Television Makes the Radio Drama Possible

By Robert Hertzberg

Television is striding forward, and today overcoming many obstacles that were once held insurmountable. "Sight" broadcasting is now part of the regular daily programs of a number of stations in the East and the Middle West, and many experimenters are experiencing new thrills in reproducing small, but nevertheless distinguishable, images.

The latest development, and what promises to be the most important as yet, is the successful combining of image and voice for the presentation of drama in the home, via radio. A second noteworthy achievement of the past few months is the transmission of full-length images of two people at a time, and the reproduction of those images at the receiving end to a size of twelve by twelve inches.

On September 11, 1928, WGY, the first station to organize a dramatic group and present plays regularly to the radio audience, established itself as the first station anywhere, to broadcast an actual drama with the aid of television: transmitting images and voice simultaneously on separate radio channels. The complete performance was witnessed by a group of newspapermen and scientists gathered in one of the buildings of the General Electric Company at Schenectady, N. Y., at a short distance from the radio transmitters themselves. It was highly effective, and held the attention and interest of the rather critical audience as closely as if it had been the highest-priced dramatic hit on Broadway.

Martin P. Rice, manager of broadcasting for WGY and its associated stations, explained that, in presenting the drama through the medium of television, the staff of WGY was co-operating with the radio engineers in the development of a studio technique, far in advance of the time when it will be practicable to offer the "televised" radio drama to the public as a finished production.

"Such practical application affords the only reliable method of determining the future possibilities, as well as the limitations of television," Mr. Rice stated. "When television has reached that stage of perfection where 'sight' signals may be received as reliably as 'sound' signals are now received, we at WGY hope to be prepared to carry the image as well as the voice of the actor to thousands not heretofore privileged to enjoy the drama."

WHEN HISTORY WAS MADE

The first play by television was broadcast at 1:30 o'clock, on the afternoon of September 11, 1928, during the regular television period of the Schenectady station; and a second performance was given at 3:30 that same evening. The offering was "The Queen's Messenger," a one-act drama written thirty years ago by J. Hartley Manners. The television version was the same in every respect as the stage production; but it involved many new problems in dramatic technique because of the limitations of the television "cameras," which could take in only the head and shoulders of one character at a time.

The presentation of the drama by television was made possible through the simplification, by Dr. E. F. W. Alexanderson,
of television transmitting apparatus which hitherto has been large and unwieldy. Readers of Radio News will recall that, early this year, Dr. Alexander has simplified the television transmitting apparatus to such a degree that it can now be carried from place to place, almost as easily as the microphone and its associated amplifiers. The time will undoubtedly come when the television will be set up in the radio studio, on the lecture platforms, the stage or the banquet tables, as readily and as frequently as the ubiquitous microphone now appears at these places. To illustrate the portability of the outfit, WGY engineers recently set up a television “camera” on the platform in the assembly chamber at Albany, N. Y., and televised Gov. Alfred E. Smith of New York, as he delivered his address accepting the Democratic nomination for the presidency.

DETAILS OF THE “CAMERA”

The television scanning “camera” as it is used to-day, is a wooden box about a foot square at the ends and about twenty inches long. It contains a twelve-inch 21-hole scanning disc, driven by a small synchronous motor. Behind the disc is a 1000-watt lamp, the light of which is concentrated by a lens on the area defined by the spiral of holes. A second lens on the outside of the box projects the scanning rays of light on the subject. The box itself is mounted on a regular camera tripod, and greatly resembles a large camera.

Accompanying each “camera” is a pair of photoelectric cells, which are placed in front of and on each side of the “camera,” and facing directly toward the person being televised. Each cell is about seven inches in diameter, and enclosed in a wooden box mounted on a tripod. Three outfits, comprising camera and photo-electric cells, were used in the broadcast of the radio drama.

In the presentation of “The Queen’s Messenger,” the television instruments were arranged as shown in Fig. 1. One camera was used for each of the two characters in the play, and the third for the introduction of the “props” and other visual effects. The play director, standing between the two “cameras” trained his actors (positions 1 and 3 in the diagram), governed the radio output by means of a small mixing panel similar in construction and function to the mixing panels used at all broadcast stations for the proper blending of the different instruments of an orchestra. With one knob he brought any one of the three cameras into the circuit; and, with another, he “faded” the images in and out, very much as the “fade-out” is used in motion pictures. In front of the director was a “monitor” television receiver, in which he could see at all times the images going on the air, and check the performance. In addition to the television cameras, there were microphones at positions 1 and 3, (for the two characters) to pick up the spoken lines of the play.

The performance was broadcast on three wavelengths; the images on 3795 and 314 meters, and the voice on 2186 meters only.
Reports received by WGY several days after the broadcasting of the play indicated that at least two radio experimenters on the West Coast had tried it up and reproduced it successfully.

**TECHNIQUE OF THE DRAMA**

Inasmuch as only the heads of the actors can be transmitted at the present stage of developments, it became necessary for the director to find some means in addition to head movements or the change of facial expression to convey action. This was accomplished by using the third television transmitter (position 3 in the diagram) for hands and “props.” For example, when the body of the play offers to pour some wine for the messenger, the third camera picked up the image of a lady’s hands with bottle and glass, as she poured the wine. Keys, a ring, a pistol, a dagger, reproductions of the British and Russian royal arms, and many other “props” were thus introduced, to add to the realism of the performance and to break the monotony of the head images only.

The faces of the man and woman handling the props at position 3 were not shown. Only their hands were televised; the “camera” being switched on at the proper moment by the play director. In this way, the voice of the lady speaking at position 1, while the television camera at position 3 transmitted hands, was heard in the loud speaker at the receiving end while the image of the hands flashed on the television screen.

Because of the limited range of the “camera,” great pains were taken to keep the actors “framed” that is, within the small area in which the scanning rays of light might find them. Each character worked in front of a white screen, which gave definition to the features. Borders were established within which the actor had to stand, or be lost to the camera.

The performing artists were confronted with special problems in “make-up,” both because the color-response characteristics of photoelectric cells are altogether different from those of the usual motion-picture camera, for instance, and because the images at the receiving end have the pinkish-red background characteristic of the neon gas used in the glow lamps. The make-up technique of both the stage and the screen was drawn upon, and an effect different from either was finally obtained. The eye of the actors was accentuated to the point of exaggeration, and the mouth and nostrils were sharply defined with strong color. The skin was softly shaded and blended in an effort to remove the shiny effect. It was...
found that diamonds or other bright stones could not be used on the lamps, because they caught the scanning light strongly and produced a disturbing glare on the image.

The actual adaptation of the television apparatus to the play was made by Mortimer Steventon, who is known to many radio listeners as the producer and director of a series of radio plays broadcast by WGY and of numerous dramatic offerings from the New York stations of the National Broadcasting Company. Mr. Steventon’s problem was not only the development of a technique for a new dramatic form, but he also had to work with apparatus that was crude and admittedly inadequate.

“The Queen’s Messenger” has but two characters. The lady was played by Isetta Jewell, a former stage star, and now the wife of Professor Hugh Miller of Union College. Maurice Randall, veteran member of the WGY Players, was cast for the messenger. Joyce Evans, actor and William J. Pivinski “director” for Miss Jewell and Mr. Randall that is, they “directed” for the production and the television camera, position 3, handled the various “props” such as cigarettes, glasses, keys, dispatch case, etc.

THE RECEIVING EQUIPMENT

The General Electric Company constructed a number of special television receivers for use at the demonstration on September 21. In external appearance and over-all size these greatly resembled loud speakers of the cone type, for which they were mistaken at first. Each is about 18 inches high and six deep, and hexagonal in shape. Within the case is a scanning disc 12 inches in diameter, and cut with a spiral of 24 square holes. A neon-gas glow lamp is positioned in the horizontal position. The images as reproduced on the disc are less than an inch square but they are enlarged to an apparent size of three inches square by means of a magnifying lens placed on the front of the case.

A number of views of this machine are shown in the illustrations accompanying this article.

A back view of the television receiver is shown in Fig. 1, which includes also a cross-sectional view of the television scanning “camera.” The discs used at both transmitters and receivers were not actually flat discs but looked like large soap plates, with scanning holes cut in the flat rim. This method of construction makes the discs very rigid and prevents them from warbling as much as ordinary discs do.

The people watching the performance of the play, as it was reproduced on the radio receivers, had to sit about ten feet away from the television instruments, in order to distinguish a clear image. At close distances the coarse lines of the scanning disc were too plain, and the images appeared to be built up of little squares of black and white. The definition of the images was quite good, in spite of the fact that the television impulses were confined to 5,000 cycles, the modulation limit prescribed by the regulations.

TELEVISION ON A SCREEN

A very interesting laboratory development, demonstrated by Dr. Alexander after the broadcasting of the radio play, is the apparatus he now uses experimentally over wire lines, for the transmission of full-length images and their reproduction over a screen area twelve inches square, on a screen ten feet from the projector. The layout of the apparatus is shown in Fig. 2. In general design, the transmitter is identical with other disc systems, except that for the quality of the parts and the sensitivity of the photoelectric cells, in particular. A 43-hole disc, about two feet in diameter, is driven by a synchronous motor, and breaks up into thin scanning rays the light from a 3,000-watt arc, directly behind it; the rays are projected forward by a powerful lens. When only his head is to be transmitted, the person televised sits about fifteen inches from the front of a large wooden frame holding an extremely sensitive phototube in each corner. The scanning rays fall on him, and are reflected into the cells, which respond in the usual manner by producing varying electric currents.

At the receiving end, a similar scanning disc is used; however, the usual plate holes are replaced by 48 powerful lenses, each only about half an inch in diameter. The glow lamp is a special neon-gas bulb, developed by Dr. L. McFarlan Moore, the renowned scientist whose achievements have done much to make television practical. This lamp, instead of containing the two flat plates found in common neon tubes, uses a small metal cylinder within which is a small, thin electrode. An intense light, hundreds of times more powerful than that produced by any other glow lamp, is thrown out from the cylinder. The light is concentrated by the lenses in the scanning disc, and then thrown on the screen, ten feet away, by a five-inch projecting lens.

To begin the demonstration of this apparatus, a man sat down before the photodophone at the transmitter and his image, fully-life-size, appeared on the screen in an adjoining room. Speaking over a wire circuit connected to a loud speaker in the projection room, he maintained a running line of chatter, describing his actions in detail so that no one would miss...
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them. He opened his mouth, and the teeth, tongue and throat were plainly visible. The definition was remarkable; certainly the best that has ever been shown in teletypes. The image was as good as the average motion picture produced by an amateur cinematographer with a hand camera. At a distance of ten feet from the screen, the observer could distinguish the streaming lines only by looking hard for them.

THE TELEPHOTOGRAPHERS

The real thrill came when the subject announced, jokingly, that he had been shot by a policeman, and was going to settle with him before the television. He then turned his head, walked about ten feet and pulled another man into view. This whole operation appeared on the receiving screen as plainly as if it had been taken with a movie camera! The images of the two men, engaged in a mock boxing match, were reproduced at full length in a twelve-inch square with every detail of their elation and disarray plainly discernible.

Dr. Alexander had exhibited this same apparatus at the Radio World's Fair, which was held in New York the following week. However, he did not then show half-length images, although he did point out one interesting feature from "The Queen's Messenger." The screen on which the images were projected was a regular silvered motion-picture screen about ten feet square, of the kind supplied to amateur photographers for home "movies."

It is not likely that radio experimenters will be able to reproduce full-length images for some time to come; as the frequency band covered by the 8-line transmission runs up to 20,000 cycles. The general broadcasting of television on such an ambitious scale awaits the development of more advanced broadcast-transmitting equipment and the clarification of a host of technical difficulties.

At the time of the Schenectady demonstration, Dr. Alexander issued the following statement, which contains some interesting facts:

OBSERVATIONS OF TELEVISION

"In order to avoid any widespread misunderstanding, it should be made clear that this demonstration is conducted over a short wire line, and that we are not prepared to transmit television of the same quality over any considerable distance. The television system of the future will consist of the television camera, the radio transmission, and the television receiver. In addition to these three essential elements there will be, in most cases, a fourth element—a wire connection between the studio and the receiver station.

"Each of these elements will be improved as time goes on. We are looking forward to more sensitive photoelectric cells for the camera and a more brilliant source of light for the projector. The principal difficulty, however, which limits the use of television at the present day is the unknown factors of radio transmission; and constant efforts are being made to solve the new radio problem introduced by television."

For this reason we are broadcasting television regularly from Schenectady five times...
TELEVISION
A Magazine for the Experimenting Fan

"TELEVISION" is a magazine pledged to further the art of the infant industry for which it is named, and to supply the "fans" with the latest information and developments in this fast-growing field. Television, as a science, occupies the same position today as radio did ten years ago. Like the radio fans of years back, enthusiasts of this new field have had to fight for whatever meager knowledge they have been able to obtain. This magazine, then, comes as manna to the information-hungry fan. It is our purpose to keep these enthusiasts constantly informed, through "TELEVISION," of each new development. The second issue of "TELEVISION" is now on the newsstands. You will find below a partial list of its interesting contents:

The first Television magazine was published by the EXPERIMENTER PUBLISHING COMPANY almost a year ago. Over 50,000 copies of this magazine, "TELEVISION," have since been sold. This alone is sure proof of the popularity of this interesting new art.

Partial List of Contents

- New York's Public Service
- News of the World
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- Enlarged "Eye" Seen at Night
- Valenite Television
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