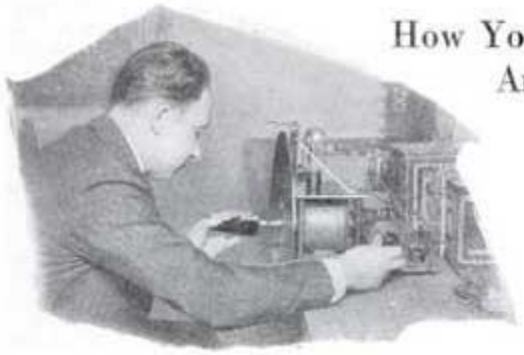
Your First Television Set



Adjusting speed of scanning disk with a tachometer, or speed indicator, in Popular Science Institute laboratory.

How You Can Build and Operate an Amateur Experimental Apparatus Hooked to Your Radio Receiver

By

JOHN CARR

THE accurate construction of one of the most important parts of a television receiver, the scanning disk, was described in the December issue of POPULAR SCIENCE MONTHLY.

The three vital parts of the television receiver are the scanning disk, the neon tube, and the motor that rotates the disk. There is, of course, the radio receiver, but this is not distinctively television equipment, because it differs in no essential from any really high-class radio broadcast receiver.

The other parts of the television equipment are merely accessories designed to assist in the proper functioning of the important parts.

You must have a high-grade radio receiver to get satisfactory results in television. This means that the receiver must being in the station with plenty of volume whether you are receiving on the broadcast or the short-wave band. Furthermore, the audio amplifier of the receiver must amplify without serious distortion all audio frequencies, from the lowest commonly used in the broadcasting of music or speech, up to at least 5,000 vibrations per second. This range will give fair results. On some of the television broadcasting, even better results will be obtained with a receiver that will amplify up to 15,000.

A variable speed motor is an absolute necessity, for you must be able to rotate your scanning disk at a speed which will be exactly in step with the scanning disk used in the television broadcasting station.

THIS matter of obtaining synchronism is the most difficult problem at present. There is no method available for amateur use that does not require constant and extremely careful hand adjustment all the time the vision is being received. The slightest error will throw the vision into a chaotic blur of dots and streaks.

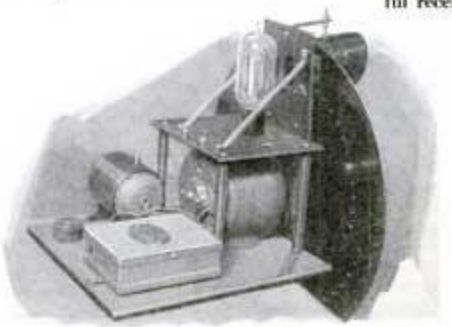
In the Popular Science Institute of Standards laboratory we have found that the simplest and most accurate way to get synchronism is to adjust the motor rheostat so that the disk will run slightly faster than is required. Then we rest a hand in a comfortably supported position close to the edge of the disk and lightly touch the side of the disk close to the rim with the ball of the thumb. The slight friction retards the disk until it strikes synchronism and it is held in step by varying the touch of the thumb.

This sounds like a rather crude system, but it works. With astonishingly little practice you will be able to hold the vision in the frame or picture space which, of course, is in front of the plate of the neon tube.

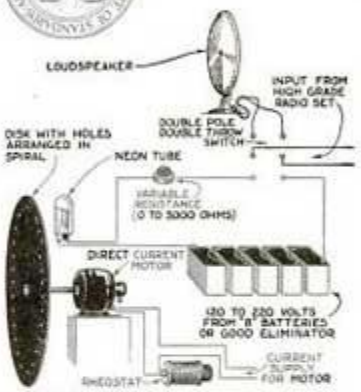
WHEN the image is being perfectly received it is stationary in the frame. As the disk starts to rotate either too fast or too slow, the image will lean in one direction or the other and will start to drift out of the frame. You increase or decrease your thumb pressure accordingly and bring it back.

The illustrations show a typical amateur experimenter's television apparatus as set up in the Popular Science Institute laboratory. At the top of the page a tachometer, or speed indicator, is shown being used to adjust the disk speed. If you haven't such an instrument you will have to experiment until you hit on the right speed.

There are no special rules for setting up the neon lamp except to get it as close as practicable to the back of the television disk, with the side of the plate that glows squarely toward the disk. To adjust the neon tube voltage, simply turn the adjustable resistance until the tube glows steadily but as faintly as possible. Directions as to the proper tube voltage are packed in the box with the tube.



Rear view of the typical experimenter's television apparatus as set up in the Popular Science Institute laboratory, showing usual arrangement of the parts.



This pictorial wiring diagram shows in detail how to hook up the television apparatus.

THE diagram on this page shows the wiring. You must, of course, see that the radio receiver is fitted with an output transformer. No worth while results can be obtained unless you use at least a type 171A tube in the last stage of the set and operate it with 180 volts on the plate. Better results are obtained if a still more powerful amplifier is used.

Television receiving must be done in a darkened room. The image is not strong enough to be seen if the room is flooded with daylight. A ground glass in front of the scanning disk also cuts down the light and can be used only with a powerful receiver. The ground glass is not a necessity, however, as you see the vision just as well by looking directly at the plate of the neon tube through the holes of the scanning disk.

When you first receive a vision you are just as likely to have it upside down as right side up. If it is upside down, take the scanning disk off the motor shaft and turn it the other side to. The image will then be seen right side up. The image also may be wrong side to. This is of no particular importance on faces or ordinary objects, but it will make type read backward. To cure

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it, reverse the scanning disk and also reverse the direction of rotation of the motor.

There is also the possibility that the image may be reversed. In other words, it will look like the negative film from which prints are made instead of like the print. To get rid of this trouble reverse the wires leading from the radio receiver. Once you have the right combination of disk face and motor rotation for any particular television broadcasting station, you will not have to make any further changes until a change is made in the broadcast apparatus.

ASSUMING that you have the neon tube glowing properly and the disk rotating at just a trifle faster than the required speed, you are ready to receive television images.

Of course the radio receiver must be tuned to the station from which the television broadcasting is to come and you must leave the double-pole, double-throw switch set so that the loudspeaker is connected to the set.

The announcer at the station will make a preliminary announcement which usually includes a statement of what is to be televised. Most of the time this will be a close-up view of a man's face and the subject will smile, laugh, smoke a cigarette or otherwise indicate animated but relatively slow motion. It also is common practice, at some time during the television broadcasting, to hold in front of the transmitter a large call-letters sign.

Of course you will be able to tell when the man's face is upside down, but it is difficult to determine whether it is wrong side to. The letters of the sign will reveal this error.

As soon as the television signals start, throw the switch connecting the radio receiver to the neon tube. The tube will flicker quite visibly. If you cut a photograph into thin horizontal strips and then put the photograph together again, with each strip moved along a fraction of an inch, the whole picture would appear leaning in one direction, and if you moved the strips too far along, the picture would disappear in a meaningless jumble of light and dark areas. This is precisely what happens when the scanning disk departs from the correct speed.

Because television is still in the experimental stage, it is not practical to publish a list of the stations engaged in television broadcasting, but if you desire information on this point or on any of the apparatus used for the work, address your letters: Technical Editor, POPULAR SCIENCE MONTHLY, 250 Fourth Avenue, New York City.

Popular Science, January 1929