TELEVISION
But Kept

Another demonstration provides
is ready for the home so far as

By S. Gordon

The demonstration of its latest television developments
by Philco provided, for this author, a peculiar combina-
tion of pleasure and disappointment. Pleasure because
the television reproduction was really good—but disappoint-
ment because of the relatively small improvement over the
demonstration of six months ago by the same company.
The latest demonstration took place at the Germantown
Cricket Club, located in a suburb of Philadelphia. Here
were arranged several consoles similar in appearance to present-day
radio-phonograph combinations. These were the combination
light-and-sound receivers and in front of each were grouped
about 40 chairs. Each console had its built-in loudspeaker
and the television scenes appeared in a mirror
mounted in the partly opened cover of the console, in such a
position that the scenes on the horizontal screen of the cathode-
ray tube within the console were reflected in the mirror so
that anyone in front of the console could view the pictures.

Demonstrates Distinctly Acceptable Quality

The transmitter was located at the Philco factory, about
three miles distant, air line, and the light-and-sound program
was transmitted via the air, the light on a frequency of 34
megacycles and the sound on 19 megacycles (about 6 meters).
The televised program consisted of a variety of subjects, in-
cluding an orchestra, a vocalist, a parade of mannequins in a
fashion show, a news reel, and some outdoor scenes on the roof
of the factory. In addition, various small objects were shown
to demonstrate the degree of detail that could be reproduced.

It can be said without hesitation that television as demon-
strated here would be considered highly satisfactory for the
home. With the family seated anywhere within 10 feet of the
front of the console, the images on the screen would be dis-

tinctly visible in black and white. Close-up views of persons
and objects were particularly good. When a dollar bill was
placed before the camera, for instance, it was possible to read
the serial number; and when an ordinary pocket watch was
shown it was possible to even see the moving second hand and
the marking on the portion of the dial over which it moved.

Television versus Home Movies

It has been the common practice to compare television with
home movies, with due allowance for the fact that the tele-
vision screen is much smaller than a movie screen, of course.
So far as close-ups are concerned, it is believed that this tele-
vision demonstration did equal good home movies. In the
case of more distant "shots," however, the home movies have
the edge. Larger objects and persons at a distance from the

camera can be clearly seen, but, beyond a few feet, facial
features become vague. Thus a person who is clearly identified
in a close-up can be recognized when 10 or 15 feet distant from
the camera only by the clothes or general appearance.

The news-reel reproduction suffered for this reason. The
various scenes were clear enough to be interesting. Close-up
views of persons, and some close-up shots of the rushing tor-
rents of the Ohio during the showing of flood scenes were
really excellent. But a motorboat passing up one of the flooded

PHILCO TELEVISION EQUIPMENT

Top: The receiver, and grouped around it, left to right, James
M. Skinner, President, Philco Battery Co.; Lee Ellmaker, Pub-
lisher of Radio News; Sayre M. Renovell and Larry E. Guild,
Vice-President and President, Philco Radio & Television Co.
Center: The new Philco Television Camera. At left:
Close-up of the latest type of light-and-sound receiver.
convincing evidence that television technical development is concerned

Taylor

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Television Now Ready

(Continued from page 653)

very serious objection to the use of this proposed range for tele- vision. This is found in the fact that the range of coverage (in miles) range is from 50 to 70 miles for those stations operating below 60 megacycles is extremely variable. A transmitter which on one day finds its range limited to perhaps 15 miles may, due to atmospheric or other natural conditions, find its signals being picked up several thousand miles distant the next day—or even the next hour.

What, then, will happen to the signals from other television stations operating on the same frequency as the transmitter mentioned? Each station will require a band several megacycles wide for its sight-and-sound transmissions and with the total proposed television frequency range there will be only about a dozen channels. The normal expected coverage of a single station will be an area approximately 25 miles in diameter and therefore to provide television programs over even the more populous portions of the U. S. will require hundreds of transmitters. The hodge-podge that will result at such times as these frequencies "open up" can well be imagined.

For a moment let us consider the facts about the varying phenomena encountered on the ultra-high frequencies so far as their mileage range is concerned. The range of 25-30 megacycles is considered the best range in the frequency spectrum for distance transmission with low power. Amateurs using "di-pole" of only 10 to 20 watts establish practically daily contacts during the winter with other amateurs thousands of miles away. The broadcast and commercial stations operating between 20 and 10 megacycles are heard, some of them consistently, as distances up to 10,000 miles. The sound transmissions from the N. B. C. Empire State Tower television station, operating on 52 megacycles, are quite commonly heard by experimenters in Europe, and even the European television transmitters are frequently heard on experimental receivers in the U. S. All of these facts point to the feasibility of employing these frequencies for television—and their desirability for other services which can use their distance range to advantage.

The 56-60 megacycle amateur band is likewise unsuitable for television, even if the Federal Communications Commission could be induced to dispose of the amateurs. Eight months ago Laurence M. Cockaduy

MAKE-UP IMPORTANT IN TELEVISION

started a series of test transmissions on 58 megacycles from his amateur station, WVIT, at North East, New York, and arranged for a group of amateurs in England to listen for his signals from 1:00 to 1:30 a.m. EST, each Sunday evening. As a result of this test, a total of 15 transmitters were reported heard in England and the reports were accurately and completely verified. His 3-meter signals were first heard in Wales one year ago, that being the first verified crossing of the Atlantic on this frequency. This series of tests was inaugurated to provide a further check on the belief held by Radio News that these frequencies are not suited to television.

The British amateur station G8RV more recently inaugurated a similar series of tests on 56 mc, with the result that his signals have been heard by a half dozen New York amateurs.

In view of this situation, why delay television by continuing to argue for a group of frequencies which, it is obtained, would be found largely unsuited to television—only to face further delay in demanding another range that would be better suited to the purpose and to rebuilding transmitters. It would serve far more logical for the B. M. A. to accept the obvious and change their recommendation to include the range between approximately 70 and 120 megacycles.

This is a range for which there are plenty of other demands for service and it is highly probable that the F. C. C. would speedily grant such a revised request.

This emphasis is being placed on frequency assignment in this article because the television interests have seen fit to emphasize this as one of the main hindrances to the development of the new service. As a result of this, Radio News went on record months ago to the effect that television was being unnecessarily delayed. For reasons best known to the television interests, the interests now announce that television will not be made available to the public during 1937, and perhaps not during 1938. There still remains a great deal of doubt as to why this should be so. Several of the European countries have established television systems, with receivers on the market for anyone who cares to buy. In the earlier days of radio broadcasting the radio busi-
nes in the U.S., developed for more rapidly than that of foreign countries.

With the engineering and production facilities of American plants, the tremendous burning power of the American public and the ability of manufacturers to promote sales, there seems to be little reason why this condition cannot apply to television. But it is not likely to apply if the present system of laboratory incubation is continued. Open competition is needed as a spur for development and perfection of television. Under the present system the smaller manufacturer cannot afford to participate in the development—or can be forced out of business by actually producing and selling television equipment—for the simple reason that through their patent holdings a few large companies have an effective strangle-hold on the situation. Until they give the word “Go!”—and this evidently is not going to occur until they have the patent situation completely cleared up—the public can sit and wait.

The fact is that Philo and others have repeatedly demonstrated television as an order of perfection which any average citizen would enjoy having in his home. Following is summarized data covering the Philo equipment employed:

**Transmitter**

**Sound Transmitter**—Frequency 54 megacycles.
Power 25/25 kilowatt.

**Television Transmitter**—Frequency 49.5 megacycles.
Power 2.5 kilowatt.

**Modulation System**—Philo high-fidelity system responding to an unusually wide band of modulating frequencies, the maximum being about 4,500 c.p.s.

**Picture Tube**—12 inches in diameter, giving white and black pictures approximately 7 1/2 X 10 inches. (High-fidelity picture reproduction on these receivers result from a design which gives an extremely wide receiver acceptance band, wider than 4,500 c.p.s.)

**Modern Oscillograph**

(Continued from page 657)

Do this job by any point-to-point method takes altogether too much time and it is also very difficult to tell when the best hobbing is consistent with adequate gain has been obtained. With the oscillograph, the problem is greatly simplified and it becomes practical to take on work of this nature at a price attractive to the set owner.

In all aligning operations, the vertical plates of the oscillograph are connected across a load resistor in the detector circuit. A frequency-modulated oscillator must be employed. But there are many other tests which may be made without this additional equipment.

Auto-radio oscillator testing is another field wherein the cathode-ray oscillograph stands supreme. When the vertical plates are connected across the transformer primary circuit, examination of the wave pattern indicates instantly when the oscillator is in proper condition and whether the buffer condensers are of the proper value. This is particularly important in the case of synchronizing vibrations. There will be a break in the curve which should occur near the horizontal axis if the buffer condensers are of the proper value. If this break occurs elsewhere, the buffer will have short life even though functionally normal at the time of test. At the present rate of auto-radio sales, the replacement oscillator business soon promises to compare with tube sales as a service revenue-producing item.

In replacing parts, it is frequently impossible to secure exact duplicates of the original type. In the case of power transformers, if the replacement is of high-grade design, a distorted wave form will result from the excessive load. A brief examination with the oscillograph will reveal this condition. Often, too, the first section filter condenser will blow and require replacement. A test with the oscillograph will determine whether the peak voltage at this point is within the condenser's rating and perhaps save a "no-charge" replacement job in the near future as well as the customer's good-will.

Experimenters will find among the innumerable other applications of the cathode-ray oscillograph a quick and simple method of determining tube characteristics under actual operating conditions. We may, for instance, select grid and plate voltages and then apply ac to the grid. By examining the resulting waveform across a load resistance in the plate circuit, we will have a complete picture of the tube's operating characteristics.

For transmitting amateurs, this instrument is indispensable. Proper excitation of Class C stages, correct modulation and other characteristics of transmitting apparatus may be easily checked.

Detailed information for making a wide variety of tests is given in bulletins issued by the manufacturer. A handy reference book on the subject is "The Cathode-Ray Tube at Work," by John F. Rider. For more advanced students, "Engineering Mathematics," by Steinmetz, is recommended.

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PHILCO CAMERA TUBE

P. J. Knobler, Philco television engineer, about to place this "electric eye" in the television camera.

**Call Letters**—Both sound and television stations operate under a single set of call letters—W3X, Philadelphia.

**Frequency Range**—210 feet. Television transmitter antenna consists of array composed of 120 dipoles, each fitted with a reflector. The sound antenna consists of a vertical half-wave. Both antennas are fed by coaxial transmission lines.

**The System**

**Number of Lines**—441.

**Frame Frequency**—30 per second.

**Field Frequency**—90 per second, interlaced.

**Aspect Ratio**—4:3.

**Polarity of Transmission**—Negative.

**Synchronizing-Amplitude selection is used in connection with the "narrow vertical" synchronizing pulse.**

**Receivers**

**Philco Field Test Receivers**—Receivers use independent television and sound sections for flexibility. These tune over the range 41-86 megacycles.

**Total Number of Tubes Employed**—46.