

THE TELEVISION RECEIVER

Figure 7: The view above, of the television reception unit comprises the cathode-ray tube and associated radio tubes mounted on metal chassis. Figure 4: Center illustration shows a view (from the back) disclosing the television receiver, at the top; the power supply, bottom; while the operator points at the short-wave unit. Figure 6: At the top left of the page is the Fernseh model using the same principles and manufactured for the German market.

Transmission and Reception by TELEVISION

cathode-ray type of tube can be used in television it. This article explains the mode of operation number of important and novel features

Kaufman

parts of pictures and it is the efficient reconstruction of the entire series that registers itself on the viewer's mind in determining the merits of the transmissions.

The RADIO NEWS group was impressed with the Farnsworth demonstration. And the daily press, too, accorded favorable comment to demonstrations at the Philadelphia laboratory. Figure 2 gives the basic schematic outline of the Farnsworth television transmitter and receiver circuits, virtually identical

to the apparatus employed at the Philadelphia press demonstrations. Mr. A. H. Brolly, chief engineer of Farnsworth Television Laboratories, Inc., who jointly with Mr. Farnsworth explained the system to this magazine's staff, prepared the diagram. The pick-up of the transmitter, designated on the diagram as A has been dubbed the "image dissector." The light intensities of an image focused upon its photosensitive surface is converted by the dissector into fluctuations of an electric current. The scanning system also embraces its enveloping coil assembly (B) and the scanning oscillators (C) and (D). Mr. Brolly pointed out that their joint duty is to analyze the area of an image into (Turn to page 375)

Cathode Ray

MAGIC "EYE"

By Merle Cummings

A NOVEL application of a cathode-ray tube has been made in the "Magic Eye" feature of the new season's RCA-Victor line. The "eye" consists of a special type tube installed horizontally in the radio receiver so that only the dome, with a fluorescent surface resembling the human eye, is visible through a panel opening. When the set is functioning, the "eye" blinks forth with a green light broken only by a tiny fan of shadow. The spread and contraction of the shadow fan denotes just how accurately the set is tuned.



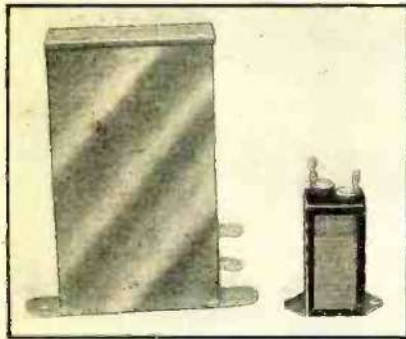
THE NEW TUBE AND HOW IT SHOWS TUNING

At the center is shown the new 6E5 tube, with the cathode-ray "eye" at the top of the bulb. The two outside views show the end of the tube and the indications of out-of-tune and in-tune positions of the tuning dial.

When the shadow is narrowed to a thin line, the listener knows definitely that his set is tuned to the most reso-

nant point. This feature greatly enhances "silent tuning" inasmuch as the (Turn to page 381)

dimensions are 2 inches high by 1 inch square. They are designed for use in high-



fidelity amplifiers, transceivers, aircraft receivers and transmitters.

Tube Tester with Index

Accommodating both glass and metal type tubes, this new Radio Products Company "Dayrad" portable series 20 tube checker includes an index system that pro-



vides complete settings for the particular tube under test. The instrument can also be used in servicing radio receivers, as it has an ohmmeter range up to 40,000 ohms and a 400 volt d.c. voltmeter range.

A.C.-Operated Pre-Amplifier

This compact pre-amplifier is designed to be used with crystal microphones and the Audio Development Company, manufacturers of this new unit, supplies the following specifications: gain 35 db.; fre-



quency response, within 2 db. from 30 to 10,000 cycles; input impedance, 5 meg-ohms; output impedance, 200 ohms; tubes required—one type 74 and one type 84.

A New Instrument for the Serviceman

The new Solar capacitor analyzer utilizing the Wien Bridge method of capacity measurements should be a great aid to the serviceman for detecting leaky, shorted, open and intermittently defective condensers. The capacity range extends from .0002 to 70.0 microfarads.

Farnsworth Television

(Continued from page 331)

a regular succession of space elements and convert them into corresponding signal currents adequate for roving over but one signal channel.

Current impulses are amplified by an electron multiplier (E) which is an integral part of the valve, and by vacuum tube amplifiers (F and G) to produce signal voltages great enough to modulate a radio carrier. Mr. Broily explained further that the connections (H and K) between the scanning circuits and the amplifier, provide signal impulses which automatically synchronize reproducers tuned to the transmitter.

The cathode-ray tube (M) is the heart of the reproducer. It converts the received electric impulses into corresponding light variations and arranges them in orderly space-sequence to reproduce the image at the transmitter. This is done with the use of the scanning system comprised of the coils (X-N), the associated oscillators (O-O) and the tube (M) itself. Once more the scanning oscillators are joined to the signal channel as shown by P to make possible automatic control from the transmitter. Mr. Broily points out that amplification compensates for the inefficiencies of translation and transmission while the series of processes is completed by propagation of the signal.

It was also explained that the focussed electron image in the dissector is scanned by displacing it in its own plane by means of transverse magnetic fields which sweep the image across a fixed aperture, thus allowing a small area of the picture element to produce a current in an electrical circuit, where it may be amplified and transmitted over wire lines or by radio. A resultant field, which is inclined to the axis of the tube is obtained by the addition of a transverse magnetic field to the focussing field. Electrons starting from given points on the cathode travel in spiral paths directed along the resultant magnetic field and come to focus at a point displaced by the transverse field.

It was pointed out that the pictures at the receiving end could be black-and-white, a fluorescent green and black or possibly other colors. It seems that there is a public objective toward black-and-white pictures. It is not because black-and-white images are more natural, but rather on account of the fact that the public has learned to accept black-and-white as natural through constant attendance at motion-picture shows. The color of the picture through the Farnsworth methods depends on material utilized to produce the fluorescence of the cathode-ray tube screen. In the Farnsworth tests, pictures with a greenish tone were obtained through the use of a zinc orthosulfate screen. To reproduce images in black-and-white, a combination of substances, including calcium tungstate, is employed.

At Farnsworth's test transmitting point (for both wire and radio), the apparatus includes his cathode-ray "camera" or "dissector", an amplifier for the minute impulses and an ultra-short-wave transmitting outfit. And, as noted, the receiver also embodies the cathode-ray tube and its allied equipment.

Experiments have reached the stage where home model receivers have been designed in attractive cabinets. The featured model seen at the Philadelphia demonstration for the Radio News staff has the screen end of the cathode-ray tube framed neatly at eye level from a sitting posture (Figure 3). The arrangement of the apparatus can be seen in the rear view, Figure 4. Commercial rack mountings of Farnsworth equipment have also been designed (Figure 5).

The recent tie-ins accomplished by the Farnsworth firm with the Baird interests of England and the Fernseh A.G. group of Germany will eventually result in a pooling of the best features of all three systems in a single set. The outward similarity of the new Fernseh set to the Farnsworth home model can be noticed in the German model shown in Figure 6. The modern casing enhances the appearance of the set while doors hide the control knobs.

The "Oscillight Tube", as the receiver cathode-ray tube has been named, is shown in Figure 7. The flat, broad end is the fluorescent screen and the electron gun is toward the end of the funnel-shaped valve. In and around this cylindrical end of the funnel is also mounted the focussing and horizontal magnetic deflection coils and the vertical deflecting magnet.

One of the chief things to be ironed out in television as Mr. Farnsworth was quoted in last month's article, is "standardization." This, he declared, must precede commercialization. Also, he said, that his firm will not manufacture television equipment, but will issue non-exclusive licenses to other companies. Philco already is sanctioned to make Farnsworth-type receivers while Heinz and Kaufman has permission to make visual transmitters. Although the Farnsworth demonstrations were warmly received by the press, company engineers are already at work on improvements. Instead of the 24-frame-per-second image used at the demonstrations, a speed of 48-frames-per-second will soon be used, although this will actually be an interlacing of two 24's.

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