# What Television Needs

*Although television is still necessarily in the laboratory stages, the author points out the immediate needs of this new baby industry of radio and recommends improved program technique*

THE television industry has come to the crossroads. For more than a decade it has existed chiefly in laboratories in this country and abroad. Research workers have been busy with television principles and their application. In many cases independence of thought has reigned, with its advantages and disadvantages. Independence of work has resulted in much duplication of effort in arriving at the same end. It has meant the lack of proper interchange of thought and ideas. But at the same time it has resulted in the growth of television along several fronts at once, each front being extended by its group as quickly as possible in the hope that its particular method would be the eventual victor in the race.

Thus we now have several organizations in this country developing television along different lines. Hollis Baird of Boston has attracted widespread attention by his attempt to merchandise television receivers in kit form through the Kresge stores, an experiment tending to lead to the development of a large television audience. This move also represents an effort tending toward the simplification and standardization of equipment.

### *Large-Size Images*

In Chicago, U. A. Sanabria has gone in for large-size television images, even to the extent of projecting them on a 10-foot screen. And, having accomplished this feat with some measure of success, he is showing these large television pictures in motion-picture theatres around the country. While some newspaper writers, comparing television with the motion picture rather than realizing to what extent the difficult problems have been solved by Sanabria, have commented on his work with a lack of enthusiasm. Engineers and television enthusiasts, however, cognizant of the difficulties encountered, praise both his courage and his ability.

The R.C.A. engineers have confined their television to the research laboratory, from which little definite knowledge has come. The G.E. research men, under the direction of E. F. W. Alexanderson, have contributed much. The Westinghouse engineers, likewise, have developed their own type of television, utilizing the cathode-ray tube.

And Jenkins, perhaps the pioneer television worker in this country, has been striving toward perfection, sticking to the mechanical scanner, but substituting the "lens" disc for the "hole" disc and projecting the image on an enlarged screen by the use of a neon crater lamp. So television is advancing technically on many fronts.

The question now confronting television concerns the use of this knowledge and equipment in organizing the industry on a profitable basis. Television and equipment must be linked with television broadcasting. The value of television receiving equipment is predicated on the existence of television broadcast programs that will be interesting to the public, and derives its value, not of itself, but as a means of receiving these desired programs. The first interest shown in television was by the scientists, who were and are concerned primarily with the technical aspects, the methods of broadcasting pictures and receiving them. But so long as interest is confined to scientists, television as an industry cannot grow.

*By* **D. E. Replogle***

Public interest *must* be enlisted! Since television has been so entirely in the hands of scientists, this public interest was first aroused among scientifically minded people—young men who were radio enthusiasts, amateur operators and the like. This move was the first for two reasons: in the first place, the television engineers had a greater acquaintance with these other scientifically minded people than with any others, and secondly, because the quality of the picture received was insufficient to hold the interest of anyone not concerned with the manner of its reception rather than the picture itself.

This primary interest in the means rather than the end is definitely on the wane—which is a good sign, for taking its place is an interest in the program, an interest shared by a much larger public and opening a large market for television equipment. Already we might say that the shift toward the program is such that about as much interest is centered in the program as in the technical aspect of television. And this trend will continue as television science becomes standardized and loses its "novelty" appeal. To aid this, the television programs will improve as does the manner of their transmission and reception. The program will be important rather than the manner in which television operates, just as in motion pictures the public is interested in the picture rather than the manner in which it is filmed, projected, sound-tracked and reproduced.

### *Entertainment Programs*

Should the entertainment field take upon themselves the building and merchandising of television programs, even now before the technical end is fully perfected, using just the technical facilities that are at present available, the public interest in television could be tripled within a few months, in my opinion. But, unfortunately for the industry, the entertainment world is waiting until the technical end has been perfected before entering the field—quite contrary to their action with the motion picture and radio, both of which were exploited by entertainment interests with great rewards when technical development paralleled the present technical status of television.

At present television is in the hands of technicians, whose interest and ability is along technical lines. Still, these men realize that the most important step at the present time is the enlisting of the entertainment interests in television. This is a thing which the engineers are not in a position to do themselves. It is a thing which will give television its present desperately needed public interest. It will do more to advance the television industry if undertaken immediately than any technical advancement that is likely to come out of the laboratories within the next year. Moreover, it will be profitable to those who exploit this field almost from the very beginning. And since the entertainment world is in need of some exhilarating branch, television offers the ideal field for their endeavors.

On the other hand, it should not be thought that the entertainment interests can step in and immediately develop the entertainment angle of television overnight. It took many years for the motion-picture production men to arrive at a motion-picture technique that placed that industry in a unique position so far as offering a form (*Continued on page* 55)

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more rugged, to withstand rough treatment in the automobile.

The tube has been so designed that it can operate from either 135 or 180 volts B supply, getting the grid bias from the same battery.

Load impedance can be chosen for minimum second-harmonic distortion. The second harmonic is zero, for a load of 8,000 ohms, but the third harmonic is still ten percent high. More economical and distortionless amplification can be obtained by operating two tubes in push-pull as a Class B amplifier. The design of the tube permits the C bias to be obtained through a resistance of 900 ohms, between A— and B—. The usual condenser should be connected across the bias resistor.

The even harmonics cancel out in this case, and the plate load can be chosen for lowest third-harmonic distortion. Figure 8 shows the plate current, output power and third-harmonic distortion plotted against load impedance for the LA, the -38 tube and the -47 tube. With a load impedance of 20,000 ohms, the distortion is minimum, about three percent, and the output is nearly equal to that of the -47 tube.

# Fringe Howl

(*Continued from page 28*)

and R is the circuit resistance. Other factors also determine the presence or absence of fringe howl, the capacity of the by-pass condenser, C, for example, but in general these are so small that they may be ignored.

When use is made of plate rectification a different situation is encountered. Although this type of detector is rarely used in high-frequency receivers, a discussion of fringe howl in this circuit will serve to complete the subject. With a grid-bias detector,

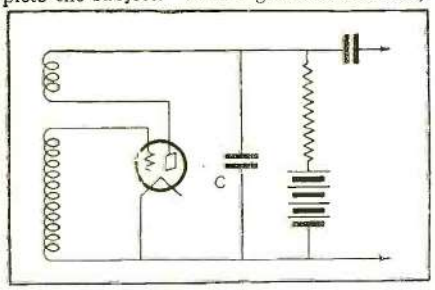


*Figure 4. This shows the circuit of Figure 1, rearranged for parallel plate supply. Isolating the transformer from the d.c. plate supply solves the fringe howl problem*

as opposed to the grid-leak detector, the average plate current rises when oscillation begins and hence the above discussion of fringe howl in the "leaky-grid" detector does not apply. Fringe howl will only occur in plate detection when resistance coupling is used with a comparatively large by-pass condenser connected between its plate circuit and the negative return, as in Figure 3.

Reasoning similar to that used in the grid-leak case may be applied here. In the grid-bias detector the rise in plate current with the commencement of oscillation is concurrent with an increase in the voltage drop across the plate-feeding resistor. Initially the by-pass condenser is charged to the battery potential, minus the voltage drop in the resistance caused by the normal plate current of the vacuum tube. Advancing the oscillation control, the drop across the plate resistor increases, but the charge on the condenser maintains the plate voltage applied to the tube until the charge is discharged through the tube resistance. When the charge on the condenser reaches the voltage of the battery, minus the increased drop in the resistance, the tube ceases oscillating and the plate current falls. The plate e.m.f. rises, delayed, however, by the charging of the condenser, and the cycle is repeated, resulting once more in fringe howl.

We now turn to ways and means of curing fringe howl. For a long time radio amateurs were alone in their struggle against this receiver malady. By their oftentimes unscientific, but nevertheless effective, experimenting, they found that a resistance placed in parallel with the first audio-frequency transformer secondary usually eliminated the fringe howl. In the light of the preceding discussion, speaking only of grid-leak detection, it is apparent that its function is to dissipate any e.m.f. that may be developed across the transformer primary. This method is not without its disadvantages, however. In difficult cases of fringe howl the resistance value must be so low that a large portion of the signal, as well as the fringe howl, is lost. If the resistance must be much less than 50,000 ohms, it is uneconomical of signal strength to resort to this method.

Since an inductive impedance must be in the plate circuit of the grid-leak detector to make fringe howl possible, a convenient way to eliminate it is to use resistance coupling of the detector to the succeeding a.f. amplifier. Transformer coupling has its advantages and some designers might not be willing to forego the additional gain attainable with transformer coupling. The solution, then, is to use a combination of the two systems. Such a circuit is shown in Figure 4, in which the detector plate voltage is led through a resistance, but the audio-frequency component is taken off by a transformer.

At present the plate rectifier is rarely used as an oscillating detector, but it is clear that, in cases of this kind where frings howl is encountered, it may be eliminated by either turning to transformer coupling or by reducing the size of the by-pass condenser and increasing the tickler size proportionately to compensate for the change.

# What Television Needs

(*Continued from page 15*)

of entertainment different from anything else is concerned. The talkies likewise suffered a period of experimentation in which the motion-picture industry sought frantically to evolve a technique with which to protect its huge investment. It will be still more difficult to evolve a form of television presentation. But that work must be done. And it were far better to do it now when the investment in the television industry is relatively small than to be forced to rush about haphazardly to protect a giant.

The television technicians are more than willing to co-operate with entertainment interests in providing programs of entertainment value to the public rather than merely of scientific value to engineers. Television executives are willing to share the profits of many long years of technical research with entertainment interests who can show them how to popularize television, which must be done through the program end. The television industry, manufacturers and dealers, are prepared to produce and merchandise television transmitting and receiving equipment in accordance with the increased demand built up by programs.