



RCA VICTOR screen measuring 16 by 21½ inches provides high-definition pictures free from distortion.



COST of television set will be determined largely by the size of the screen. For \$100 you will get a 3-by-5 or 7-by-9-inch picture.

Television Manufacturers

ADMIRAL	AIR KING (PATHE)	ANDREA
ANSLEY	AUTOMATIC RADIO	AIROLA
BELMONT	CROSLEY	DETROLA
DUMONT	EMERSON	ESPEY
FARNSWORTH	FREED-EISEMANN	GALVIN
GAROD	GENERAL ELECTRIC	GILFILLAN
HALLICRAFTERS	HAMILTON	HAMMARLUND
HOFFMAN	KARENOLA CORP.	MAGNAVOX
MAJESTIC	MIDWEST NATIONAL	PACKARD
PHILCO	PHILHARMONIC	PILOT
REGAL	SCOTT SENTINEL	SEARS-ROEBUCK
SONORA	SPARKS-INDUSTRIES	STEWART-
WARNER	STROMBERG-CARLSON	TEMPLE
WARWICK	WELLS-GARDNER	WESTINGHOUSE

TELEVISION FOR YOU

ALMOST 50 MANUFACTURERS ARE MAKING HOME RECEIVING SETS, MANY OF WHICH WILL SELL FOR AS LOW AS \$100.

IN THE next six months, and maybe sooner, you will be able to walk into a television store and say to the man behind the counter, "I like that one. Wrap it up, please."

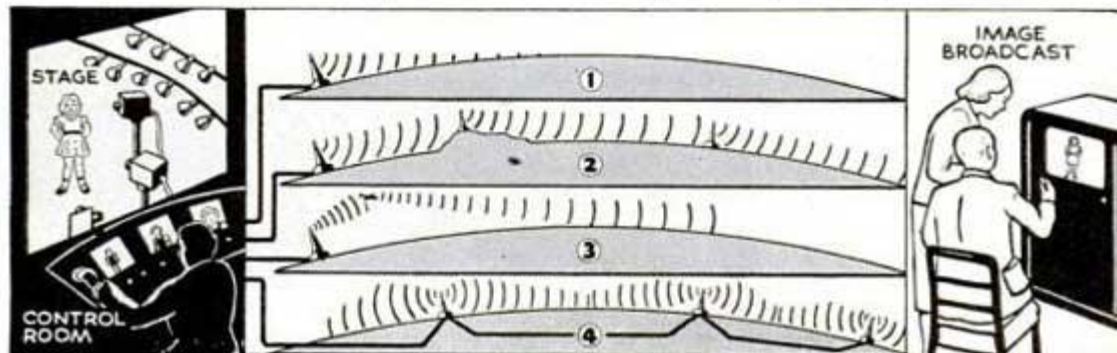
You will get a pretty good picture in your television set, something between the quality of the 16-millimeter home movie and the

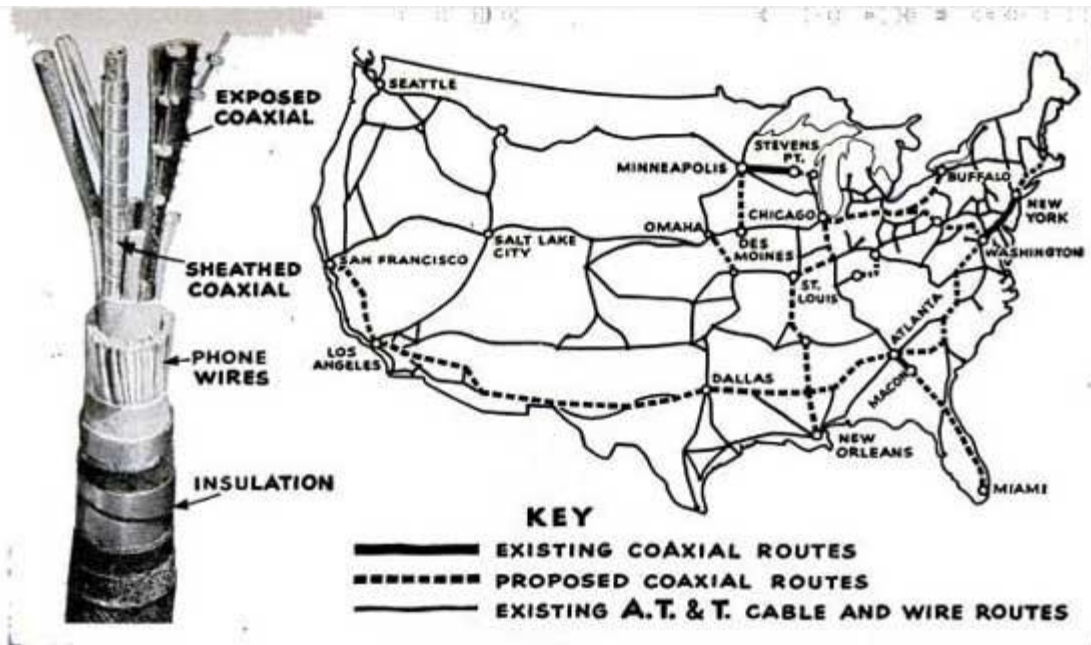
35-millimeter you see at your neighborhood theater. If you want to pay for it, you can get a screen far larger than any produced even experimentally before the war. The largest available is almost as big as a full-size newspaper page.

Television is improved because, finally, it

HOW THE RANGE OF TELEVISION BROADCAST IS EXTENDED

- 1 Television waves refuse to follow curvature of the earth; tower transmitters broadcast only 50 miles.
- 2 Relay towers erected at 40 to 50-mile intervals, automatic and unattended, pick up and relay signals.
- 3 Transmitters in planes flying six miles up cover a 420-mile circular area. Relay planes extend range.
- 4 Underground coaxial cable, laid for telephone use, can be equipped to carry television programs, but it would be a costly method. Repeater stations 80 miles apart would power amplifiers within the cable.





COAXIAL ROUTES to take care of telephone needs, but which some day may form the basis of television networks, will soon span the country. At left is the cable developed by Harold S. Osborne, of A.T.&T.

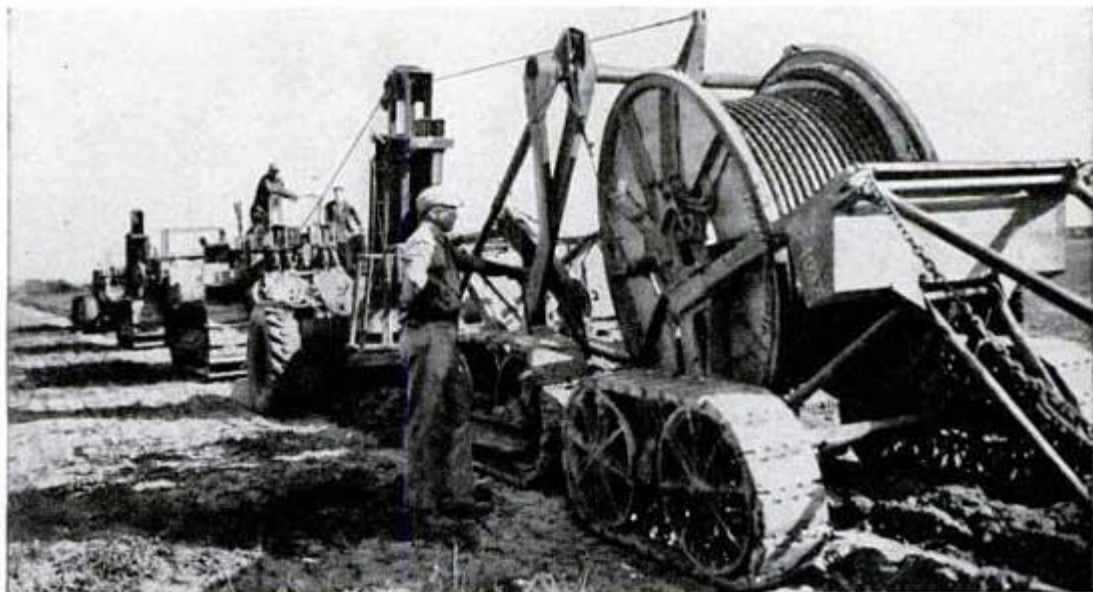
is coming of age. The war has done much to improve it. What television needed, radar needed. And, to win the war, radar engineers by the thousands had to pioneer in producing better cathode-ray tubes and the timing-synchronizing units that go with them and in the ultra-short radio waves that make the transmission of moving images through the ether possible.

Work now is under way to sprinkle television signals over wider areas, so that in the next couple of years you may sit before your fireplace in Bangor or Beloit and watch

the January Rose Bowl game in Pasadena. As against the less than 10,000 receiving sets in operation in the United States today, almost 50 manufacturers expect to market several hundred thousand in the next twelve months and millions in the next five years. Prices start at \$100 and range upward to \$1,000.

New pickup tubes for the television cameras, developed by the Radio Corporation of America, are extremely sensitive to ordinary light and will enable television reporting teams to cover outdoor events in

PLOW TRAIN lays the lead-sheathed cable in the ground, 30 to 36 inches deep. The "rooter" plow (center) explores the ground for roots and rocks, and then the cable unwinds into the plow shaft (right).





TELECASTING a scene at Station WABD. Note the microphone boom and array of ceiling lights.



CONTROL ROOM where engineers, technical directors, and producers check details of program.

any kind of weather that they may encounter.

Unlike the multiknobbed radio sets of the 1920's, the television receiver will be simple to operate. You will turn a switch to introduce power to the set, push a button for the station you want, and then adjust the picture for contrast and brilliance. The controls you use for contrast and brilliance will serve the same purpose as those you use on

your present radio set to obtain tone control and the proper volume. In a few more years even these controls may be taken care of at the transmitting station.

Only nine television transmitting stations—three in New York, two each in Chicago and Los Angeles, and one each in Philadelphia and Schenectady, N. Y.—are available to the television (*Continued on page 210*)

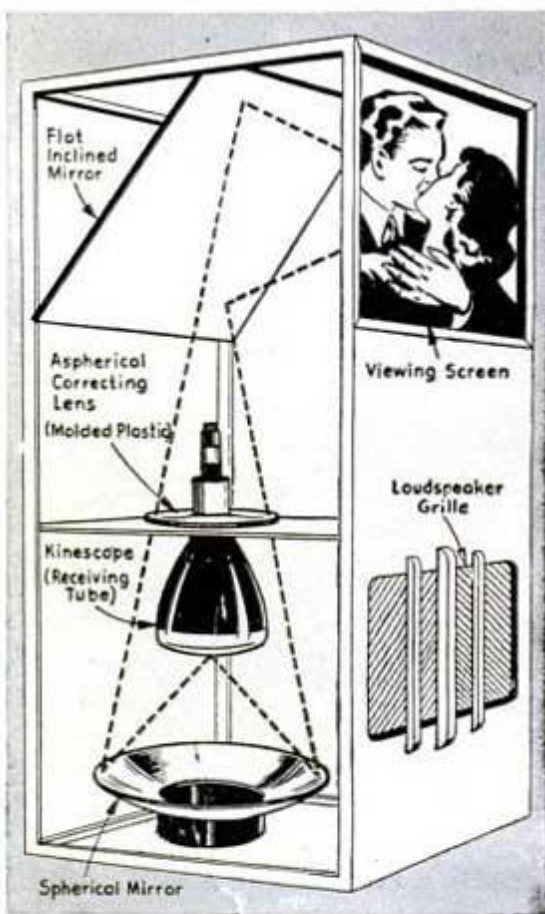
CBS Says:

"It is estimated that color television receivers will be only slightly more expensive than black-and-white receivers . . . This most advanced television system, transmitting images in full color and utilizing the progress made during the war in the field of electronics, will guard against receivers becoming obsolete for a long time to come."



NBC Says:

" . . . Authorities agree that color television will not be acceptable to the public until a fully electronic method has been perfected. Research has made good progress on this problem but . . . it is expected that several years will elapse before television pictures in natural color will be available in the home."



OPTICAL SYSTEM for a built-in television screen. Broken lines indicate path of light beams.

Television for You

(Continued from page 72)

dialer at the moment, but 129 applications to install transmitters are before the Federal Communications Commission, boss of all radio operation in this country.

Ultimately 450 to 500 stations, as compared with 900 aural stations that broadcast to listeners regularly, can be accommodated on the 13 radio channels set aside for television.

All this is on the credit side of television, but to say that everything is wonderful would be abusing the truth. It isn't.

The television people are acutely conscious of the fact that the eye is the most critical of the five sensory organs. The ear will forgive some background noises. The eye gets annoyed at anything less than perfection, and the television image isn't yet perfect. It has no "flicker" but often its "definition"—sharpness of detail—leaves much to be desired.

Television receivers won't operate in certain areas at all. They receipt for "ghosts," or one image overlaid with a slightly offset shadowy image, like a color picture in a magazine that is "out of register." This is due to "bounce" or reflected signals from the transmitting station, exactly like a sound that is echoed from a wall. Yet, in the strange world of electronics, often a receiver will pick up a good single image in reflection when direct pick-up is impossible. Ordinary foliage interposed between transmitter and receiver often proves to be a nuisance to the television set owner.

Electrical interference from machines that produce an arc, such as the diathermy equipment used by doctors and even the unshielded ignition systems of ancient automobiles, is so serious that the television image is destroyed entirely. The problem of antennas, particularly in big cities, is far from being solved. In the first place, an antenna must be in a direct line-of-sight with the broadcasting transmitter unless, perchance, a perfect reflected image is obtainable. In one area of New York City receivers can't pick up a certain transmitter, but they do very well with the signals inadvertently bounced off some cliffs on the west side of the Hudson River.

Apartment-house owners object to the installation of a forest of antennas on their roofs. That means that a common antenna for all the television receivers in a building must be erected. Moreover, one television receiving set may have a tendency to "feed

(Continued on page 214)

Television for You

(Continued from page 210)

back" into the antenna, affecting the reception of other sets using it.

The economics of the growing television industry are giving the treasurers of the broadcasting companies no end of headaches. It costs about \$25,000 to produce a half-hour show such as that put on by Jack Benny on Sunday. It will cost at least double that for a television program. That's because—if a play is presented—stage sets have to be built, even as Hollywood builds them, and actors and actresses have to memorize their lines. In presenting a show for the ordinary aural receiver a maximum of four hours of rehearsing is done—there is no scenery, the players are not costumed, and they may read their lines from the script and wear horn-rimmed glasses on their noses when doing so. For every hour of a television show 18 to 35 hours of rehearsing are necessary.

The high cost of production—to be borne, of course, by the advertiser—isn't as bad as it appears at first glance. Network shows ultimately may be "canned" on movie film, which projects nicely through a television transmitter, and be sold to scores of independent television broadcasting stations.

The economics of transmission will add to the cost of programs. There are three ways of long-distancing television signals: by buried coaxial cable, by retransmission from relay stations spaced a few miles apart, and—a brand-new suggestion—by equipment lodged in airplanes flying in the stratosphere. (See "Stratovision" and FM Radio from Planes 30,000 Feet Up?" pages 92-93.)

Television signals, of course, have some of the properties of light beams. They are quasi-optical. They travel in straight lines. Those emitted by the National Broadcasting Company transmitter atop New York's Empire State Building, highest in the world, can be picked up no more than 45 to 55 miles away, due to the curvature of the earth. What engineers know as "refraction" adds about 10 miles to the "carry" of the signal.

Engineers of the telephone companies say coaxial cable transmits television signals most faithfully, without distortion. But 339 miles of it, between Meridian and Jackson, Miss., and Shreveport, La., cost \$7,056,000 to lay, and a rough estimate for the country as a whole is that television coaxials reaching 95 per cent of the population will cost upward of \$100,000,000.

(Continued on page 218)

Television for You

(Continued from page 214)

Radio relay would be less costly, but that would require, among other things, "apex" stations. This means, literally, stations built on the peaks of mountains to lift the signals over the upthrustings of the terrain. RCA is concluding five years of experiments with unattended radio relay stations between New York and Philadelphia. The transmission by plane might be less costly.

It would be nice to say that all the television engineers are of one mind on what ought to come out of a receiver. They aren't. They hold views more divergent than the automotive engineers who produce in-lines and V-8's. What that really reduces to is an argument between most of the manufacturing and broadcasting industry on one side and the Columbia Broadcasting System on the other. Right now, through the efforts of a trade group, the "Television Broadcasters Association," the scanning lines that you will see on your screen are standardized. But some technicians, both in this country and abroad, insist that almost twice the "definition" can be obtained from finer-grained images. The French have succeeded, in fact, in producing better images.

CBS, which only broadcasts, and NBC, which is a subsidiary of RCA, a manufacturer, are at swords' points over the question of transmitting color. NBC says it will be years before color television will be practical.

The argument between NBC and CBS is more than academic. CBS next month will begin the experimental broadcast of television in color, using a transmitter on top of New York's Chrysler Building, second in height only to the Empire State. The man sparking the CBS campaign for what the company terms better television in color is Dr. Peter C. Goldmark. He exudes optimism.

"In the near future," he says, "we will have television pictures that are made up of approximately 1,000 lines, instead of the prewar 525 lines. The pictures will contain about twice as much detail of light and shade. The eye won't be able to detect the lines. It will make possible pictures at least 18 inches in height."

To get such pictures, he explains, television has had to "move upstairs" in the radio spectrum, into the ultra-high frequencies. It has had to increase its band-width of transmission from six to 16 megacycles.

All that backstage scuffling that is going on doesn't mean that television's arguments can't be settled. They are only evidence of growing pains.—DEVON FRANCIS.

POPULAR SCIENCE