

Fig. 4. The RCA estimate of television yearly cost.

SENSATIONAL reports published in newspapers that television is ripe for practical utilization, and that in a short time to come it will be introduced into the home, have aroused hope among optimistic radio listeners that this technical dream finally has become a reality. The pessimists however, in reading between the lines fail to envision such fast progress.

If we wish to find the reason why these pessimists—and there are many of them among leading radio engineers—have this negative opinion about an early achievement of television, we should remember that television can not really be considered as just a supplementary art to sound broadcast, but rather as an ardent competitor, subject

80 TELEVISION TRANSMITTING STATIONS NECESSARY

All of us know, that, at least at present, ultra-short waves are the only means by which television images of better quality can be radiated. However, since the effective range of ultra-short waves is very small, it is necessary to employ a large number of transmitters if most of the country is to be covered with television service.

According to estimates made by RCA Mfg. Co., 80 ultra-short wave stations will be necessary to give television a distribution equal to that of broadcasting. This firm (which should know best the cost of a suitable television station) has quoted its price for one station as approximately \$500,000, which brings the total sum required to install a television network consisting of 80 such transmitters up to \$40,000,000—or \$500,000 per station. As RCA further stated, an additional \$40,000,000, must be spent for an interconnecting network consisting of the

WHAT ABOUT TELEVISION?

Here is a glance behind the curtain which hides practical television from our view—after reading this lucid explanation every reader of RADIO-CRAFT will understand why television has not "arrived".

W. E. SCHRAGE

to entirely different technical and financial conditions; and since money is the nourishing mother of all technical progress let's not only consider the technical problems of television, but also the financial complications which are involved in this interesting means of communication.

newly developed coaxial cables, since normal telephone lines cannot be used for this purpose. The initial investment cost, in case television is to be introduced on a nation-wide scale, is, therefore, about \$80,000,000 (see Fig. 1).

Despite the fact that \$80,000,000 does not seem much money on paper—especially when it is remembered that such large-scale investments are fairly normal transactions among "big-money people"—one should keep in mind that in the realm of radio entertainment it is a tremendous amount of money since all 600 American broadcast stations together have an estimated value of only about \$60,000,000, and this sum includes even the good-will! (See, "Milestones in Broadcasting—Part II," *Radio-Craft*, February, 1936.)

THE PHILADELPHIA PLAN

A well-known Philadelphia group, not financially interested in present radio networks and probably not much interested in the manufacture of sound broadcast receivers, recently permitted some reports to "leak out," the gist of which are as follows: This group intends to erect in the beginning a television network of 10 stations, so located as to cover the principal centers of population. Among the cities selected are Boston, Los Angeles, New York, Philadelphia, Portland and San Francisco, etc. This network it is claimed would cover 40 to 50 per cent of the population of the country. Each station has been estimated to involve an outlay of about \$250,000, which brings the total cost for the entire group of 10 stations to about \$2,500,000.

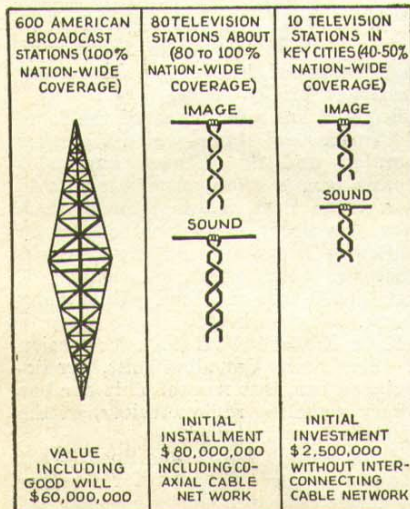


Fig. 1. Television compared with sound broadcasting.

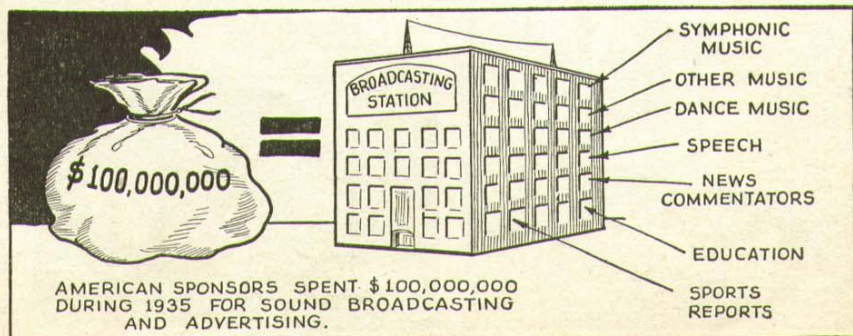


Fig. 2. The cost of sound entertainment to advertising sponsors at the present time.

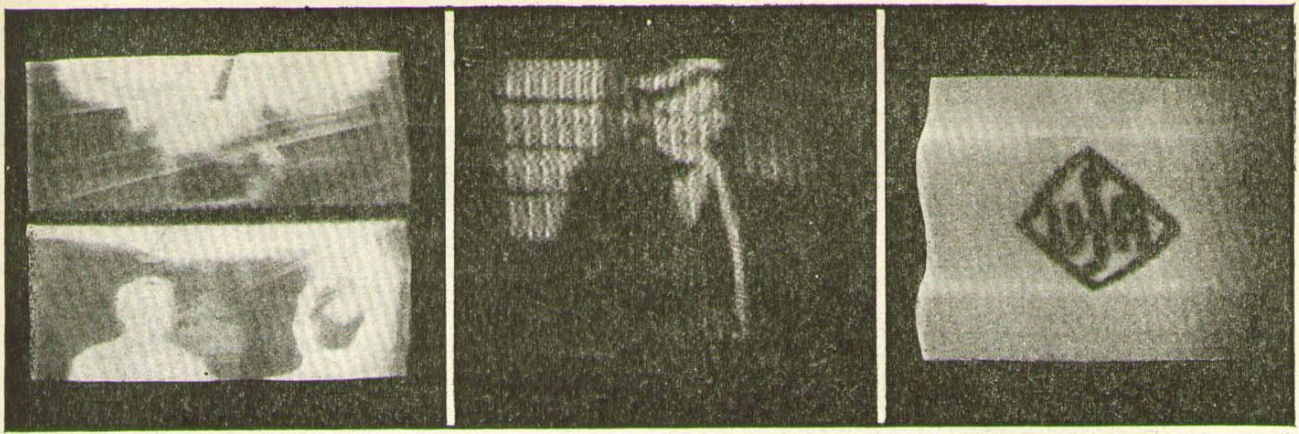


Fig. A. Incorrect television receiver adjustments. Left, the frame (horizontal deflection) has been incorrectly adjusted; center, when the receiver oscillator is off adjustment, cutting off one side of the signal. Right, a 60-cycle voltage interfering with the images.

THE AIM OF BOTH PARTIES

This large variance in estimated price for a *single station* (or ¼-million vs. ½-million dollars) is a valuable key in understanding what goes on behind the curtain of television politics. There are, then, two outstanding groups that plan to put "big money" into television.

One group, bearing in mind (a) its respectable income from licenses to receiver factories; and (b) its large investments in broadcasting networks, does not dare to make hasty experiments which would endanger these sources of income. They consider also the important fact that in case regular television broadcasting should start in one single city only, the sale of sound broadcast receivers all over the country would be instantly paralyzed. The second group however is interested in television broadcasting *only*, and desires early financial returns from their investments in preliminary experiments, regardless of how much other branches of the industry must suffer.

However, both projects are at present no more than "projects" and 10 times as many reports full of alarming news "leaking out" from Philadelphia will not accelerate the first group into taking any premature steps since they know very well that television receivers because of retail prices being too high at present have no large-scale market. Another important point in their calculation is the fact that without a large-scale distribution of television receivers the project of television broadcasting is doomed to failure.

THE \$400 RECEIVER

If we look at the following facts we will easily see that there must be a delay until television receivers are more reasonable in price. On January

1, 1936, there were, in the U. S. 22,869,000 families operating one, or more than one, radio receiver in each home. In addition, 3,000,000 auto-radio receivers are at present in use, which brings the number of "radio-outlets" to about 25,000,000.

To feed these 25,000,000 "outlets" with proper entertainment, American advertising sponsors have spent during 1935 approximately \$100,000,000, or in other words \$4.00 per "outlet" (see Figs. 2 and 3).

Since the average price of a modern television receiver is at present \$400 (starting with \$300 and varying up to \$800), it is difficult to imagine that more than 100,000 television receivers will be in use in the first 3 years. This is a very important factor worthwhile keeping in mind, as we shall see.

We know by RCA estimates that in case a nationwide network of 80 television stations is to be operated it will cost \$58,000,000 a year for transmitter operation and depreciation (see Fig. 4). Expressed in the shrewd language of the balance sheet this expenditure asks for a gross revenue of about \$100,000,000 or a gift of \$1,000 to each owner of a television receiver by the sponsors!

A RIDICULOUS PROPOSITION

To believe that radio sponsors will

spend this tremendous amount of money is ridiculous. But let's be generous, and double the estimated number of television receivers in use during the first 3 years (at a price per receiver of \$400). This would bring the total up to 200,000 television sets. In addition to this "boosting" we shall cut the quite liberal estimated sum of transmitter operation cost, etc., and also the required gross revenue in half; which would bring us down to a sum of about \$50,000,000.

However, once again, the balance sheet would indicate the impossibility of such a beginning, because television sponsors will have to make a donation of about \$250 for each television receiver in operation, which leads us again into the dark. Much more favorable financial conditions are possible under the "Philadelphia Plan," which proposes the initial installation of only 10 stations, to be erected in important key-cities. This plan it is claimed, provides a coverage of about 40 to 50 per cent of our population. Transmitter operation, depreciation, etc., for such a small network would take approximately \$2,000,000, but still the production cost of the program would ask for an expenditure by the sponsors of about \$30,000,000, if the television program is

(Continued on page 102)

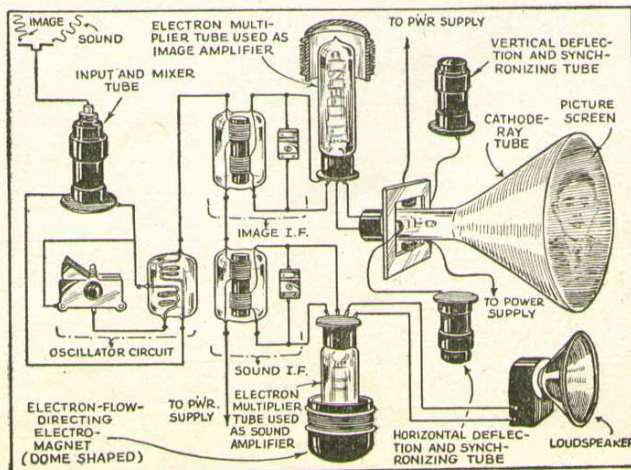


Fig. 5. A television receiver of the future. Electron multiplier tubes are employed. There are only 5 tubes in the complete receiver!



Fig. 3. Cost of radio entertainment, per set.

WHAT ABOUT TELEVISION?

(Continued from page 73)

to be an attraction capable of drawing attention away from sound broadcasting.

These considerations about the future of television have shown us clearly that the most important condition for its introduction into the home is not the money to be spent for the installation of a television network, but the prices asked for a receiver. To make television popular the sets will have to sell at a much lower price! But, with popularity and volume, we believe that they will cost no more than a better-grade radio receiver costs today and they will become just as popular.

Although the cabinets of present television receivers bear close resemblance to sound broadcast sets they are actually highly-complicated devices consisting of 4 or 5 distinct parts, each of which must not only function correctly within its own sphere of activity, but must synchronize with every other part of the receiver.

The complex design of a present television set is clearly indicated by the number of the control knobs required. *The recently-demonstrated experimental RCA receiver worked only after 14 knobs were manipulated.* Of course, after the image had once been tuned in correctly, at least two-thirds of the control knobs did not require further attention; but nevertheless it is hard to imagine that a layman can handle such a labyrinth of control devices.

This single detail about the design of present American television receivers indicates that we have today about the same situation with television receivers as was the case with sound broadcast receivers in the early days of radio. Receivers were forbiddingly expensive, and had a large number of control knobs. Today there is only one control knob left for the actual tuning, and the 2 or 3 additional knobs which still remain are operated only once in a while, as for example when a change in wave-range is required. It took a long time to "induce" the many control knobs of sound broadcasting receivers to disappear but each time a knob disappeared a part of the initial high price disappeared too, and today we have the cheapest but the best radio receivers in the world.

5-TUBE TELEVISION SET OF THE FUTURE

The same evolution is to be expected as far as television-receiver design is concerned. We are at present only at the beginning of the design of receivers for high-definition image reception, and yet there are already some interesting signs that in a short time to come television receivers will be simplified to a considerable extent. Instead of the 32 tubes applied in the newest RCA television receiver, only 4 or 5 will be necessary in the television receiver of 1945. The main trick of these simplified television receivers will probably be the newly-developed electron-multiplier tubes (see Fig. 5). These tubes are at present quite expensive, and consequently do not promote price reduction in television receivers.

However, what mass production is able to do as far as tubes are concerned has been impressively indicated in the past. The first radio tubes were sold for about \$10 each. Tubes of today having an efficiency 5,000 times greater than the initial ones are listed at about \$1.00 or less. There is no reason to believe that the new electron-multiplier tubes (which also have the advantage of eliminating a great number of the television receiver circuit elements now required) should not be sold at a relatively reasonable price. This, if accomplished, would bring the television receiver within the reach of the man on the street.

(The contention had been made that such multiplier-type tubes, due to the number of elements incorporated in one envelope could not be maintained at the requisite high vacuum. But it will be recalled that Loewe in Germany has had on the market for several years multi-element tubes incorporating in one envelope not only the elements which comprise several tubes, but also all the resistors and condensers that go toward making up a complete amplifier—and even a radio receiver!—*Editor*)

THE IMPORTANT ROLE OF THE TELEVISION AMATEURS AND EXPERIMENTERS

Our discussion so far has indicated that there are no short-cuts to the inauguration of television which would bring it within the next

year or so into every man's home. Two impediments have first to be overcome:

(1) The "1 tuning knob" television receiver has to be designed which must sell for a reasonable price (see the article, "World-Wide Television," *Radio-Craft*, August, 1935, page 80, Fig. 31).

(2) Quite a bit of interest has to be created for this new branch of radio communication by demonstrations in the vicinity of the listener's home.

Both tasks cannot be solved without the help of the amateur and experimenter.

Amateurs have actually boosted broadcasting reception technique in the past, and in fact some of the best men at present in the American radio industry formerly were amateurs. After broadcasting transmission and reception changed from a hobby into a money-making enterprise, amateurs were actually thrown out of the broadcast range, and restricted to the short-wave field, which at that time was without importance.

Again radio amateurs have done pioneer work, and have actually been responsible for exploring the short-wave bands. Their success in bridging continents with a few watts has not only promoted a completely new realm of long-distance communication but has also fertilized the field in which American radio industry has harvested the boom of the all-wave receiver.

The few engineers kept busy in the nation's leading television laboratories to solve design problems cannot do as much of the work as is necessary; nor can they attempt to equal the accomplishments of properly directed mass activity. To make television receivers cheaper and easier to operate, then, the aid of thousands of radio amateurs (and experimenters) will have to be enlisted.

In addition to their technical contributions towards fool-proof television receivers, amateurs will create interest among radio listeners by their demonstrations. This free publicity will again fertilize the field of which the American radio industry will harvest the fruits of its third boom, the fruits of the television era to come.

TELEVISION AS HOME ENTERTAINMENT

(Continued from page 80)

TELEVISION'S DEMANDS UPON THE ONLOOKER

Television broadcasting, on the other hand, absolutely fixes the looker. The room must be partially darkened, the looker must go to a specific place and must keep his eyes fixed on a small picture area (at this time about 5 x 7 ins. in size). If his attention is distracted, he completely loses the program. *There is no chance to do other things nor can wandering attention be tolerated during a television broadcast.* In fact, it demands in the home, and with relation to a small picture, all the attention which the audience must focus on the large screens in a motion picture theater.

Perhaps present broadcasting has taught the radio audience bad radio manners and perhaps television despite the nervousness or restlessness of many people, will help them to develop habits of attention to their own benefit.

The moral of all of this is that television is extremely new and untried; that its development will of necessity proceed experimentally and slowly; and that the burden upon those who create the programs will be indeed a heavy one. In fact, television programs must be so supremely interesting and attractive that they will justify, on the part of the lookers, the expenditure of (1) money, (2) time, and (3) attention—which are some of the most valuable things which the audience can give. Probably the needs of the situation will develop highly ingenious program creators who will accomplish what is needed in due course. But years of study, experiment, and program development must pass before the great television audiences of the future will be fully satisfied by the entertainment value of the programs sent to them.

Please Say That You Saw It in RADIO-CRAFT