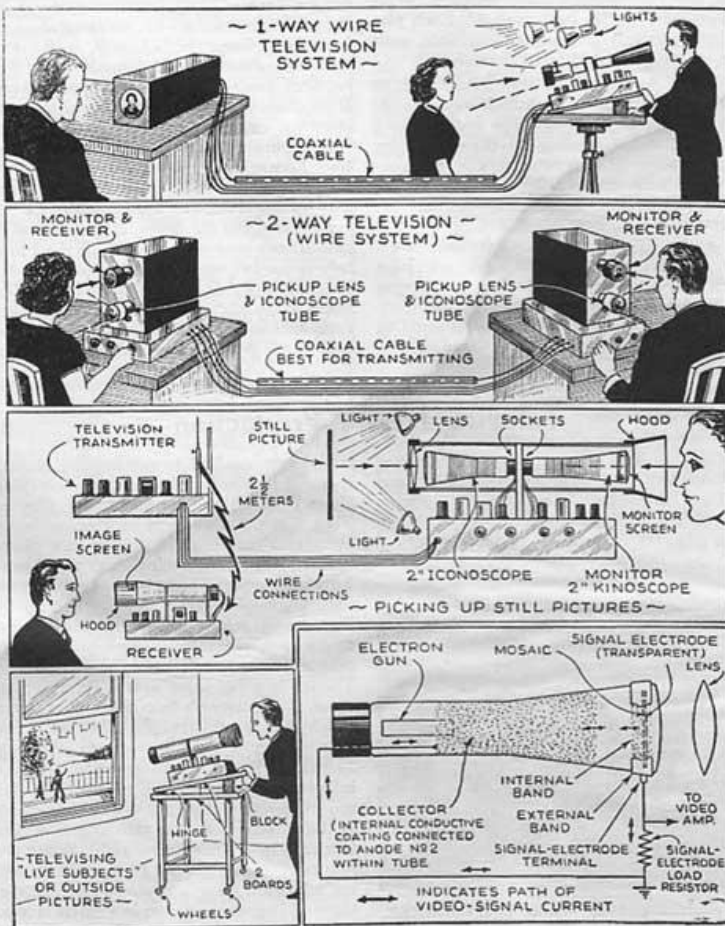
• AN inexpensive television camera "eye" tube which opens the field of electronic television to thousands of American radio amateurs has been developed and perfected at the RCA Laboratories.

Developed in line with RCA's policy of encouraging amateur interest in television and cooperating with experimenters in that field, the new tube is actually a smaller, much simplified version of the more familiar "iconoscope" television camera tubes used in television studio cameras.

With the new iconoscope, it is practicable for the first time for the amateur to build a complete electronic television transmitting and receiving system at a cost which compares favorably with the cost of a medium-power amateur radio phone system. In fact, amateurs who now have 2½-meter transmitters will find it relatively simple to adapt them for sending television signals alternately with sound broadcasts.

Press representatives recently witnessed a demonstration of the tube in the RCA Laboratories. The 120-line, 30-frame, non-interlaced pictures transmitted by the iconoscope, while not of the same excellent quality as the 441-line television images being broadcast in New York, are remarkably clear and sharp, equivalent to newspaper half-tone reproduction. The new iconoscope transmits a television picture about 1½ inches square which may be enlarged at the receiver. In the demonstration system the receiver shows a picture having three times the iconoscope picture area.

In its research and development work, RCA collaborated with the *American Radio Relay League*, which has been seeking for several years to "make it possible for the amateur radio enthusiasts to enter the television field. All the necessary equipment has been available for some time for amateurs, with the exception of the iconoscopes, Television receiving tubes, or kinescopes,



Television News

progress in television development. The radio industry today points to a number of important steps pioneered by American amateurs, including the development of new circuits. Radio amateurs were among the first to demonstrate the enormous possibilities of short waves, a region which at the time was not highly regarded for radio purposes.

What The New Tube Does

The iconoscope, of course, is the "eye" of television, changing light into millions of infinitely small electric impulses which are amplified and then flashed through the ether to the receiving antenna. While performing much the same function of the larger commercial iconoscope, the new tube does not resemble it in appearance. Measuring about seven inches in length as compared with the other's 20-inch length, it looks like a tapered drinking glass with the top sealed. It requires a maximum of 600 volts for operation.

In operation, the new tube is placed behind a small lens which focuses the scene upon the front surface of the mosaic. The light strikes through the transparent surface to the back surface, which is scanned by an electron gun shooting a stream of electrons across it in horizontal lines at the rate of 300 miles an hour. Scanning the mosaic a line at a time, the electrons transmit thirty complete pictures in the form of electrical impulses every second. Each picture is actually millions of tiny dots, each of which is transmitted separately.

In the demonstration transmitter built to test the new tube, a cathode-ray tube is placed behind the iconoscope to serve as a monitor—corresponding to the viewfinder on a camera. The operator sees in the monitor the same scene being televised by the iconoscope, and trains and focuses the camera at will.

As in the case of the big television transmitters, the range of an amateur television station is determined by the horizon, because of a peculiarity of the ultra-high-frequency radio waves on which the pictures must be transmitted. The height of the transmitting

antenna largely determines the range of the station.

Amateurs Helped Develop Radio

The new iconoscope opens to amateurs the third step in the development of their field. The first step was the "code" stage when "hams" flashed telegraph signals around the world. Then came the 'phone stage when a microphone replaced the telegraph key, and amateurs were able to chat with each other. Now the means is placed at their disposal to add *sight* transmission. Thus, they may see each other while talking, and may train their home made television cameras on their own equipment to give the other chap a look.

It is anticipated that the unplumbed genius of the 55,000 American radio amateurs, when applied to the complex problems of television, may produce important developments. Existing amateur radio licenses permit television transmissions on the 2½-meter band and shorter waves, so that the way is already open for their participation in the new art.

[Editor's Note: While the new type 1847 iconoscope tube makes possible radio-television for the amateur, there is another great field of experimentation opened up to science students, who can now build a successful television wire system, placing the transmitter and receiver in adjacent rooms or houses. One of the interesting features of the wire television set-up, utilizing the new iconoscope image pickup tube, is the fact that only about half the number of tubes required for radio television is necessary. With about a dozen tubes, more or less, the electrical experimenter (and note that he will require no station or amateur operator's license) can rig up a successful television system either for one-way or two-way transmission, at a reasonable cost.

For receiving the image, either a 2" or 3" cathode ray tube may be used; as a monitor tube is used at the transmitter anyway, the experimenter will merely have to run a few wires from the terminals of the monitor tube socket to a second cathode ray tube, which will provide him with one-way tele-

vision. If he desires two-way television, he will need two of the iconoscope tubes, together with the necessary oscillator and sweep control apparatus, and two receiving tubes of the 2" or 3" type. The RCA setup of the new amateur television system as demonstrated to the editors, used 120 line scanning, but the controls permit adjusting the sweep up to as high as 200 line scanning. For radio, the transmission is on 2½ meters—one of the channels open to amateurs for television transmission.

For experimenters interested in the wire transmission of television images, we might point out that a piece of coaxial cable should be used to connect the transmitter and the receiver for best results. Of course, transmission can be carried on over an ordinary wire circuit, subject to a loss through attenuation, which causes the image to lack contrast, etc.

In the demonstration of this new system for amateurs by RCA it was pointed out that outdoor images may be picked up. For televising in the studio live subjects are placed in front of the lens (before the iconoscope tube) and several fairly powerful lamps serve to illuminate the subject. At the demonstration a light reflector box was shown; this was built on the same principle as a postcard projector, a photograph being placed at the rear of the box and powerful lamps arranged at either side on the interior of the cabinet. The lens of the iconoscope camera was pointed at an opening in the front of the light box, so as to pick up the brightly illuminated image of the photo.

A cardboard or other hood is best arranged on the end of the monitor (or receiving) tube; in this way the image may be viewed in a more brightly lighted room.

The cost of building a complete television transmitter and receiver for radio operation will run between \$200 and \$300, but as all of the parts and tubes used, with the exception of the new iconoscope tube for picking up the image, are standard, many radio experimenters will be able to construct the television apparatus at very reasonable cost, some of the parts and also the tubes being available from their reserve stock.]