

RADIO ENGINEERING

FOR SEPTEMBER, 1936

PHILCO TELEVISION

Unknown to Most People, Philco Has Been Conducting a Long Series of Experiments on Television. Their System, Which Is Described Below, Was Shown Publicly on Aug. 11

AS WE MENTIONED on our editorial page last month, the Philco Radio & Television Corporation gave a demonstration of their television system on August 11.

The accompanying illustrations indicate only slightly the extent to which Philco has progressed with television. While stressing that television is not yet commercially feasible, A. F. Murray, in charge of Philco's development work, pointed out the features of the

system to the guests who witnessed the demonstration. A portion of Mr. Murray's remarks are quoted below.

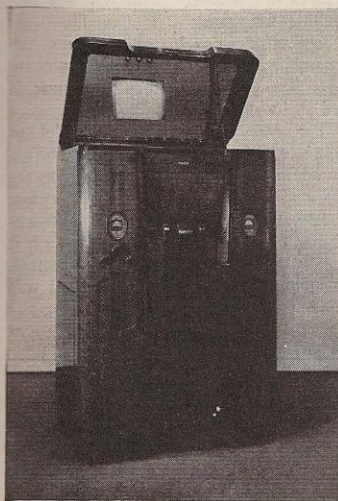
"The job of transmitting television signals of sufficient strength to give usable high-definition pictures at a distance of at least 7 miles, was not an easy one on the ultra-high frequencies used for television. The newest ideas in u-h-f transmitters, antennas and transmission lines were tested. Considerably more power was required at the transmitter to cover the desired distance than sound broadcast experience would indicate.

"One of the most difficult problems to be solved was the modulation of the transmitter by the very high video frequencies (generated by scanning) necessary for high-definition television pictures. It is a relatively easy matter in a sound transmitter to modulate from 30 to 10,000 cycles, but when the upper limit of the modulation band is pushed to 2.4 megacycles the problem of constructing amplifiers and modulators appears at first insurmountable. The solution was the invention of a new and unique type of modulation which is being used by Philco.

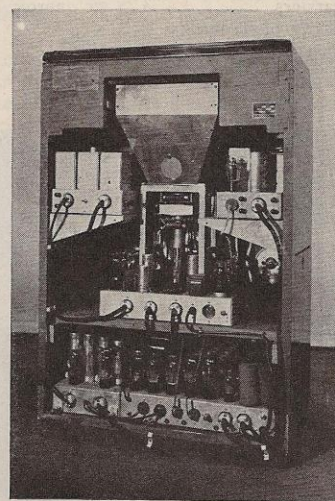
"Concurrently, ultra-high-frequency radio receivers (42-86 mc.) were being developed to faithfully reproduce these high modulating frequencies necessary for clear, high-definition pictures. Receivers for the accompanying sound were also developed so that the apparatus necessary to receive a television

program (sound and picture) could be placed in an ordinary console.

"With all of the units of a complete system developed and operating satisfactorily, field tests were ushered in on December 23, 1935 by a one-hour program reproduced at a distance of 7 miles from the transmitter. This demonstration was witnessed by a number of Philco executives. It showed the system lacked many desirable features. Nevertheless, the results were sufficient-



Philco television receiver.



The "works."

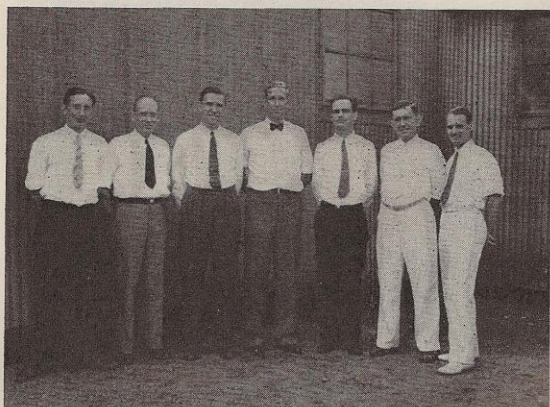


Television control room.

ly promising to warrant pushing development work with greater speed. The engineers once again concentrated on the weaker links of the system, to remove the cause of weakness and to improve the picture. Subsequent demonstrations made at frequent intervals (to Philco executives and their guests) showed rather slow but steady progress up to that point where scheduled programs were broadcast nightly by Philco covering Philadelphia on 51 mc. (picture) and 54.25 mc. (sound). These were started June 18, 1936.

"The electrical specifications for The Philco System are given briefly in tabular form.

Channel width.....	6 mc.
Spacing between television and sound carriers	3.25 mc approx.
Polarity of Transmission	Negative



Philco television engineers. H. Branson, P. J. Konkle, P. J. Bingley, A. F. Murray (Engineer-in-Charge), W. N. Parker, S. F. Essig, N. S. Bean.

Number of lines....	345
Number pictures per second	60 interlaced
Aspect ratio	4:3
Percentage of television signal devoted to synchronizing	20%
Synchronizing signal.	Narrow vertical
Carrier frequency of picture transmitter.	51 mc
Carrier frequency-sound transmitter ..	54.25 mc.

"These specifications agree with the standards recommended by the RMA at a recent hearing before the FCC, that is, except the number of lines. As soon as our equipment can be changed we will conform with the new suggested standard of 440-450 lines. This matter of having one television standard for the U.S.A. is very important. It will be appreciated by every future television user.

"It naturally enhances interest in the demonstration which you are to see to know the conditions under which it is given and, briefly, how the equipment functions. The logical starting point is the studio, where the television signal is generated. The studio is located in our main laboratories, C and Tioga Streets. A camera employing a Philco camera tube generates by electrical scanning, voltages corresponding to the light and shade of the television picture which is focused by a lens on the signal plate of the tube. This signal is amplified in cascaded stages in the control room until it has sufficient amplitude to modulate the u-h-f transmitter. Mixed with this television signal, in the proper proportions, are synchronizing and blanking impulses. These control at the various television receivers in the field, the movement of the electron beam in the picture tubes and place around two sides of the picture a black border.



Making television tubes.

To pick up the sound accompanying the picture the studio is equipped with microphones and associated equipment, which permits transmission of high fidelity sound from our u-h-f sound transmitter operating on a frequency spaced 3.25 mc. above the television carrier wave. Further description is unnecessary since there is nothing unusual about the sound channel.

"Motion picture film, when passed through a specially-built projector, is transmitted by flashing pictures intermittently into the so-called 'electric eye,' or camera tube. This projector is designed so that the film and its sound track is moved at a speed of 24 frames per second, for satisfactory sound, and at the same time 30 frames per second are transmitted to secure 60 interlaced pictures per second. You will see this machine later.

"For outdoor television scenes the camera is placed on a motion picture tripod and motion picture technique is used in its operation.

"The latest experimental model of cabinet which is being demonstrated today comprises a sound and television receiver tuning over the frequency range of 42-86 mc. For flexibility these receivers are separately tuned, although it is easy to secure single knob control. The number of control knobs, you will notice, is only slightly more than on the usual sound receivers. These are not difficult to operate. Our field tests have shown that inexperienced persons can adjust the knobs to secure satisfactory pictures. The deflecting chassis is the name given the unit which incorporates the synchronizing and deflecting equipment. The power supply units are placed at the bottom of the cabinet. The total number of tubes used is 36."