

Popular Mechanics Magazine

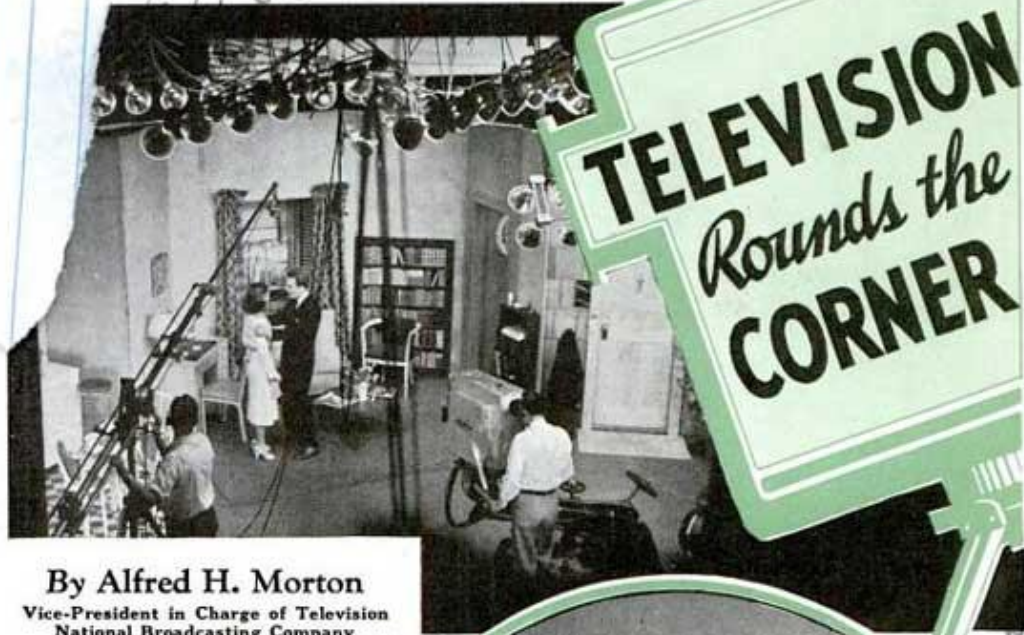
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WRITTEN SO YOU CAN UNDERSTAND IT

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By Alfred H. Morton

Vice-President in Charge of Television
National Broadcasting Company

THEIR first glimpse of television leaves Radio City visitors amazed at its advanced stage of development and wondering when it will come to their home towns.

The best efforts of hundreds of scientists and skilled engineers were absorbed by television for more than a decade before it was ready for its historic public debut April 30, 1939. Enormous strides have been made since that day, when the National Broadcasting company's telecast of President Roosevelt and others at the opening of the New York world's fair marked the beginning of the new art in America.



Top, scene in television studio. Note multiplicity of high-powered lamps. Bottom, watching pictures on receiver's screen

MAY, 1940

Radio City

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Hundreds of programs have gone out on the air since the debut. Among them have been major league baseball games, inter-collegiate football and track contests, tennis matches, swimming meets, variety shows and dramatic presentations. The images have become brighter and more stable and more highly detailed. Greater achievements remain for the future.

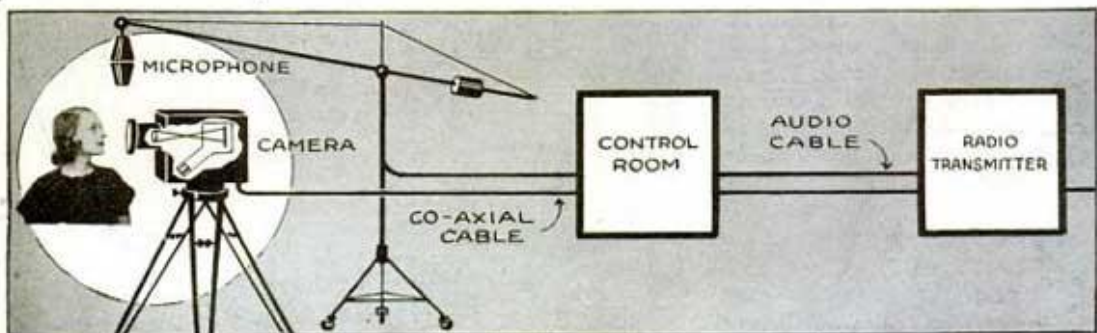
New York and Los Angeles, with their surrounding territories, already have television, and a station serving the region including Schenectady, Albany and Troy, N. Y., is being linked to NBC's New York station by radio relay—thus forming the first television network.

Technical standards already have been adopted by the industry, providing ample margins for further improvement in image quality without the necessity of changing a single transmission standard. This is the

public's assurance against early obsolescence of receivers.

Since television is highly complex, many technical standards are involved in the group. The one most easily understood by the public is that television's images are in 441 horizontal scanning lines and are transmitted at the rate of thirty complete images a second. The images are in black and white.

The television that all of America is destined to receive is entirely electronic. It has no moving mechanical parts. Its two bases are the Iconoscope, a large dipper-shaped vacuum tube which converts a light image into a corresponding pattern of electrical impulses, and the Kinescope, a type of cathode-ray tube, which converts electrical impulses back to light values. These light values in turn, properly distributed over the face of the Kinescope, constitute



Top, mass viewing of television programs. This shows more than 200 students seeing and hearing a lecture demonstration. Bottom, sketch on this and page opposite shows television from start to finish

Photo taken by [unclear]

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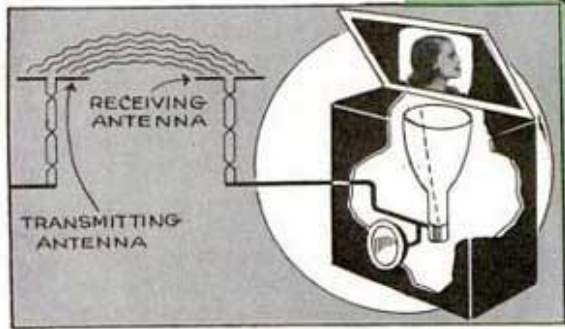
Rotary Leaders

Left, what television screen showed of picture at right. Center, latest portable television field pickup equipment. Bottom, horn over "eye" of television camera guards it when shooting toward the sun



a synthetic image corresponding to that seen by the camera in the studio or on the field.

In practice several cameras are used for each studio program or pickup in the field. The purpose is to give an interesting variety of "angles" or "shots." Since television means simultaneous transmission of a program, multiple camera pickups enable the program director to vary his shots from moment to moment without going through the equivalent of motion pictures' cutting room. A special television lighting system has been devised to provide a



R. W. Picard
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improvement



Top, miniature stage being arranged. Center, scene from play appearing on television screen. Bottom, at the control panel in New York television studio

fluid auxiliary to the camera pick-up. Sound associated with the image is registered and transmitted in the usual way. Both sound and image are tuned in with a single control.

One of television's present limitations is the coverage afforded by a single transmitter. Highly detailed images necessitate the use of an enormous group of extremely short waves in transmission. For instance, the Federal Communications Commission has set aside a band 6,000,000 cycles wide in the ether for the use of each television station. A sound broadcasting station occupies a strip only 10,000 cycles wide, extending, let us say, from 600 kilocycles to 610 kilocycles.

It is a peculiarity of these extremely short waves that reception by home viewers is ordinarily limited by the visual horizon, as seen from the transmitter antenna. In some instances, however, the programs may be received regularly and satisfactorily some distance beyond. The service area of NBC's Station W2XBS is thus roughly a circle with a radius of a little more than fifty-five miles. This, of course, applies to reception from comparatively low-

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Television Rounds the Corner

(Continued from page 644)

power transmitters. Just what the situation will be when considerable power, say twenty-five kilowatts, is transmitted from the antenna no one can say for certain.

The type of receivers being marketed in New York and Los Angeles centers about the central Kinescope. At present three sizes of images are available, corresponding to five-inch, nine-inch and twelve-inch Kinescopes. The image of the largest of these affords an image approximately eight inches by eleven inches. The image is traced on a translucent screen on the under side of the large, or "open," end of this funnel-shaped tube. In the case of the smaller tubes, the image is viewed directly. Present designs of twelve-inch Kinescopes, however, are too long to permit construction of a receiver of pleasing dimensions without introducing the reflected images. The tube is, therefore, placed upright and telecasts are seen as reflected in a mirror.

Controls for brightness, contrast and horizontal and vertical synchronization are provided in the receivers.

Prices of home receivers are quite high, compared to those for sound receiving sets, but a reduction is planned. Now the price of a set incorporating a twelve-inch Kinescope is \$600. This instrument includes an all-wave radio receiver. An attachment for a late model radio to receive television sound is available at \$199.50.

Before a greatly accelerated public demand for receivers can be expected, numerous transmitting stations must be scattered over the United States. At present NBC is maintaining a minimum program schedule of ten hours weekly in the New York City area. The Don Lee Broadcasting System is also sending out programs in Los Angeles over Station W6XAO and the General Electric company is just going on the air in the Schenectady area.

Programs in television can be of almost infinite variety. Practically everything that is now transmitted by radio can also, with necessary adaptations, of course, be converted into television stuff. In addition, a thousand and one subjects, excluded from radio, will come into their own with television solidly on its way. Art, for instance, has never found a place in radio. Most interest, of course, will center on television's

entertainment fare. With sound reduced to its proper relationship to sight, the nature of radio entertainment will undoubtedly change radically with television. But the larger categories of radio entertainment will probably remain—drama, sports, variety, music, educational programs.

Television's coverage of news events has undoubtedly held more interest, where the transmissions have been of their best quality, than any other single category of program. The President delivering his address at the fair, the visit of King George VI and Queen Elizabeth and the parade of the Army's "Iron Horses" down Fifth Avenue were only three of the many programs.

Television's problem is to find some way of linking stations in various cities into a network. It is highly probable that the first extensive linking will take place along the North Atlantic seaboard. The General Electric station at Schenectady is the first link in such a chain. Others will probably stem from Chicago and Los Angeles.

Radio had the long lines of the telephone network at its service when it decided to embark on a nationwide service. But telephone lines will not serve television, at least for the present. The wide band of frequencies necessary for transmitting a satisfactory television signal make the use of telephone lines inadvisable for intercity connecting links.

Several years ago, Bell Laboratories engineers installed a coaxial cable link between New York and Philadelphia, but the cost of this purely experimental venture was about \$5,000 a mile.

Tubular in shape, the coaxial cable can transmit more than 200 telephone messages simultaneously, but only a single television program. There, in a nutshell, is the problem of networking television.

A new method, however, is coming over the horizon. An automatic radio relay has been announced by Radio Corporation of America. This is a small gadget which is capable of transmitting television programs on a radio beam from point to point without the attention of a single person. It is believed that these relays, spaced at intervals of perhaps twenty miles, will materially reduce the cost of erecting a nationwide television network. The radio relay is the method used in linking NBC's New York station with the Schenectady outlet.