placed before the transmitter pick-up at station WLEX, in Boston, is a microphone stand with the station letters mounted on it. If the image of the microphone stand and letters is received with the object erect but reversed (so that the letters read "XELW") then the scanning disc is being so rotated that the holes pass the glowing plate of the neon tube in the wrong direction.

The correction of this fault is not so obvious. It is plain that whether the experimenter scans the plate from top to bottom or from bottom to top, makes the difference between the picture being right-side up or upside down. Similarly, whether the experimenter scans the plate from left to right or from right to left makes the difference between seeing the image correctly or reversed.

How can we make the holes pass the plate in the opposite direction and still progress from top to bottom? Reversing the rotation of the disc alone will turn the image upside down. The disc must also be turned around on the shaft of the motor. Thus if the image is right-side up but reversed, we must reverse the direction of rotation of the disc, and *also* remove the disc from the shaft and turn it around with the other side out.

In spite of the fact that these two factors make three wrong combinations and only one correct one, the wrong combinations provide perfectly recognizable images whose worse fault is to be upside down.

Should the image obtained be *a negative* instead of a positive, the trouble is due to reversed A.C. connections to the neon tube. Interchanging these connections will correct the trouble.

In the experimental work at WLEX it has been found that the television signal may be almost submerged in noise and yet provide an image. This fact will undoubtedly be of interest to those who are already trying to receive the signals from WGY and WRNY and who think that reception is hopeless, because of the noise caused by daytime electrical disturbances and the static of warm weather.

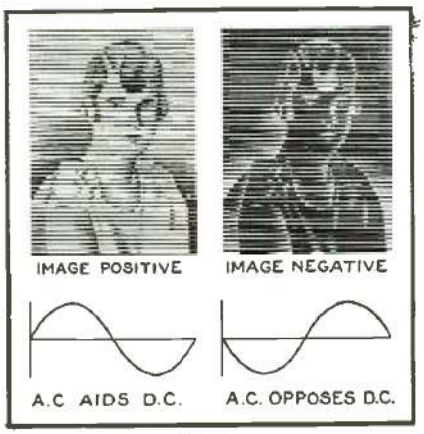


Fig. 4

When the image is negative, as shown at the right, the A.C. signal is working against the battery. Reversing the leads to the lamp is the simplest remedy.

It is true that, when we are interested in listening to a signal, the noise level is an important determining factor; but in the case of television, the noise level may be high—in fact, so high as to make speech transmission hopeless—and still a fair image can be received. Of course, noise does not help matters; it produces a mottled background and tends to speckle the picture itself. Extreme noise will produce dark lines of varying width across the field of the image. But in spite of this, the picture is there and, since noise is *non-periodic unless introduced by vibration from the motor and disc*, the speckle and dark lines are continually shifting their positions while the image remains generally stationary or moves in an orderly fashion.

Therefore, if in the experimenter's attempts to receive television images, he finds the signal more or less accompanied by noise, he should not judge the noise by speech broadcast standards, but go right ahead and try the signal on the disc. It goes without saying that the minimum of noise should be introduced by the set itself. Loose connections in the microphonic tubes, noisy resistors, and other causes of noises should be avoided.

When a good television signal is being received, it sounds quite like a slowly-revolving circular saw which is slightly off center. In other words, one hears a high-pitched note which might correspond to the tooth frequency, and broken up into groups whose frequency corresponds to the rate at which the saw (the disk) rotates. The latter we have referred to as the group frequency while the high-pitched note is the modulation introduced by the scanning spot. If the disc speed is high and the signal is weak, it may easily happen that the only sound audible in a pair of phones will be the group frequency. Even so, this is no indication that a fair image cannot be received.

Television Teems with Trials for Telexperimenters

Editor, Radio News:

In the interest of the science please allow me to make this suggestion: get the broadcast stations and the experimenters in television together and confine their experiments to the same type of scanning discs and same speed. You can well see the trouble that is sure to arise, with every different station using a different number of holes and with different-speed motors.

As yet I have not tried to receive any pictures from these stations on account of atmospheric conditions and the distance from the televisor; having confined my experiments to a simplified method of synchronism. I can get a stable speed on one frequency but, when shifting from one speed to another, great difficulty is experienced; and of course the layman will have even more trouble when he attempts this adjustment. Then too, how many television receivers do you suppose can be sold when the user is told how many discs will have to be changed before tuning from one station to another?

Please accept this criticism or rather this suggestion in the same spirit it is given.

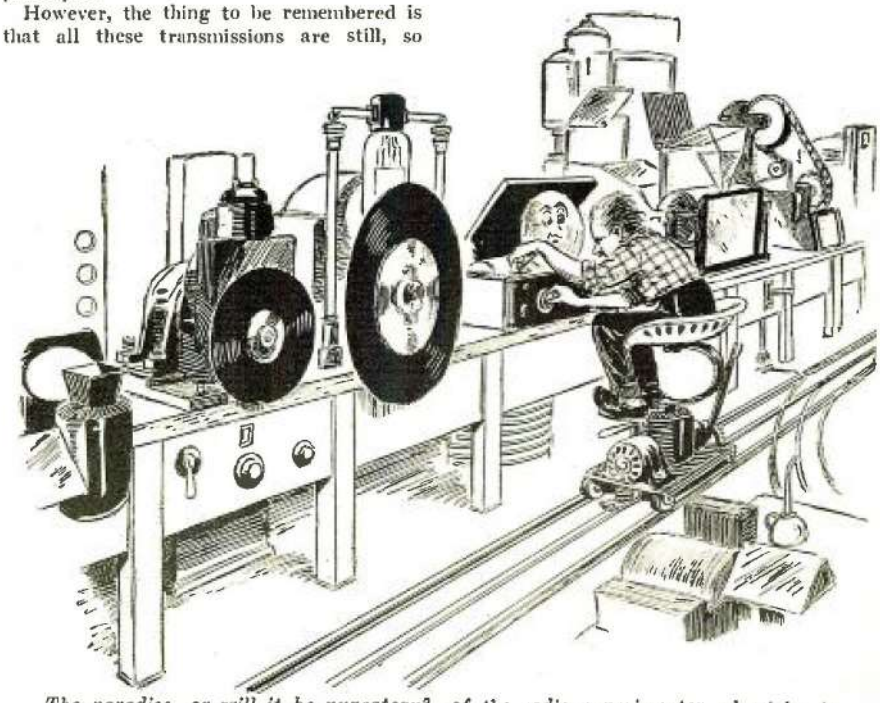
Wilmer N. Barnes,
1120 *No. 22 Street, Waco, Tex.*

A DAY-AND-NIGHT TASK

From one standpoint, our correspondent's good-natured protest may seem well justified; the numerous systems now projecting radio television, radio movies, radio photographs and the like seem to call for such activity on the part of an enterprising experimenter as our imaginative artist has portrayed.

However, the thing to be remembered is that all these transmissions are still, so far as the working details are concerned, very much in the stage of experiment. *The*

(*Continued on page 475*)



The paradise—or will it be purgatory?—of the radio experimenter who tries to keep up with everything new in radio imagery. (Drawn from imagination.)

Television Trials

(*Continued from page 429*)

best systems must be worked out by actual practice. Will transmission be easier, and reception clearer, on this waveband or that? Which mechanical system will be most satisfactory in the long run?

We may compare the state of television and its kindred arts to that of transportation in 1832: it is no time as yet for standardization. The "Tom Thumb" was a good locomotive in its day, but railroading would have been at a sad pass if it had to be standardized on the basis of such machinery. So with television: it has yet a few years ahead of it in which to be perfected, and undoubtedly the final apparatus which will be used for home, as well as commercial, scientific and governmental reception will be as much superior to that with which we are now working as the great passenger and freight locomotives of today exceed the "Tom Thumb" in efficiency.

SPECIALIZED SYSTEMS FOR ALL NEEDS

It is probable that, even when television has become a perfected art, we shall be a long ways from standardization. The problem of the frequency bands which can be allotted for the purpose is one of the principal ones: even if broadcasting is revolutionized, it is probable that comparatively-limited bands will be used for the television transmissions which will be receivable in the home. Much more elaborate apparatus will be used to project pictures in theatres and other places where large groups of spectators are gathered. (Again, we need a new word in the language: perhaps a "televisence" will signify the gathering who are looking on the screen of the televisor.) Other purposes will demand elaborate apparatus, operating probably on wavebands which are today useless even for experiment, but which will yield a frequency range capable of carrying the most detailed images, of largest sizes.

For the present, the most advanced televisionaries are yet in the kindergarten class, and every conceivable system and arrangement must undergo careful test by engineers and other experimenters: the field is too wide for any one man or group of men, with even the most elaborate equipment that scientific organizations possess. The home experimenter will have to nibble at this dish and that, for the banquet of television dainties will present too many courses for one digestion.

However, Radio News does sympathize with those of its readers who are desirous of keeping fully abreast of all that is going on: and to the best of its ability, it will present ideas for the use of apparatus with which it will be possible to receive as many different systems as possible. Apparatus manufacturers, too, are keeping this contingency in mind: and, while different television systems permit of varying ranges of speed and detail of pictures, we shall undoubtedly have soon combination discs which may be used, by simple adjustment, for reception of coarser or finer images, at different locations of the glow-lamp and scanning hood. And, too, we may before long find the scanning-disc system entirely superseded by more refined electrical devices.

James Clerk Maxwell predicted the laws of radio in 1867.