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Christmas Greetings

To many of us, the Yuletide season is a time for reunions with relatives and friends. We gather around the big dining-room table for a long-to-be-remembered feast, then relax for a general roundtable discussion of how each and every one is getting along.

Our successes seem bigger than ever at this time when they are discussed by those whom we regard most highly.

At Christmas, too, we slow the mad pace of life a bit to see if we can be of help to others who may be needy. A cheery greeting, a few words of encouragement, a small gift, often change despair to happiness for those less fortunate.

And soon the New Year will roll around, bringing with it new opportunities to gain happiness, to acquire comforts and even luxuries for ourselves and our family. Resolve to take these opportunities, to prepare for more profitable work, to get an early start towards making the next Yuletide season the happiest of them all.

May the spirit of Christmas be with you. And may the New Year bring you good health and genuine happiness. To you and yours my sincere wish is—Merry Christmas and Happy New Year.

J. E. SMITH, *President.*

Servicing "Horizontal Pulling" In TV Receivers

By B. VAN SUTPHIN

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B. van Sutphin

PARTICULARLY remember my first encounter with the complaint of horizontal pulling. The set was brought to the shop and the customer said that everything in the picture was badly bent. I turned the set on and immediately noticed that the edge of the picture had an S-shape. This condition existed on every channel. I looked at the set for a few minutes and tried to think of a possible reason for the complaint. By this time the customer had gone on his way. I looked at the set a few minutes more, finally muttered, "This is impossible!" and went to lunch.

When I returned from lunch, the complaint still existed. I then dug out some books, read the material, made a few tests, and quickly discovered that the complaint was the result of heater-cathode leakage in the horizontal phase-detector tube.

Many servicemen have felt the same way regarding horizontal pulling. In some cases, it does seem impossible. The complaint seems to come and go at random, and it may affect some channels and not others. It is truly a difficult complaint to service.

There are many possible reasons for horizontal pulling, but it is possible to "pin down the trouble" to a particular section of the receiver very quickly.

Set owners use various terms to describe horizontal pulling. They may say that telephone poles, doors and windows in the TV picture appear bent, bowed over, curved, snaky, etc. Some use even more descriptive terms such as,

"Everything in the picture seems to do a continuous hula."

Although horizontal pulling is a common trouble in Television receivers, there is not too much information available on the subject. This article is designed to meet the need for authoritative data on causes and remedies for horizontal pulling. If this article helps you service even one receiver more quickly, it will have served its purpose. By properly applying the information given here, however, you will probably be able to service many receivers more effectively and faster.

Two Types of Pulling

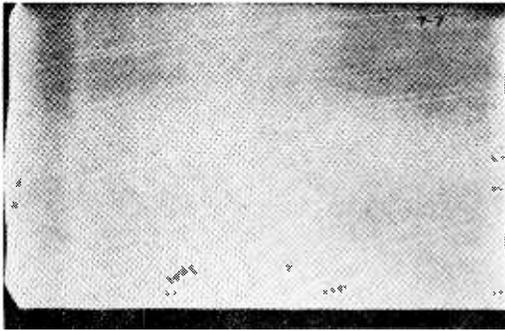
For trouble-shooting purposes, it is important that you recognize that there are two entirely different types of horizontal pulling.

1. "Raster Pulling." This type of pulling or bending is present on the raster itself, even without a picture. Naturally, any pulling or bending of the raster is also evident in the picture, but the difference between this condition and picture pulling is important in determining which section of the receiver is most likely to be affected. This condition is illustrated in Fig. 1.

Possible causes of raster pulling include:

- (a) Insufficient filtering in the "B" supply.
- (b) Defects in the horizontal sweep section.
- (c) Certain defects in the deflection yoke.
- (d) Undesired magnetic fields near the picture tube.

2. "Picture Pulling." This type of pulling is



Courtesy RCA

FIG. 1. This illustrates raster pulling. The vertical oscillator in a TV receiver operates at 60 cycles; since there are two cycles of width change in $1/60$ of a second, this indicates that the trouble is 120-cycle hum. The most frequent reason for this complaint is defective filter condensers in the power supply.

evident on the picture but **not** on the raster. In Fig. 3, notice that the edge of the raster is straight but the picture is bent. (In the illustrations for this article, the picture has purposely been shifted off center so that you can see both the edge of the raster and the edge of the picture.)

Picture pulling is a direct result of variation in horizontal sync pulse phasing. Possible causes include:

- (a) Poor low frequency response in the rf, i-f, or video amplifiers.
- (b) Undesired limiting action in the video amplifier because of a defect in the amplifier, or because of excessive signal input.
- (c) 60-cycle hum modulation of the horizontal sync pulses because of heater-cathode leakage in one of the tubes in the rf, i-f, or video amplifiers, the sync separator, or the horizontal afc circuit.
- (d) Excessive or insufficient sync signal input to the sync separator, or troubles in the sync separator.
- (e) Undesired signals coupled into the horizontal afc circuit by any means.
- (f) Electrical hunting action in the horizontal afc or horizontal oscillator circuit.
- (g) Extremely weak signals and/or some types of interference. .

The two different types of pulling will be discussed separately with information on determining which type exists in the particular receiver.

Serviceing the Complaint of Horizontal Pulling

When you start to service the complaint of horizontal pulling, bring the edge of the raster into view by decreasing the picture width and/or

shifting the picture off center. You can decrease the picture width with the Width and the Horizontal Drive controls, and you can shift the picture off center with the regular Centering control. Be sure to bring the edge of the raster itself into view.

Raster Pulling. When a TV receiver is operating properly, all the horizontal scanning lines of the raster are exactly the same length and the left and right edges of the raster are straight and parallel. Any variation in the amplitude of the horizontal deflection signal will cause some of the scanning lines to be shorter than the others, resulting in an appearance of horizontal pulling or bending at the edges of the raster. Such a complaint is shown in Fig. 1 which illustrates a 120-cycle hum in the raster produced by a defective filter condenser in the receiver.

Notice there are two cycles of bending between the top and the bottom of the raster, or two cycles of bending in $1/60$ of a second indicating that the variation in width is occurring at 120-cycles per second.

The important point of this illustration is that the edge of the raster is not straight. The picture signal is not available on the screen because the video amplifier tube was removed when the picture was taken. If the complaint seems to be raster pulling, temporarily "kill" the video amplifier circuit and notice whether the pulling still exists. If it does, then the complaint is definitely raster pulling.

When the trouble is 120-cycle hum, you should immediately check the filter condensers in the power supply circuit. Incidentally, this complaint is frequently accompanied by hum in the sound signal and sometimes by two lighter or two darker horizontal areas in the raster.

Some modern receivers use half-wave voltage double circuits to supply the B+ for the receiver. In sets using that type of low-voltage power supply, a defective filter condenser will cause 60-cycle hum, rather than 120-cycle hum. When you encounter raster pulling with but a single curve at the edge of the raster, look at the receiver schematic to determine what type of power supply is used. If the power supply is of the half-wave voltage doubler variety, remember that a defective filter condenser in the power supply circuit will cause 60-cycle hum and the complaint of raster pulling with a single curve at the edge of the raster. Incidentally, a single hum bar may appear in the raster.

Another reason for pulling or bending of the raster is the presence of an undesired magnetic field near the picture tube. Such a field can come from a speaker, a transformer, or a choke.



Courtesy RCA

FIG. 2. Raster pulling because of an undesired magnetic field near the picture tube. This condition can be caused by having a speaker, a choke, or a transformer too near the picture tube, or by magnetization of the cone of a metal picture tube.

Fig. 2 shows the appearance of the picture when a strong magnetic field is near the picture tube. In well designed receivers, this type of trouble is seldom encountered because the parts that produce strong magnetic fields are kept well away from the picture tube.

In those sets that use metal picture tubes, however, magnetization of the metal shell of the picture tube itself will produce a raster pulling and pattern similar to that shown in Fig. 2.

Also, certain defects in the deflection yoke can cause raster pulling. Yoke troubles can generally be identified by the characteristic trapezoidal shapes that they produce in the outline of the raster. In modern receivers, a pillow-shaped raster, a pin-cushion shaped raster, or a barrel-shaped raster is generally the result of improper adjustment of the correction magnets mounted on each side of the deflection yoke. In some receivers, however, defects in the deflection yoke can produce patterns with the shapes mentioned above.

Also, raster pulling can sometimes be the result of incorrect adjustment of the focus coil or the ion trap. These complaints are easily corrected by proper adjustment.

When raster pulling is not caused by trouble in the B-supply circuit or in the deflection circuits, the following simple tests will enable you to determine whether the trouble is the result of a defect in the yoke, or an external magnetic field.

With the picture off center so that you can view the edge of the raster, completely remove the thumb screw from the deflection yoke and ro-

tate the yoke about ninety degrees. Be sure the yoke remains tight against the bell of the picture tube. The raster will turn as the yoke is turned. If the pulling or bending of the raster is caused by yoke trouble, the shape of the raster will not change. If pulling is due to an undesired magnetic field, however, the shape of the raster will change.

If you find that a defect exists in the yoke, then purchase a replacement and install it in the receiver. If correction magnets are used, be sure to readjust them as necessary.

If your tests indicate that the pulling is the result of an undesired magnetic field, you must determine what is causing this magnetic field.

Examine the receiver layout carefully. If the set uses a glass picture tube there may be chokes or transformers near the neck of the picture tube; remove the mounting bolts for these chokes or transformers so that you rotate the parts and change the direction of the magnetic field. If moving the part offsets the amount and/or the direction of pulling, continue rotating the part until you have minimum pulling. This is seldom necessary, however, as parts that produce strange magnetic fields are generally kept well away from the picture tube.

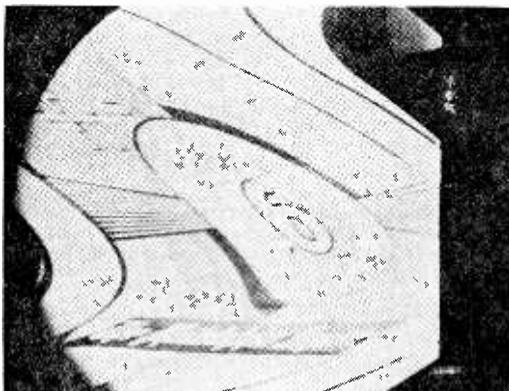
If the receiver uses a metal-cone picture tube, magnetization of a portion of the cone will cause horizontal pulling. Here is the procedure for checking this possibility.

Turn the receiver off. Short the B+ connection of the receiver to the chassis to discharge the low-voltage filter condensers. Also, short the metal cone of the picture tube to the receiver chassis so that the high-voltage filter condenser will be completely discharged.

Then bring a small compass near the metal shell of the picture tube. If the compass tends to align itself with the curvature of the picture tube shell, a portion of the shell is magnetized. The proper servicing procedure in this case depends upon the type of tube. If the tube is of the round variety, you can often turn the tube so that the magnetized portion is at the top, or at the bottom, where it will not affect the picture.

If the tube is of the rectangular variety, however, you must demagnetize the picture tube shell. To do this, use one of the commercial devices available from most large wholesalers for de-magnetizing reels of tape for magnetic recorders. Follow the procedure you would use in de-magnetizing large spools of tape.

Then check the picture. If the pulling has disappeared, the shell of the picture tube is demagnetized, and you should have no further



Courtesy RCA

FIG. 3. This illustrates picture pulling. Notice that the edge of the raster is straight but that the picture is bent. (In taking the photographs for these illustrations, the picture has been shifted off center so that you can see the edge of the raster.)

trouble. When you put the set back in the cabinet, however, be sure that you do not push the metal shell of the picture tube against the speaker so that the shell will again be magnetized.

Picture Pulling. If, when you de-center the picture and carefully examine the raster edge, you find that the raster is straight, but that the picture is bent, this indicates picture pulling which is the direct result of variation in horizontal sync pulse phasing. Incidentally, in some receivers it may be necessary to turn the Contrast control all the way down and the Brightness control all the way up to see the edge of the picture. A typical example of picture pulling, with the horizontal blanking and the horizontal sync pulses visible on the edge of the raster, is shown in Fig. 3.

Under normal conditions, the leading edge of the horizontal sync is parallel to the edge of the raster and the edge of the raster is straight. A variation in spacing between the leading edge of the horizontal sync pulse and the edge of the raster indicates a variation in horizontal sync phasing and consequent picture pulling. Just as it is possible to localize the defect that causes raster pulling, so is it possible to localize the defect that causes picture pulling. The basic technique is the same: observation of the picture.

The composite video signal (picture, blanking, and sync) from the Television station passes through the rf, i-f and video amplifiers, and appears on the picture tube. With nor-

mal adjustment of the Contrast control, the blanking and sync signals are blanked out and are not visible. They may, however, be brought into view and are then extremely useful in diagnosing certain cases of picture pulling.

The composite video signal is picked off at some point beyond the video detector, usually in video amplifier circuits, and is fed to the sync separator. Normally, the amplitude of the sync signals is about thirty-three per cent greater than the amplitude of the blanking signals; the blanking signals are of slightly greater amplitude than the darkest picture signals. On the basis of this difference in sync amplitude, the sync separator is designed to pass the high amplitude sync signal and to remove the blanking and picture signals. This circuit function is obtained by use of limiting and clipping action. The output of the sync separator should consist of only the sync pulses with no trace of the blanking and picture signals.

The horizontal and vertical sync pulses are separated from the complete sync signal by the differentiating and integrating circuits respectively and are then fed to the proper circuits in the receiver. The horizontal sync pulses that are fed to the horizontal afc circuits should have uniform amplitude, uniform spacing (phasing) and uniform duration. Any change in one of these parameters can produce picture pulling.

Any defect in the rf, i-f, or video amplifiers that acts to reduce the amplitude of the horizontal sync pulses, bringing them closer to the blanking and picture level, will prevent proper functioning of the sync separator. In turn, this may result in picture pulling or complete loss of horizontal synchronization. In cases of picture pulling, there are two principal troubles to watch for in the rf, i-f, and video amplifier circuits of the receiver:

1. Poor low frequency response. The sync pulses represent relatively low frequency signals. Insufficient low frequency response in the rf, i-f, or video amplifiers can reduce the amplitude of the sync pulses in comparison with the higher frequency picture signals and produce picture

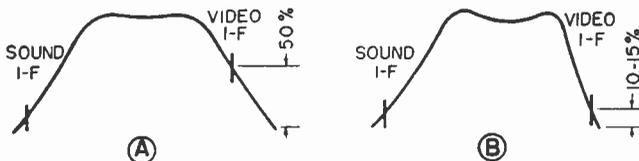


FIG. 4. (A) Correct video i-f response of an intercarrier with the video i-f carrier 50% up on the response curve. (B) Incorrect video i-f response with the video i-f carrier only 10% up on the response curve. A response curve like this means reduced low-frequency response, poor picture quality, and possible picture pulling.

pulling. The most frequent reason for poor low frequency response in the rf and i-f amplifiers is incorrect alignment, with the video carrier too low on the slope of the response curve. Fig. 4A shows the correct response curve of a typical Television receiver; Fig. 4B shows an incorrect response curve with the video carrier too low on the slope. This defect will cause both picture pulling and poor resolution of the horizontal wedge of the test pattern.

Fig. 5A shows the normal appearance of the vertical sync pulse when the receiver is properly aligned. Fig. 5B shows the vertical sync pulse as it appears when the receiver is aligned so that the video carrier is too far down on the response curve.

To view the vertical sync pulse, adjust the Vertical Hold control so that the picture rolls slowly down the screen. Pay particular attention to the relative brightness of the blanking signal and the sync pulse. The blanking pulse should be blacker than the darkest picture area and the sync pulse should be blacker than the blanking signal if the low-frequency response on the receiver is satisfactory.

The most frequent reasons for poor low frequency response in the video amplifier are as follows:

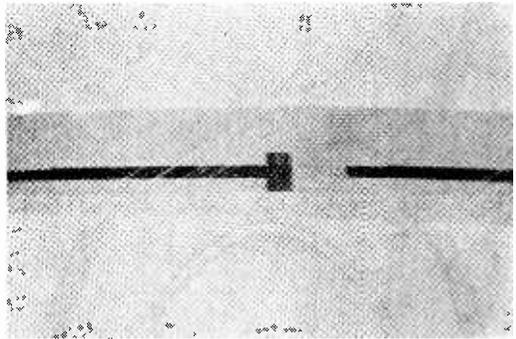
- (a) decrease in the value of a load resistor.
- (b) decrease in the value of a coupling condenser.

If there is any evidence of poor low frequency response in the video amplifier circuit, and if the response of the video i-f stages is satisfactory, check the individual resistors in the video amplifier circuit with your ohmmeter, and check the coupling condensers by temporary substitution.

2. Undesired limiting action in the video amplifier. This will reduce the over-all amplitude of the composite video signal and, of course, reduce the sync amplitude. When the amplitude of the sync pulses applied to the sync separator is reduced, the picture may pull. The most frequent reasons for undesired limiting in the video amplifier are as follows:

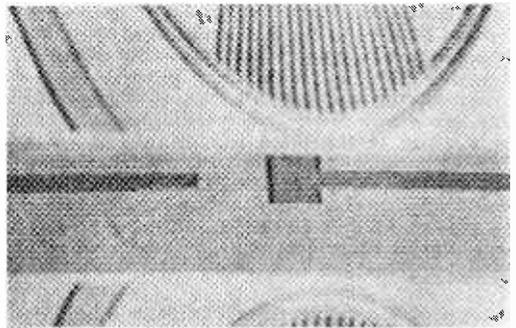
- (a) Excessive amplitude of signal input to the video amplifier because of trouble in the agc circuit, incorrect adjustment of the agc control or a change in the characteristics of the video amplifier circuit.
- (b) Incorrect voltages in the video amplifier circuit because of a defective component in the circuit itself, or lower than normal B+ voltage in the receiver.
- (c) Defective or weak tubes in the video amplifier circuit.

Excessive input signal to the video amplifier will more than likely cause the picture to be too



Courtesy RCA

FIG. 5A. Appearance of vertical blanking and sync signals on the picture tube of a properly aligned receiver. Particularly notice that the vertical sync pulse is blacker than the blanking, and that the blanking is blacker than the darkest picture area.

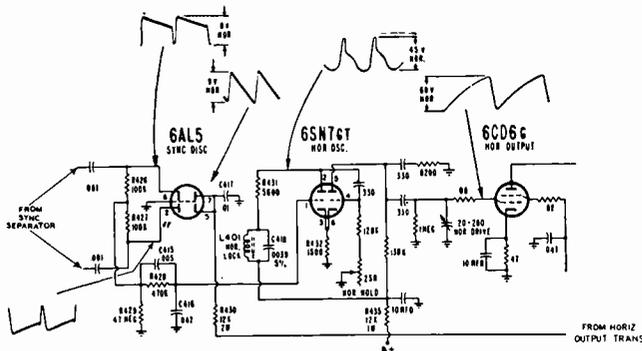


Courtesy RCA

FIG. 5B. Appearance of vertical blanking and sync with reduced low-frequency response as a result of improper alignment.

dark. Therefore, you may have a double complaint of "Picture too dark, and horizontal pulling." If an agc control is included on the rear of the receiver chassis, be sure to check the setting of that control. It should be adjusted just slightly below the overload point when the strongest station is tuned in, and the Contrast control is turned all the way up. Of course, the final adjustment of this control should be made in the customer's home since the signal level there may be different from the signal level at your home or shop.

If no agc control is provided on the receiver, but the picture is overloading, then check the individual parts in the agc distribution network. Particularly, check any paper or electrolytic bypass condensers used in this circuit since even slight leakage in one of these condensers would upset the agc voltage. The best way to check the condensers is by temporary substitution.



Courtesy Admiral

FIG. 6. A typical horizontal phase detector and multivibrator used in TV receivers.

In most receivers, the Contrast control is a cathode bias control in the video amplifier circuit. Turning the control all the way up reduces the bias applied to the video amplifier stage and gives greater amplification. In some receivers, operating the set with the Contrast control turned all the way up will cause excessive current flow through the video amplifier tube and overheating of the plate and/or the screen resistors in that circuit. Resistors that have been overheated frequently increase in value. You should always check the individual resistors in the video amplifier circuit if you encounter the complaint of horizontal pulling and the voltages in that circuit are incorrect.

In some of the earlier receivers, dc coupling was used between the video detector stage and the video amplifier stage and between the video amplifier stage and the picture tube. In sets having dc coupling, the setting of the Contrast control is very important to obtain the voltage readings specified in the service information. When you check the voltages in such a circuit, be sure to set the Contrast control properly.

Weak tubes in the video amplifier stage will, of course, reduce the amplitude of the composite video signal, and reduce the amplitude of the sync pulses. The best way to check these tubes is by temporary substitution.

If the low frequency response of the receiver seems to be normal after you have performed the tests described above, you can assume that the picture pulling is not caused by trouble in the rf, i-f or video amplifiers. You should then concentrate on the sync separator circuits and the horizontal afc circuits.

There is a simple method that is occasionally helpful in isolating the cause for picture pulling. Briefly, this test consists of removing the horizontal sync input from the horizontal afc circuit

and allowing the horizontal oscillator to "run free" temporarily. By then adjusting the Horizontal Hold control (and the main control for the horizontal oscillator if necessary) so that you temporarily obtain a stable picture, you can observe the picture to determine whether the pulling still exists.

Fig. 6 shows a popular type of horizontal oscillator and afc circuit. This type of circuit has been used in hundreds of receivers. When you wish to "free wheel" the oscillator temporarily, disconnect the two .001-mfd condensers that go to the sync separator. It is very important that both these condensers be disconnected; if only one were disconnected, the oscillator frequency would change and

it would be impossible to sync the picture temporarily. Even if you could sync the picture, however, the test would be meaningless.

In receivers that use the pulse-width type of horizontal oscillator, temporarily disconnect the condenser that feeds the sync signal from the sync amplifier stage to the input of the horizontal oscillator stage to "free-wheel" the oscillator.

Fig. 7 shows a typical pulse-width horizontal oscillator. To "free-wheel" this circuit, disconnect the condenser that feeds the sync pulses to the afc circuit. This is C154 in the diagram.

If no picture pulling is evident when you adjust the Horizontal Hold control and the main oscillator control so that the picture is synchronized momentarily, then the defect is in the sync separator-amplifier circuit. If the pulling remains, the trouble is in the afc circuit. Remember that the trouble is not likely to be in the horizontal sweep circuits proper because that would cause raster pulling rather than picture pulling.

If you find that the pulling disappears when you "free-wheel" the horizontal oscillator circuit, then check the operation of the sync separator-amplifier circuit in the receiver. A scope is useful in this application because it allows you to trace the video signal through the sync stages to determine whether all video information is being removed from the sync signal and whether the sync pulses are being clipped, or otherwise distorted.

Heater-cathode leakage in one of the tubes in the sync stages of a TV receiver can also cause horizontal pulling. Though the pattern produced with such a defect in the receiver is similar to that produced when there is 60-cycle hum in the raster, it is easy to differentiate between the two because with the latter complaint, the edge of

the raster is straight.

Heater-cathode leakage in the tube used in the afc circuit will cause pulling. If the pulling remains when you "free wheel" the oscillator, be sure to check this possibility.

In each of the above cases, the picture will be like that shown in Fig. 3.

Undesirable coupling between the vertical output circuit and the horizontal sweep circuit can also cause pulling. If you have reason to suspect such a defect exists in the receiver, you can temporarily connect the sweep output circuit of another TV receiver to the deflection yoke of the receiver under test and then remove the tubes from the vertical deflection circuit of the receiver under test. This, however, is a very difficult task and it is usually satisfactory to test the individual filter condensers connected between the vertical sweep circuit and B+. A defective filter condenser in the plate circuit of the vertical output tube is a frequent reason for this complaint.

At times, however, you will encounter a condition that is not caused by defective filter condensers in the vertical sweep circuit. If all of the filter condensers seem to be good, then disconnect the vertical integrator network from the grid of the vertical oscillator circuit, carefully adjust the Vertical Hold control so that you momentarily obtain a stationary picture, and notice whether the pulling has disappeared. If it has, additional isolation is needed between the vertical oscillator and the sync circuit. Generally, this simply indicates that some component in the vertical integrator network is defective and should be replaced, or, in the case of a printed circuit vertical integrator network, that the entire network should be replaced.

In some receivers, the amplitude of the signal fed to the sync-separator circuit is rather critical. Too much input signal, or too little input signal, will cause picture pulling. For example, turning the Contrast control up too far on some receivers will cause picture pulling. This is generally no cause for concern because the picture generally becomes too black for satisfactory viewing before the pulling is evident. If it is impossible to advance the Contrast control far enough for normal viewing, however, you should look for trouble in the video amplifier circuit. If there is no pulling at lower settings of the Contrast control, but pulling appears as you turn the Contrast control up, check the individual parts in the circuit where the sync signal is taken off, and the individual parts in the grid circuit of the first sync stage. In some stubborn cases—though I hate to admit this—you must change the value

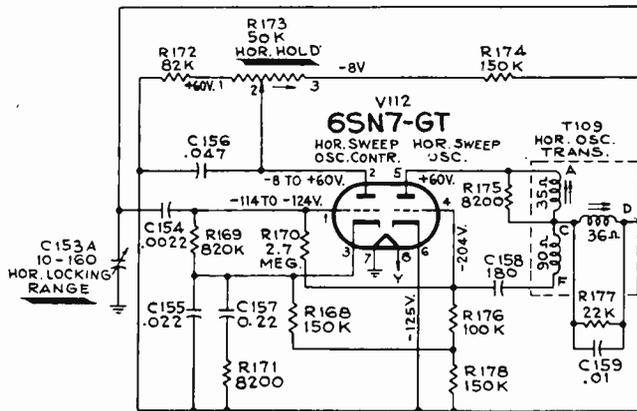


FIG. 7. A typical pulse-width type of horizontal oscillator circuit.

of a part in one of the circuits. This should be done only in the extreme cases, however, and only after writing the receiver manufacturer to see if he has any suggestions regarding the particular trouble. It is definitely not a good idea to change the value of any component in a receiver until you have exhausted all other possibilities.

After the manufacturer brings out a new line of TV receivers, he sometimes notices that horizontal pulling is a problem with all of the sets. In that case, the manufacturer will issue special instructions for changing the receiver circuit to prevent the undesirable pulling.

In a circuit like that shown in Fig. 6, an open by-pass condenser connected between pin 1 of the 6SN7 horizontal oscillator tube and ground (C416) will cause a "hunting" action that produces a picture condition similar to horizontal pulling. This is illustrated in Fig. 8.

Occasionally you will encounter the complaint of horizontal pulling or weaving that occurs only when the volume control of the receiver is turned all the way up, or when someone walks near the receiver. This usually indicates a microphonic tube in the receiver, or a poor solder joint.

In some receivers using the pulse-width oscillator circuit (shown in Fig. 7) improper adjustment may cause horizontal pulling. This type of circuit should always be adjusted by following the suggestions given in the service information.

Another peculiar complaint resembling horizontal pulling is sometimes encountered when a new horizontal output transformer is installed in a receiver. This condition is illustrated in Fig. 9.

The horizontal sweep pulse for application to



Courtesy RCA

FIG. 8. This illustrates electrical "hunting" action in the horizontal oscillator circuit.

the horizontal phase detector in the type of circuit shown in Fig. 6 is generally obtained from a special winding on the horizontal output transformer or on the Width control. Improper connection of the winding used to supply this voltage will change the phasing between the sync signal and the horizontal sweep to produce a picture like that shown in Fig. 9. Reversal of the connections will change the phasing of the sweep signal fed to the afc circuit and allow you to obtain a normal picture.

Summary

To help you use this information in your day-to-day service work, here is the basic troubleshooting procedure in simplified form.

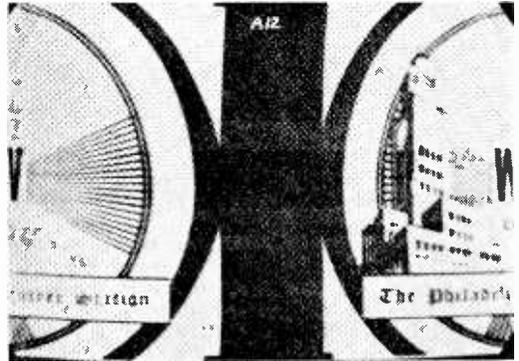
1. Determine whether the complaint is raster pulling or picture pulling. Raster pulling affects the shape of the raster while picture pulling does not affect the shape of the raster.

2. If the complaint is raster pulling, look for a defect in one of these circuits:

- (a) The B supply filter network.
- (b) The horizontal deflection circuit.
- (c) The deflection yoke.
- (d) Check the possibility of an undesired magnetic field near the picture tube.

3. If the complaint is picture pulling, the edge of the raster will be straight. Ordinarily, any defect that causes picture pulling must be in the rf, i-f, video, sync separator, or horizontal afc sections of the receiver. Occasionally, a power supply defect can cause picture pulling, but it must then be beyond the point where the B+ voltage for the horizontal sweep circuits is obtained. To locate the defective circuit, make the following tests:

- (a) Adjust the Vertical Hold control of the receiver so that you can review the verti-



Courtesy RCA

FIG. 9. Blanking bar in the center of the picture because of incorrect phasing between the horizontal sync and the signal fed back from the sweep circuit.

cal blanking interval. The vertical sync should be blacker than the darkest portion of the picture, and darker than the blanking interval.

- (b) If the relative amplitude of the sync appears normal on the picture tube, the trouble is not likely to be in the rf, i-f or video amplifier circuits, but is instead in the sync separator or the horizontal afc circuit.
- (c) Temporarily disconnect the sync input from the horizontal afc circuit, let the horizontal oscillator run free, and inspect the picture to determine whether the pulling is still present. If it is, the defect is in the afc circuit. If the pulling has disappeared, the trouble is ahead of the afc circuit, probably in the sync separator or sync amplifier.

As mentioned earlier, horizontal pulling is a puzzling complaint at first, and one that is difficult to service. The information given here, however, is basic information and applies to all TV receivers. Consequently, it can be used in servicing all receivers, regardless of make.

Careful application of this information to your individual service problems will help you service TV receivers faster.

The initial tests to determine the reasons for complaints of horizontal pulling were performed by John Meagher, RCA Renewal Sales Engineer, and credit for the information given here must be given to him. Also, the photographs were taken from the RCA *Picto-guide* by John Meagher.

— n r i —

If you are having trouble trying to pick a useful Christmas gift *for yourself*, take a look at pages 16 and 17. You may find it there.

"Never Too Old To Learn"

(Excerpt from Morituri Salutamus)

By Henry Wadsworth Longfellow

But why, you ask me, should this tale be told
To men grown old, or who are growing old?
It is too late! Ah nothing is too late
Till the tired heart shall cease to palpitate.
Cato learned Greek at eighty; Sophocles
Wrote his grand OEdipus and Simonides
Bore off the prize of verse from his compeers,
When each had numbered more than fourscore
years.

And Theophrastus, at fourscore and ten,
Had but begun his Characters of Men.
Chaucer, at Woodstock with the nightingales,
At sixty wrote the Canterbury Tales;
Goethe at Weimar, toiling to the last,
Completed Faust when years were past.
These are indeed exceptions; but they show
How far the gulf-stream of our youth may flow
into the arctic regions of our lives,
where little else than life itself survives.

Breathes there a man with soul so dead,
Who never to himself has said,
This is my own, my native land?
If such there be, go mark him well,
For him no funeral raptures swell;
High tho his titles, broad his fame,
Boundless his wealth as wish can claim;
Despite those titles, power and pelf,
The wretch center'd all in self,
Living shall forfeit fair renown
And doubly dying shall go down
To the vile dust from whence he sprung
Unwept, unhonored and unsung.



"Why do Santa Clauses always smell like mothballs?"

Help Fight TB



Buy Christmas Seals

Opportunity For Radio-TV Service Business Exists In Clarendon, Arkansas

The community of Clarendon, Arkansas, is without an experienced TV serviceman. All dealers in this community are interested in having a TV service business established to handle their service work, according to a letter received recently from John W. Kornegay of the Kornegay Furniture and Appliance Company, Clarendon, Arkansas. The trade area for this community extends to Holly Grove, a distance of twelve miles from Clarendon. Holly Grove is also without a serviceman. Mr. Kornegay writes further that fishing and hunting are the "best." If any experienced NRI Graduate or student would be interested in establishing a full-time service business in this community, Mr. Kornegay would be pleased to hear from him and to supply further information. It is stressed that the people of this community are anxious to have an experienced serviceman who is able to equip and operate his own shop.



Employment Opportunity In Communications

The organization, Page Communications Engineers, Inc., 710 Fourteenth Street, Northwest, Washington 5, D. C., has openings for men interested in work in the Communications field.

Applicants should be familiar with receiving and transmitting equipment which may operate between 1 mc and 1000 mc with transmitter power from 50 watts to 50 kilowatts. Technical "know how" must be accompanied by willingness to do whatever tasks may be required for the completion of the objective, whether it be a circuit evaluation, component wiring, trouble shooting, equipment handling, or a combination of all. A real technical challenge.

Applicants must be United States citizens. Many of the activities are located outside of the United States. Applications should be sent direct to Frank Bunn, Personnel Manager, Page Communications Engineers, Inc., 710 Fourteenth St., N.W., Washington 5, D. C.

Page Eleven

New Metal-and-Ceramic "Micro-Miniature" Tubes

WASHINGTON, D. C.—A radical new concept in receiving tube design has been announced by General Electric and demonstrated in the form of a tiny "micro-miniature" ceramic triode for UHF television sets.

The micro-miniature triode—6BY4—is an all metal-and-ceramic tube about three-eighths of an inch long and five-sixteenths of an inch in diameter. Preliminary ratings on this particular tube are based on an operating frequency of 900 megacycles. Development work at the G. E. Receiving Tube Sub-Department in Owensboro, Ky., indicates production models soon will be available with a noise factor of approximately eight decibels, and a power gain of approximately 15 decibels when operating at this frequency with a bandwidth of 10 megacycles.

While the tube cathode normally is heated with a filament in the conventional manner, a startling demonstration with a blow torch applied to the outside of the tube showed how it also will operate when heated by an external source.

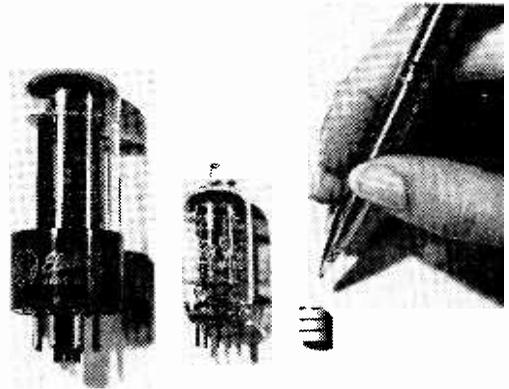
G-E engineers see the possibility of a complete line of these tiny electronic tubes from diodes to complex multi-element tubes. Possible applications include mobile and industrial communications, airborne and mobile radar, industrial controls, guided missile controls, nuclear power controls—possibly even man-made satellites.

"In general, any electronic equipment requiring motion, high temperature, restricted space, automatic assembly or UHF performance has a potential requirement for micro-miniature tubes," according to Mr. J. M. Lang, GE's tube department manager.

"The design and manufacture of micro-miniature ceramic tubes represents a complete departure from conventional techniques of quantity tube manufacture," said Lang. "New materials, processes and assembly methods were necessary to produce tubes such as the 6BY4.

"The grid assembly is typical of this fresh approach. This grid is made from tungsten wire only .0003 of an inch in diameter—so fine it is virtually invisible under normal room lighting. Nevertheless, the wire is wound and brazed to a small tungsten washer at a pitch of 1000 turns per inch—representing a new degree of precision in quantity tube manufacture. Special machinery developed by G-E engineers performs this delicate operation.

"Extensive ceramic research was necessary to develop the material used for spacers in this tube. The search for a low-loss ceramic of ap-



MILESTONES in radio and television receiving tube development. At left, conventional glass type with plastic base; center, miniature type tube; right, new ceramic "micro-miniature" introduced by General Electric.

propriate expansion characteristics, dimensional stability and vacuum tight sealing characteristics required investigation of materials not previously used in vacuum tube manufacture.

"The exhaust and sealing techniques used in the production of these tubes are unique in the field of vacuum tube manufacture. The resulting seals remain vacuum-tight at temperatures in excess of 700 degrees Centigrade.

"The development of the 6BY4 and subsequent ceramic micro-miniature receiving tubes transcends the art of designing electrical tube characteristics. It embraces research in metals and ceramics, development of new exhaust and sealing techniques, design of new tube-making machinery and investigation of new processing methods. The result is a tube of completely new construction and greatly improved physical and electrical characteristics."



New Electro-Voice Bulletin On Do-It-Yourself Enclosure Kits

A colorful new Bulletin No. 211, illustrating and describing the E-V line of Do-it-Yourself High Fidelity Speaker Enclosure Kits has just been issued by Electro-Voice, Inc., Buchanan, Michigan.

This new bulletin tells how easily the music lover or high fidelity enthusiast can build his own speaker enclosure with simple household tools, and save up to one-half. Every piece in each E-V kit is precut, ready to assemble. Fin-

ished kits are comparable to the Electro-Voice factory-assembled enclosures. Seven kit models are listed, covering the Electro-Voice Patrician IV, Georgian, Centurion, Regency, Empire, Aristocrat and Baronet. Finishing Kits for fine furniture finish, and Decorative Trim Kits are also listed. Simple step-by-step instructions are supplied with each kit or may be obtained separately at nominal cost.

For a free copy of Enclosure Kit Bulletin No. 211, write to Electro-Voice, Inc., Buchanan, Michigan.



Employment Opportunities With Kellogg Switchboard And Supply Co.

According to a letter received recently by NRI from the Personnel Manager of the above company, openings are at present available for men to wire switchboards and train for further opportunities in the Telephone industry. Men with some Radio and TV experience are desired. Opportunities also exist for persons who understand electrical theory in communications to train to be switchboard testers.

Men with experience of the following types are needed: Previous wiring and soldering experience on Television, Radio, etc. Should be right-handed. Men capable of trouble shooting and analysis of circuit faults. Should be able to use all standard electronic test equipment, such as capacitor testers, voltmeters, ohmmeters, milliammeters, oscilloscope and other testing equipment.

The Kellogg Switchboard and Supply Company was founded in 1897. Its principal purpose has been the design, manufacture, and installation of central office switching equipment for telephone exchanges of all types and sizes. In March, 1952, Kellogg Switchboard and Supply Company became a subsidiary of International Telephone and Telegraph Corporation.

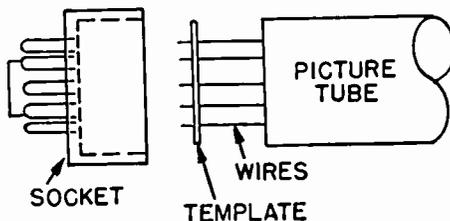
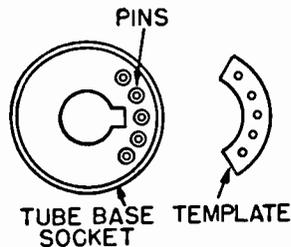
Main plant and research laboratories are located at 6650 South Cicero Avenue, Chicago, Illinois. Sales Offices are located at 79 West Monroe Street, Chicago, Illinois. Warehouses are located in Chicago, Dallas, Kansas City, St. Paul, San Francisco, and Mansfield, Ohio. A new warehouse is being constructed in Atlanta, Georgia, and will be ready by February, 1956.

Further information about these job opportunities may be had by writing directly to Mr. Clyde E. Aultz, Personnel Manager, Kellogg Switchboard and Supply Company, 6650 South Cicero Avenue, Chicago 38, Illinois. Telephone Number is Portsmouth 7-6900.

Rebasing Picture Tubes

The below item, written by NRI Graduate Earl W. Maxson, originally appeared in the June-July, 1955 issue of *Techni-talk*, published by General Electric Co. Tube Department. It is reproduced through the courtesy of that publication.

"I was called in to service a TV receiver because the picture tube base had come off. When I tried to repair this, I had an extremely hard time to get the wires from the tube into the



base. First three would go in and then the other two would go in but not all five together. I found this an almost impossible task, due to the shortness of wires and long base.

"Then I thought of making a template of the inside of the base, fixing this on the wires from the tube and then putting on the base socket. I made the template out of a manila letter file folder by cutting out a rough circular form and putting it inside the tube base. Then using an awl, I punched the holes, corresponding to tube base pins. Then I put template on wires and gently pushed tube base socket over this and the wires fitted into socket very easily. I had spent two hours trying to get wires into pins before this thought occurred to me. I cemented the tube base socket on with General Cement "Pli-O-Bond" and then soldered the tube pins in place. The job was completed in only about five minutes with the template."

Earl W. Maxson,
Maxson's Radio Service,
46 William St., Hudson Falls, N. Y.

Letters from NRI Graduates Show NRI Training Increases Earnings



**\$70 Per Month
In Part-
Time Service
Business**

"Since completing your course, I have grossed \$932.24 in spare time work, or an average of about \$70 per month. As I do no advertising of any kind, I feel that I have done exceptionally well. My work is continually expanding.

"I consider my shop to be one of the most up-to-date and best equipped shops in town. I have purchased a complete line of instruments, and they are all paid for out of work that I have performed since completing my course. I don't believe I can thank Mr. Smith and the NRI staff adequately for the help and encouragement they gave me."

L. K. Foxworthy,
3753 Albury Ave.,
Long Beach 8, Calif.



**NRI Training
Helped
Gain
Advancement**

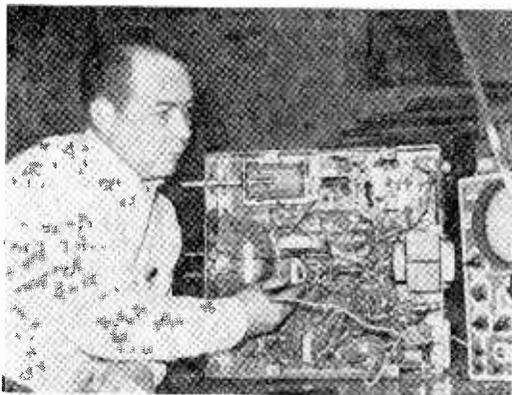
"Recently I was advanced to Chief Radioman in the U. S. Navy. Much of the credit for my promotion is due to the training I received from your course in Radio and TV Servicing.

"You have been a tremendous help in bettering my station in life, making my job much easier, and bringing more money home to my family. Now that I have a thorough background in Radio, I feel there is no limit to what I can learn in the field of electronics."

John A. Greany,
2204 Halprin,
Norfolk 3, Virginia

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— n r i —



**Has Best Equipped
Shop in Town**

"Our TV and Radio business is good. We have all we can do. We sell and service leading brands—Zenith, Philco, Arvin—both Radio and TV. I have the best equipped shop in town.

"I am certainly glad that I had the chance to study Radio and TV through NRI. I give you all the credit for a job well done."

Howard Nichols,
Edgemont, 1001 N. Main St.,
Shelbyville, Tennessee



**Electronics
Mechanic, 1st Class,
in
Naval
Shipyard**



**Full Time
Radio-TV
Serviceman for
Large Store**

"I am employed by the Boston Naval Shipyard as Electronics Mechanic, First-Class, thanks to the excellent training I have received from NRI. I specialize in Radio-Teletype, Radio, and Facsimile overhaul, repair, and test.

"I am working at the Arcade Furniture Store of Ft. Smith, Arkansas. It is very interesting work checking new Radios and TV's. This job pays enough for me to be able to send my son to college and pay for a new car.

"I hold an amateur operator license, call W1SYF, as well as a Radio telegraph license, first-class.

"I am very thankful for having studied your interesting course. NRI gave me the boost needed for better and happier living."

"I find that the more training a person has in any field, particularly in electronics, the more he will benefit and enjoy the excellent opportunities available. A person is never too old to learn, nor too young to start learning. Thanks a million for the excellent training."

**Ernest Hall,
Hackett, Arkansas**

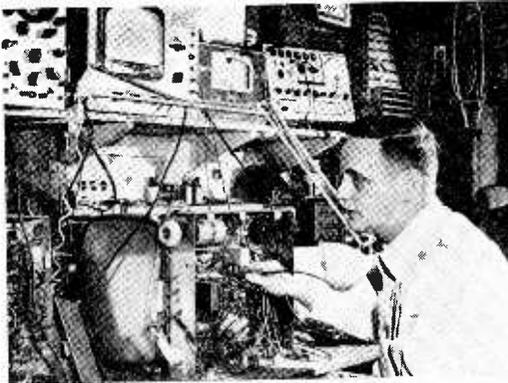
**J. J. Hizny,
19 Curtis Road,
Natick, Mass.**

"Nothing splendid has ever been achieved except by those who dared believe that something inside them was superior to circumstances."

**P. G. Miller,
Maumee, Ohio**

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**Profitable TV Sales
And Service Business**

"Since taking your Practical Radio and Television course in 1952, I have set myself up in a very profitable part-time TV Sales and Service business. Eventually I intend to make it a full time business.

"I highly recommend your courses to any young man who wants a career with a very promising future."

**Howard E. Treible,
115 Jane St.,
Stroudsburg, Penna.**

As space permits, from time to time, we like to devote a page or two in NR-TV News to short success stories such as above. They are taken from testimonial letters we have on file. Photographs and letters of this kind are always greatly appreciated by us. We feel we should pass them on to our readers for the inspiration to be gained from a reading of them.



Christmas Suggestions For You



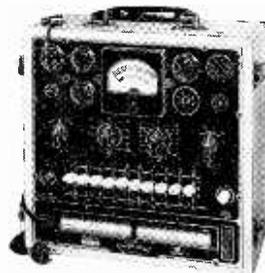
In this issue, and the October-November issue of NR-TV News, we give a complete though condensed catalog of the items that can be purchased through the NRI Supply Division. Further information will gladly be given upon request. Monthly time payments can be arranged for all

test instruments. All NRI test instruments are covered by standard RETMA warranty. Order blank on next page includes all items listed in this issue and in the October-November issue. Be sure to place orders early for delivery by Christmas.



Weller
Model 8100K
Soldering Kit
\$7.95 Value.
NRI Price \$5.95,
Postpaid

Contains 100-watt Weller "Junior" Soldering Gun; Soldering Aid and Soldering Brush; Roll of Resin-Core Solder. An ideal gift.



Model 70
NRI Professional
Tube Tester
Price \$49.75

Designed to test the latest Radio and Television tubes. Convenient, built-in roll chart. Approved RETMA emission circuit minimizes possibility of obsolescence.



Weller
Dual-Heat
Soldering
Guns

Model D-440 rated at 100-150 watts. For Radio-TV work. List price \$14.90. NRI price only **\$10.73, postpaid.**

Model D-550 rated at 200-250 watts. Heavy duty. List price \$16.25. NRI price only **\$11.71, postpaid.**

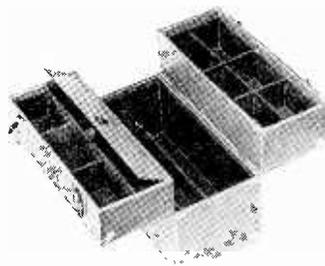
Ten separate four-position tube element switches. Eight tube test sockets. Fifteen filament voltages. Handsome, hardwood case. Size: 10 $\frac{3}{4}$ " x 10 $\frac{3}{4}$ " x 6 $\frac{1}{4}$ ". Actual weight, 11 lbs. Shipping weight, 13 lbs. Sent express collect. 50-60 cycle, 110-120 volts, ac required.

TV Picture Tube Adapter: For use with all NRI Tube Testers, Models 66 through 70. Provides cathode emission check, short and leakage test. **\$4.98 postpaid.**



NRI Replacement Parts Kit
\$21.75, Including Tool Box

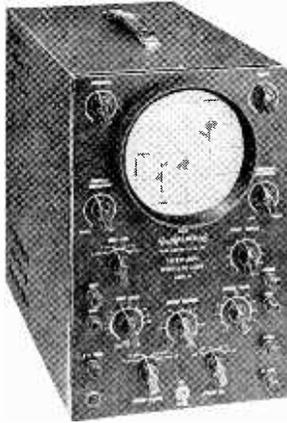
Just the thing for starting Radio and TV work. Most commonly needed replacement parts. Regular dealer's net price would be over \$40 for this assortment. Shipping weight 15 pounds. Sent express collect. **Your price, \$21.75.**



NRI
Deluxe
Tube
Caddy
Only
\$12.95,
Postpaid

Handsome, professional in appearance. One-fourth inch plywood construction. Protected by metal hardware. Covered with attractive, long-wearing luggage type fabric.

Opens from center. Holds up to 200 tubes in assorted sizes. Plenty of room for VTVM and small tools. Light weight—easy to carry. Size: 16 $\frac{1}{2}$ " x 8" x 13 $\frac{1}{4}$ ". Net weight 8 lbs.



Model 56
NRI Professional
TV Oscilloscope

Price
\$147.50



Sensational, Wide-Band 5-inch TV Oscilloscope. For black and white and color TV. Vertical amplifier response flat up to 4.5 mc (± 3 db). Sensitivity, .014 (RMS) per inch deflection. Push-pull deflection amplifiers. Sweep range up to 100 kc in four ranges. Voltage regulated power supply. Calibrated vertical attenuator circuit, reads peak-to-peak voltages directly. Uses twelve tubes. Detailed instruction manual. Sent express collect.

Professional Oscilloscope Probe Kit (Right, above): For use with Model 56, or previous Model 55 NRI Oscilloscopes. Four probes: low-capacity probe; demodulator probe; resistive isolating probe; and shielded direct probe; plus shielded cable and plastic case. **Only \$14.95 postpaid.**

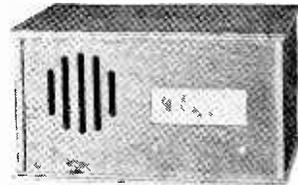


Model 113
NRI Professional
Resistor-Condenser
Tester
Price \$39.95

Speeds up service work. Gives you more confidence. Tests all types of condensers used in Radio and TV. Uses highly accurate bridge-type circuit to measure capacity and resistance. Power factor test for electrolytics. Dual range, extra-sensitive leakage test circuit, applies actual working voltage up to 400 volts.

Four Capacity ranges—10 mmf to 1500 mfd. Four Resistance ranges—1 ohm to 150 megohms. Test leads and instructions included.

Maroon, crackle finish cabinet. Etched panel. Size: 8 $\frac{1}{2}$ " x 7" x 6 $\frac{3}{4}$ ". Actual weight: 6 lbs. Shipping weight: 7 $\frac{1}{2}$ lbs., Send express collect. 50-60 cycle, 110-120 volts ac required.



Cabinet for Your NRI Radio
Only \$4.95, Postpaid

Well-seasoned, natural wood, unpainted. Mailed to you knocked down. Fun to assemble. Be sure to order the proper cabinet for the radio built from parts supplied with Kit 7E (six tubes) or Kit 7RK (five tubes).

Use Order Blank Below

All test instruments and the NRI Parts Kit are shipped by Railway Express, charges collect. Other items are shipped parcel post, prepaid.

ORDER BLANK

National Radio Institute, Supply Division,
16th and U Streets, N.W.,
Washington 9, D. C.

I enclose \$..... (money order, check or bank draft). Send me the following material:

- Mod. 8100K Soldering Gun Kit\$5.95
- Mod. D-440 Soldering Gun\$10.73
- Mod. D-550 Soldering Gun\$11.71
- Model 70 Tube Tester\$49.75
- TV Picture Tube Adapter\$4.98
- NRI Replacement Parts Kit\$21.75
- NRI Deluxe Tube Caddy\$12.95
- Model 56 TV Oscilloscope\$147.50
- NRI Oscilloscope Probe Kit\$14.95
- Model 113 Resistor-Condenser Tester ...\$39.95
- 7E Radio cabinet kit\$4.95
- 7RK Radio cabinet kit\$4.95
- NRI Professional Tool Kit\$8.95
- Model 11 Vacuum Tube Voltmeter\$38.50
- High Voltage Probe for Model 11\$8.00
- Detector Probe for Model 11\$6.65
- Leather case for Model 11\$9.50
- 2-E and 2-CK Steel Cabinet\$3.75
- Automatic Wire Stripper\$4.95
- Model 89 Signal Generator-Marker\$45.00
- "A" Battery Eliminator\$39.95
- Send information about time payments.

Name Student No.

Address

City Zone State

Express Office

If you live in Washington, D. C., add 2% for D. C. Sales Tax.

The "Reprocessed" Tube Racket!

By Creighton M. Marcott,
Ass't Editor, Technician Magazine

Reprinted from **TECHNICIAN & CIRCUIT DIGEST**, July 1, 1955.
Copyright Caldwell-Clements, Inc., 480 Lexington Ave., New York 17, N. Y.

AN unscrupulous element in the electronics industry has turned the hundreds of thousands of old, worn out receiving tubes discarded by TV technicians into a multi-million dollar annual business. These firms, a number of whom are trading on the respectability of old established names, are reprocessing these tubes and selling them back as "first quality" tubes to unsuspecting servicemen at fantastic profits. These are the facts turned up by an investigation recently completed by **TECHNICIAN**.

In many cases, **TECHNICIAN** found that the old tubes had been purchased for 1¢, 2¢ or 3¢ apiece, and then, after "reprocessing," and insertion in a new carton, with a private name, had been sold back to the trade at prices ranging from 30¢ to \$1.50. They were advertised as "first quality," "peak performance," and similar impressive but meaningless titles.

The actual amount of business done by these firms could not be pinned down, but unofficial sources estimated that "reprocessed" tubes account for close to 10% of the replacement tube market. Reasonable substantiation was found in **TECHNICIAN**'s findings.

One firm in New Jersey, from all indications the

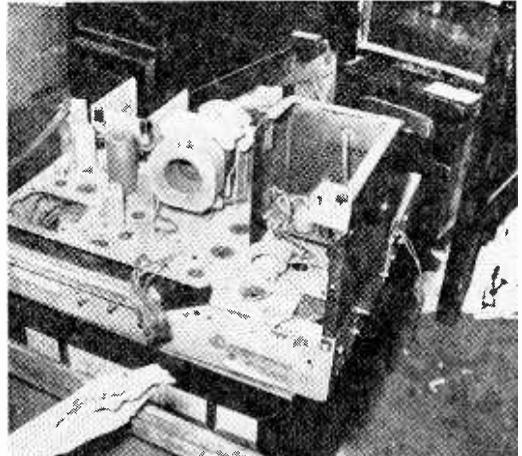
largest in the country, does its business through legitimate jobbers, as well as mail-order. A constant supply of old tubes is provided by a network of "commission agents," each of whom makes the rounds of the TV technicians in his own community. While the number of tubes "reprocessed" by this firm can only be conjectured, something of a clue can be gained by the fact that in a recent court case purchase orders were introduced which showed a transaction involving many thousands of tubes between this New Jersey firm and two other companies in the electronic field.

Another firm, which has been quite active in Brooklyn, N. Y., has now, according to latest information, moved all its equipment to Florida. This was just one of the signs that indicated that the "reprocessing" business, which until quite recently had been centered around the New York-New Jersey area, is now becoming widespread.

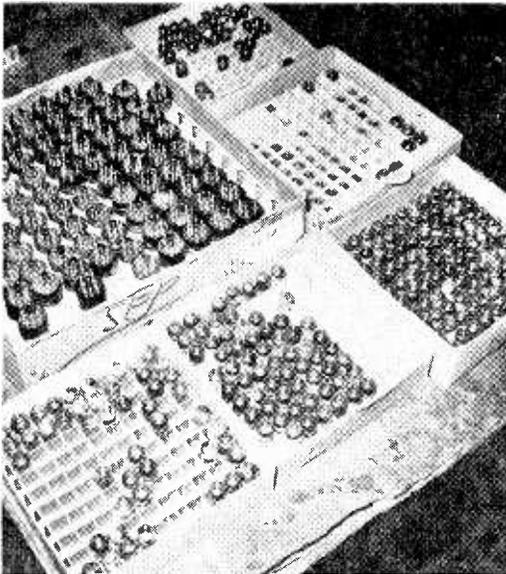
The racket came to light when **TECHNICIAN** editors became suspicious of the ridiculously low prices at which tubes were being hawked in mail order advertisements and decided to go "shopping." The itemized account of the tubes purchased and the number found unusable will



Tubes being discarded by TV service shops are purchased for 1c, 2c or 3c apiece.



"Pull-outs" are tubes removed from electronic equipment, usually old TV receivers like this.



"Bulk" tubes (left) come from equipment manufacturers in 100-tube boxes (nestings). Radio and TV receivers being "cannibalized" (right) are chief source of "used" tubes.

be found elsewhere in this article. But more important than the number of defective tubes is the fact that so many of the tubes showed signs of having been tampered with in order to restore them to usable status. Remember, these are receiving tubes being discussed, not picture tubes.

Tube Industry Operation

To understand how such a business is allowed to exist, it must first be understood how the tube business is organized.

The first run, brand new, in warranty tubes come from two sources. The first, the tube manufacturer himself, is, of course, the prime supplier. In this case the channel of distribution is tube mfr.-to-distributor (jobber)-to-dealer, or service technician.

The next source for new tubes is the equipment manufacturer. Since he buys a great many tubes he gets a substantial discount below the distributor when buying from the original tube manufacturer. Not infrequently he will find himself over-stocked, or with an excess of obsolete tubes (for instance, in the change from 5U4G to 5U4GA/GB). The tube maker is ready, in most cases, to buy back the tubes at cost, but on the other side is the distributor (or jobber) who is ready to pay the equipment manufacturer more than he originally paid for the tubes. Human nature being what it is, a great many of these

tubes find their way into the market, as the familiar "bulk" tubes. The practice is frowned upon, naturally, by the tube manufacturer and strenuous efforts are made to minimize the practice.

When buying "bulk" tubes, which, as you know, do not come in a carton, you will have to rely on the distributor to stand behind the warranty indicated by the date on the tube. Incidentally, there are differences in the markings on the tube which will indicate to the tube manufacturer whether the tube was originally sold to be used in equipment or as a replacement tube.

"Seconds and Rejects"

For the "seconds," "rejects," "used" and "re-processed" tubes, which experienced tube manufacturers estimate comprise approximately 20% of replacement tubes sales, there are many sources.

The first is the original tube manufacturer. Some of the tube manufacturers destroy their rejected tubes, but a few sell them under different names, or sell them to other individuals or firms which brand them with their own name. These may be very fine tubes—or very poor. If tube makers destroyed all their rejects, a major source for the "bargain" outlet would be cut off.

The "second" or "reject" is the best bet in the "bargain tube" field—if you are sure that it is



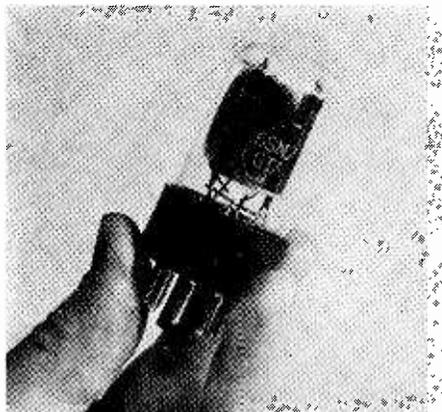
This old 6SN7, rescued from trash, was made originally by a prime tube manufacturer.

truly a new tube. TECHNICIAN found in the course of the investigation, however, that even experienced tube men hesitate to identify a tube as "brand new, never used." "Reprocessing" has become such an "art" that sometimes only a top-notch tube engineer can be relied upon to distinguish the new from the "reprocessed" tube. Information on how the tubes are processed—and tips on recognizing them—will be found in a later section of this article.

One Philadelphia company is representative of a legitimate phase of the bargain tube field. Many of its tubes are purchased new from prime tube manufacturers, directly or indirectly, with no brand name imprinted. This company then puts its own brand on the tubes, but does not do any washing or reprocessing, and sells them through established jobbers. Tubes obtained from other sources are tested to see if they meet the firm's specifications before they are sold.

The high business mortality rate among equipment manufacturers in the past few years is responsible for another type of tube available in large quantities. These are the new, but out-of-warranty tubes bearing names of defunct organizations. These tubes were originally scheduled for use in the TV receivers manufactured by these firms. When the firms' assets were auctioned off due to the bankruptcy proceedings many thousands of these tubes were made available to the market. These are top quality tubes which can be picked up for a fraction of the cost of in-warranty tubes, but obviously, there is no guarantee on their performance.

The "in-warranty" or "out-of-warranty" factor has top priority in establishing the tube price. For that very reason, as soon as a tube goes out of date, its value takes a sharp drop. This opens



First step in "reprocessing." Tube is washed and name and code removed with oil-abrasive.

the door to very considerable savings for the serviceman, if he can find a source of such tubes. These tubes, like the tubes above, become available to the market when the stocks of bankrupt firms are auctioned off. Well-advertised in the cut-rate ads but without any substantial basis in fact that TECHNICIAN could find, are the "pull-outs," tubes removed from electronic equipment. The ads make a point of stating that they are removed from government equipment, which is quite impressive, if true, since the tubes used by the military are often superior to those available through other channels. But little substantiation was found for the statement. TECHNICIAN found only a handful of tubes which could be definitely traced to government sources.

The majority of "pull-outs" which TECHNICIAN investigated were found to come from other TV sets which were "cannibalized" for parts. When we take into consideration the number of sets estimated to be "junked" each year we can see that the number of tubes contributed by this source is not negligible. The life expectancy of tubes purchased from these sources is of course, speculative. It will depend completely on the past history of the tube; how, and for how long it was used.

Now, despite the rather questionable life expectancy of these four classes of tubes, and their hazy past history, these tubes are "legitimate." If the tubes are advertised as removed from electronic equipment, and the tube comes from an 8-yr. old 630TS—or worse, a prewar radio—it is still an honest transaction in that the buyer knew, or should have known, what he was getting.

The point is that these millions of usable tubes drifting around in the industry do have a value,



Tube appears new but internal "burn" marks are tip-off that it has seen heavy usage.

but that value can be determined only on the basis of their past history.

So much for the "legitimate" tubes. While some of them are of questionable origin, and it may be hard to condone their use, they stand on their own merits. We will now take up the case of a very different phase of the tube industry—the tube "reprocessors."

Tube Reprocessors

Tube "reprocessors" fall into one of two groups, depending upon whether they treat the tubes electrically, in addition to restoring their outside appearance. The first, and most vicious group, are firms which generally buy up old tubes from TV service shops, for 1¢ apiece, clean and polish them, buff off the manufacturer's name and other pertinent information, and resell them. The only requisites in most cases are that the filaments are intact (that the tubes light up), and that some deflection be shown in a tube checker.

For supplementary information on this racket, TECHNICIAN went to District Attorney Edward S. Silver of Brooklyn, N. Y., who has just finished a successful prosecution of an electronics firm on counts of counterfeiting receiving tubes. D. A. Silver, and his aides, assistant district attorneys Albert DeMeo and Jerome Ditore, who had prepared the case, revealed that this company had been buying old defective tubes from TV service firms, rebranding them with top name brand identification and "in-warranty" date codes. They were then sold to local distributors for 80% of the market price. No reprocessing had been done. The tubes were simply the choice tubes selected from those being discarded by service shops.

RESULTS OF TECHNICIAN "BARGAIN" TUBE SHOPPING SURVEY

The names of the following companies are being sent to the proper agencies, along with other data turned up in this investigation. Pending subsequent action by the authorities, these names are not being revealed publicly for the present.

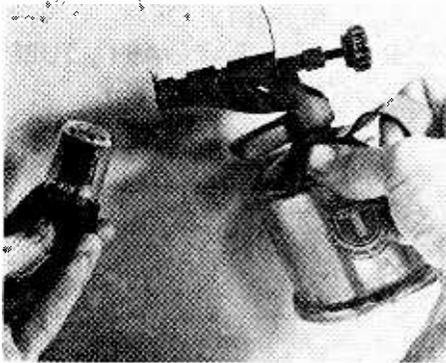
Firm	No. of Tubes Purchased	No. of Tubes Unusable	Percent- age
Co. A	41	31	75.6%
Co. B	20	5	25.0
Co. C	18	3	16.7
Co. D	7	3	42.9
Co. E	12	3	25.0
Co. F	10	1	10.0
Co. G	11	2	18.2
Co. H	14*	10	71.4
Co. I	8	5	62.5
Co. J	20	4	20.0
	161	67	Avg. 41.6

*Seven of these tubes carried the brand name of Co. A. Five of the 10 bad tubes bore Co. A's brand name.

A similar operation is being conducted today by Company A of this survey who, incidentally, advertises the lowest prices in the industry. TECHNICIAN shopped this mail order firm twice; once as a private individual, and once as an established, and rated, TV service firm. In the first order of 21 tubes, 14 were found unusable. (The check was made on an emission-type tube checker with "Good" reading as the standard. Life tests and gm measurements were not made, giving the tubes the benefit of any doubt.) In the second batch of tubes from this firm, which was ordered for TECHNICIAN by a long-established service firm, 17 of 20 tubes were found unusable. (Contrast this failure percentage with that of brand new tubes which commonly run about one unsatisfactory tube out of 100, according to one prime manufacturer.) All 3 usable tubes, strangely enough were 12-AU7's—the only 12AU7's ordered!

"Hot-Shot" Tubes

The first order of 21 tubes turned up 6 tubes which could be positively identified as "reprocessed" or "hot-shot" tubes. It should be borne in mind that it is often very difficult to say for certain whether a tube has been restored, and



Flame of torch brushed over top of the glass envelope removes all traces of "burn."

that, almost certainly, many more of those tubes had been treated.

To pin the operation down, TECHNICIAN returned the defective tubes for refund, pointing out the guarantee promised in the advertisement. Not long afterward a check was received for the full amount due for the returned tubes. This is apparently a standard practice with these firms. In another case, with Company B, a refund was also quickly forthcoming, and from checking with other quarters it seems reasonably safe to say that there is, as a rule, no quibbling over refunds.

Misleading Advertising

One firm has an address only a few doors from one of the top tube manufacturers. Another one makes a point of mentioning that he is located in the home town of one of the largest tube manufacturers in the country. This may give some servicemen the impression that they are getting "seconds" or "rejects" right out of the factory. Absolutely no facts were found by TECHNICIAN to support any such theory. Tubes, even with the manufacturer's name buffed off, can usually be traced to the original manufacturer through the manner in which the tube designation is applied to the tube. Among the tubes ordered from the latter firm, the percentage of tubes from the manufacturer with whom the firm may be assumed to have an "in" did not exceed that of his competitors in the bargain tube business. And, in no case, were there more than would be expected with a random sampling of the industry's receiving tubes.

Reputable tube wholesalers, having brand new first quality tubes to offer, are finding it next to impossible to compete in the open market because of this fraudulent advertising. One firm whose prices on standard brand tubes are com-

parable to those offered by parts jobbers, but almost twice those offered by his lowest-priced competitors in the mail-order field, finds it necessary to justify his prices with this explanation: "Latest dating—No private label, electrical or mechanical rejects. No rebrands or 'rewashed' bargains."

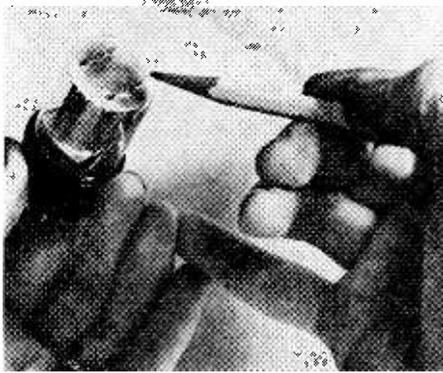
There can be absolutely no defense of the firms picking up discarded tubes and reselling them as "quality, 1 yr. guaranteed" tubes. This is so misleading that it can only be wondered that the practice has endured for so long. This point was brought up in talks with District Attorney Silver. Why, TECHNICIAN asked, was this practice, which he and his staff also had become aware of in their investigation, not made a part of his case? He pointed out that at no time were the tubes referred to, or advertised as "new." The only claim was that they were "peak performance" tubes. Since such a phrase has no standard connotation, it was felt that there was no basis for his staff to work on. He subsequently submitted the case to government authorities for prosecution as mail fraud, but no prosecution resulted.

Service technicians should bear in mind that they run a double risk when they make replacements with used tubes. First, the chance of subsequent tube failure in a short time can incur much customer displeasure and annoying callbacks. Second, there may be unhappy legal implications for the technician who charges brand new list price for a tube he knows to be used or reprocessed.

There seems little reason to believe that this phase of the "reprocessing" business—that of picking up discarded tubes, washing, sometimes rebranding, and reselling them without trying to improve performance—is widespread. It may flourish on a local basis in some communities, and, as with Company A, in isolated mail order operations, but on the whole, it is spurned by most firms in the cut-rate field. The reasons are two-fold; first, it is a messy business, and second, it is so much easier, once the equipment is set up, to do a real "reprocessing" job on the tubes.

The firm selling washed, discarded tubes is a nuisance, but at least you can usually recognize his product. The real "reprocessor" is something else again. This firm takes an old tube and restores it so that both outwardly and electrically it appears to perform as well as brand new tubes. This represents a true menace.

Reprocessing, or "toasting," or "hot-shot-ing," as it is sometimes referred to, is almost as old as the tube business. Tube engineers have long been aware that even when tube emission has fallen below the point where it is usable, the application of certain methods will restore emission, at least temporarily.



"Reprocessed" tube, with clean and shiny glass envelope, is ready for re-branding.

Tube emission is dependent, mainly, upon the amount of free barium on the surface of the cathode. When the barium is depleted, the tube emission fails. Now, although, the "free" barium is depleted, there is still some left in the cathode material which has not come to the surface; the result, in most cases, of improper "aging" during the manufacturing process.

Heating The Cathode

The tube reprocessor takes over where the tube manufacturer left off. With the tube whose emission has failed due to depletion of the free barium, he simply heats the cathode to a temperature in excess of that to which it is normally exposed. This additional heating liberates barium which did not come to the surface in the course of the original "aging" and would not normally come to the surface at the usual operating temperature of the cathode. This fact brought out an interesting observation by one veteran tube engineer. He pointed out that while this reprocessing would, indeed, restore emission temporarily, it would endure only until this new supply of barium was exhausted. No more barium would be liberated at the ordinary operating temperature of the cathode.

In talks with other tube engineers, TECHNICIAN tried to pin down estimates of the average tube life which would be expected of these "hot-shot" tubes. There was a general reluctance to make a firm statement because, to a very great extent, the future tube life will depend upon the past history of the tube—whether it was used as an amplifier, oscillator or detector—and for how long it was used. This, of course, is not known. However, one old line tube engineer whom TECHNICIAN questioned on this subject would commit himself to this extent: "Of this we can be sure. The tube life, on the

average, will be much less than that of new tubes."

A dead give-away, so far as determining whether a tube had been used or not, would seem to be the burn mark (old barium) opposite the cathode in the top of the glass envelope. But the tube "reprocessors" have licked that one, too. They found that by simply applying the flame of a torch to the glass at that point the barium disintegrated, leaving nothing to indicate that the tube had been used. The glass envelope is absolutely as clean as that of a brand new tube. All that is needed then is to buff off the old name, substitute their own private brand and they have, apparently, "out of warranty, brand new tubes." If the pins are a little discolored from usage, inserting the tube in a metal pin straightener a few times will often do wonders.

Even tubes with open filaments can be "reprocessed" by these firms. Special machines vibrate the tube while high voltage is applied to the external filament connections. When the broken ends within the tube touch together, the arc-over "welds" the joint.

It would appear from the description above that there is no defense against the tube "reprocessor." Actually, this is not so. Despite all the pains they take to camouflage the fact that their tubes have been used, there are a number of almost certain indications which give them away. While no one of these signs is convincing in itself, a combination of these symptoms should arouse suspicion.

First, when you buy anything but a brand new, boxed tube, check it immediately in a tube tester. And when you check it, make sure that you do it in this manner. With the checker on, and the correct settings made, insert the tube in the socket and immediately depress the "Merit" button. In this way you will have a picture of the emission as it builds up. If the tube is a "reprocessed" tube, the swing of the needle will be erratic. It will swing up rapidly, then hesitate at one or several points, then continue moving up again. If you want a comparison, try a brand new tube. You will notice that the deflection is rapid, and positive, with no hesitation. The reason that the deflection with the "reprocessed" tube is irregular is that the cathode has been damaged; as the temperature increases, additional areas are activated.

Loose Particles

A second, but less trustworthy symptom, is the presence of particles in the glass envelope. In "reprocessing" parts of the tube elements are often flaked off.

A third symptom is the burned mica spacer. This quite commonly results from the heating

of the glass envelope to remove the "burn" marks. To recognize burned mica, the technician will have to become more conscious of the appearance of new, undamaged mica. This is quite an important test of "reprocessed" tubes. Discolored pins are another symptom. If the tube you are buying is advertised as "brand new, out of warranty" there is no reason for the pins to show signs of wear.

There is one obvious sign. If the tube designation is barely decipherable, and you are supposedly buying an unused tube, you should immediately become suspicious. There is absolutely no reason for the printing to fade, other than constant use.

One more tip: check the tube base for an oily film. Brand names are usually buffed off with an oil-base abrasive.

Those are the ways that you can protect yourself. But more important is the way that you can protect everybody in the industry. Don't sell your old tubes! Scrap Them! The couple of pennies you make are probably costing some other poor serviceman dollars.



Our Cover Photo

The scene on the cover of this issue is filled with the spirit of Christmas. The photo was taken at the first annual Christmas Pageant of Peace, held in Washington, D. C., during the 1954-55 Christmas Season. In the background can be seen the National Community Christmas Tree. Twenty-two nations and twenty-seven States and Territories had Christmas Trees or other symbolic decorations on the Pathway of Peace. This display flanked a boarded corridor leading to the giant National Community Christmas Tree, shown at right. 1955 New Year's greetings and pledges of peace from thirty-eight countries were broadcast to the world from the Pageant of Peace stage.

The *Theme and Purpose* of the annual Pageant of Peace, which will be held again this 1955-56 Christmas Season, is as follows: "To provide a means of expression of Americans of all creeds and color to dramatize the Christmas Message: 'Peace on Earth; Goodwill Toward Men'; to provide an exchange of friendship and understanding among all the peoples of the world."

The Pageant of Peace is incorporated as a non-sectarian, non-profit institution, supported entirely by voluntary financial contributions. The photographs on our cover, and of the National Community Christmas Tree, at right, were furnished through the courtesy of PAGEANT OF PEACE, INC., 1616 K Street, N. W., Washington 6, D. C.

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Technical Ramblings

By B. VAN SUTPHIN

NRI Consultant

Picture Tube Rejuvenation Using a Tube Tester and Picture Tube Adapter

Many students have written us to inquire about methods of rejuvenating picture tubes after the cathode emission has decreased so much that the raster brightness decreases to the point where a picture is barely visible.

Fortunately there is a simple method of doing this with a tube tester and a picture tube adapter. By following the procedure given below, picture tube operation can *sometimes* be restored to normal for a time, or at least until the customer can save enough to purchase a new picture tube.

Basically, cathode rejuvenation involves "boiling" the cathode to expose new electron emitting material. This is done by applying higher than normal filament voltage to the picture tube.

Suppose that you test a poor-performing picture tube in the normal manner and find that its cathode emission is weak. If this happens, you can then try the rejuvenation process. Make a note of the exact reading of the meter in the tube tester. Then adjust the filament control and the line voltage control of the tube tester so that approximately 8.5 volts is applied to the picture tube filament.

Leave the tube connected with 8.5 volts applied to the filament for fifteen minutes. Then check the cathode emission again with normal filament voltage applied to the tube. If it has increased, turn the equipment back on for an additional fifteen minutes with 8.5 volts applied to the filament. If emission has not increased after the first fifteen minutes, the rejuvenation process will not help.

At the end of this second fifteen-minute period, check the cathode emission again with normal filament voltage applied to the tube. If the cathode emission has not increased any more, further application of higher than normal filament voltage will not improve the picture tube operation. If the cathode emission has increased above previous readings, however, apply the higher than normal filament voltage for another

fifteen minutes. Continue this process until the emission will increase no further, or until you have applied the higher than normal filament voltage for one hour, whichever comes first.

Explain to your customer that the process may or may not work. Also, explain that the increase in picture brightness is not permanent and that the picture tube will probably fail in a short time. If the tube was quite weak in the beginning, however, the customer has little to lose.

If you find that the initial application of higher than normal filament voltage did not increase the emission as measured with normal filament voltage on the tube, then use a picture tube booster which applies higher than normal filament voltage permanently. This *may* restore the picture tube to normal operation for a short time. When you install one of these units, however, you should always warn the customer that the picture tube is weak and that replacement will be necessary in a short time.

To use the Model 70 NRI Professional Tube Tester and Picture Tube Testing Adapter in this application, connect an ac voltmeter to measure the voltage between pins 1 and 12 of the picture tube. (This can be done by placing the a. c. voltmeter leads in terminals 1 and 8 of the locktack tube socket on the NRI tube testers. Pins 1 and 12 of the picture tube socket connect to pins 1 and 8 of the Picture Tube Adapter plug.) Set controls A, C, D, E and F to the positions specified on the instruction sheet for the picture tube tester adapter. Set control B to position 8 and adjust the Line Voltage control so that 8.5 volts exist between pins 1 and 12 of the picture tube.

To use the NRI Model 66, 67, 68 or 69 in this application, set all controls except B to the positions specified on the instruction sheet for the picture tube tester adapter. Set control B to the 7.5-volt position and adjust the Line Voltage control so that 8.5 volts exist between pins 1 and 12 of the picture tube.

This technique is not a "cure-all" for the complaint of a weak picture tube. But it will work in some cases.



N.R.I. ALUMNI NEWS

Thomas Hull	President
F. Earl Oliver	Vice Pres.
Louis E. Grossman	Vice Pres.
Elmer E. Shue	Vice Pres.
Herbert Garvin	Vice Pres.
Louis L. Menne	Executive Secretary

GROSSMAN OF NEW ORLEANS IS PRESIDENT-ELECT OF THE NRIAA

Oliver of Detroit, Garvin of Los Angeles, Fox of New York, and Smith of Springfield, Massachusetts, are elected Vice-Presidents.

IN one of the closest election in years involving the offices of President and Vice-Presidents, the final tally shows Louis E. Grossman of New Orleans to be elected President to serve the NRI Alumni Association during the year 1956.

The balloting for Vice-President was lively too. The ever reliable F. Earl Oliver of Detroit was returned to office. Herbert Garvin of Los Angeles, also elected, is a hold-over from last year. Two new national officers are William Fox of New York and Howard B. Smith of Springfield, Massachusetts. Thus all sections of the United States are represented in our National Organization.

Elmer E. Shue of Baltimore, who ran on the ticket against Mr. Grossman in this friendly contest, made a surprisingly strong showing. He is a man to keep in mind for the office of President for some year in the very near future. Jules Cohen, Frank Skolnik, and Joseph Dolivka, unsuccessful candidates for Vice-President also received plenty of support.

Louis E. Grossman, who is elected President, has been very active in our Alumni Association for several years. Single handedly he organized New Orleans Chapter. He has contributed much in time and energy toward making this chapter one of the best in our organization. He is a man with a wide business experience, is a director in a bank and has had much experience in fraternal work. One needs to be in the home of Mr. Gross-

man only a very short time to understand that he is inspired by his gracious wife, Fanny-Clare, who is deeply interested in anything with which Mr. Grossman becomes identified. Mr. Grossman also has good reason to be proud of his son and daughter, both of whom made outstanding records in college. It may be said Mr. Grossman is a completely successful man.

On December 31, 1955, Thomas Hull of New York will relinquish the office of President to Mr. Grossman. Mr. Hull, however, will not step aside entirely. He will continue to serve the members of New York Chapter in some capacity. As this is written he is Chairman of New York Chapter having succeeded the incomparable Bert Wappler, who for twelve consecutive years did such a remarkable job as Chairman of New York Chapter. When Bert relinquished the Chairmanship, he lead the members of his chapter in picking Tommy Hull to succeed him. Hull has done an exceedingly good job in this important capacity.

Of course all of our members know Vice-President F. Earl Oliver of Detroit who has done such excellent work in our local chapter there. Herbert Garvin of Los Angeles has no chapter affiliations. He received strong support from the West Coast. Mr. Garvin has plans for retiring within the next year or two.

William Fox, more popularly known as Willy,

has long been a member of New York Chapter. The boys of that local are very proud to know Mr. Fox will serve as a Vice-President.

If there was a dark-horse candidate in this election, it could easily have been Howard B. Smith of Springfield, Mass. Mr. Smith was strongly supported and has been elected a Vice-President. Both Willy Fox and Howard Smith are elected to office for the first time. Howard Smith is the present Chairman of Springfield Chapter. In a recent conversation with the Executive Secretary, Mr. Smith expressed a desire to step down as Chairman at the next election in order to give opportunity to someone else to serve. Howard Smith will continue to hold some office in Springfield Chapter. For the fine work he has

done in organizing Springfield Chapter, it is a fitting reward that he should be elected a Vice-President.

1956 promises to be a most interesting year in the field of Radio-Television-Electronics. The affairs of our Alumni Association will be in good hands to live up to the preamble of our constitution and by-laws which is "To cultivate fraternal relations among the alumni of the National Radio Institute, to foster the spirit of unity among the alumni, to encourage and aid the Institute in the dissemination of Radio and Television knowledge, to consider and foster new ideas and trends in Radio and Television, and by the interchange of helpful information, promote the welfare of the Institute and each alumnus."

Chapter Chatter

New York Chapter members had one of their big rallies on October 20 which was attended by Ted Rose and L. L. Menne of Headquarters. First there was a two hour dinner meeting of the Executive Committee consisting of ten officers, present and past. This was followed by the regular meeting of members.

Chairman Tommy Hull, who is completing his year as National President, acted as chairman during both sessions. At the Executive meeting programs were planned for the next several months. At the regular meeting the results of this type of planning were very evident.

A smooth, well organized program is always in effect at New York Chapter. Speakers are given their subject well in advance, know exactly how long they are expected to speak, and come to the meetings prepared to give an informative talk. The Open Forum is always a part of these meetings. Then too Crez Gomez, Willy Fox and others are usually good for a bit of humor. No wonder New York Chapter meetings are always well attended.

Tommy Hull and his very pleasant wife spent three days in Washington in consultation with staff members of the National Radio Institute and NRI Alumni Association. This was in line with Mr. Hull's duties as President of the NRI Alumni Association.

Meetings of New York Chapter are held regularly on the first and third Thursday of each month at St. Mark's Community Center, 12 St. Mark's Place, between Second and Third Avenues, in New York.

Phila-Camden Chapter members were privileged to make a tour through the Phila. Police Communication Center. This tour was conducted through the courtesy of Lt. Peter Reilly. A visit was also made to the Fire Communications Bureau. Our members extend a vote of thanks to Lt. Reilly and other officers for their courtesies.

Mr. Lubrano, Service Manager for Pierce-Phelps Corporation, distributors of Admiral TV, is scheduled to talk to our group in the very near future. This event was scheduled for an earlier Fall meeting but was postponed because of illness of Mr. Lubrano. Mr. Nunemaker, one of the top engineers in the Admiral organization is scheduled to assist Mr. Lubrano. This will be a bang-up meeting including demonstration of equipment.

Mr. Dick Hershey, in charge of the Philco Corp. Educational Programs, loaned us a film strip movie showing the Philco 1956 models TV and home radio series. This was a good demonstration of the Philco push-button tuning and, more important, how to service these sets.



Some of our Phila-Camden chapter members being brought to the start of the tour through Phila. Police Communication Center.



Lt. Peter Reilly of Phila. Police Department is explaining modern techniques in Radio Communications for police work.

New members are John Schmidt of Hatboro, Penna. and Harry S. Parrish, of Trenton, N. J.

Meetings are held at the Knights of Columbus Hall, Tulip and Tyson Streets, in Philadelphia, on the second and fourth Monday of each month. Secretary Jules Cohen can be reached at 7124 Souder Street, Philadelphia, telephone Fidelity 28094.

Baltimore Chapter members held their semi-annual dinner on October 20 at Munder's, famous for good food. These affairs are something to look forward to.

Chairman Joseph B. Dolivka gave a brief talk on Ways and Means to Detect a Second-Hand, Reworked Tube which some unscrupulous firms offer servicemen at low prices and represent them to be top quality tubes.

Mr. H. J. Rathbun gave a very interesting talk on Installing Burglar Alarms and also on how to trace the lead wires on Intercom sets.

Another dinner party is being planned for December.

Meetings are held on the second Tuesday of each month at 100 N. Poca Street.

Detroit Chapter members had a great time at a stag party which was held, as usual, at the Moto Club in Windsor. Guests at the party were Ted Rose and Lou Menne from the Detroit headquarters. The entertainment was good and the food was excellent.

Secretary E. Umbriet, at one meeting, gave a demonstration of the Bar and TV set. At this same meeting, the most interesting demonstration was a professional TV Oscilloscope

which, by the way, is owned by our chapter. We are very proud of this instrument.

We are planning a series of talks on color TV.

NRI men in the Detroit area who are interested in attending meetings are requested to contact Chairman Stanley Safran, 2660 Holmes, Hamtramck, Michigan, or Secretary Jack Shupak, 475 Tuxedo, Detroit 4, Michigan.

Flint, Michigan, Chapter, better known as the Saginaw Valley Chapter of the NRI Alumni Association, held a meeting at 2 P.M. on Sunday, October 23, in order that Vice President Earl Oliver of Detroit and Ted Rose and L. L. Menne of Washington might be with us following a meeting in Detroit. The talks made by these men were very much appreciated.

This was the kick-off meeting for our expanded chapter now taking in the entire Saginaw Valley and membership is expected to increase materially. The new official charter was presented by Executive Secretary Menne. Chairman Warren Williamson and Secretary David J. Nagel did a good job in arranging this meeting. The officers of the chapter are extending themselves to the very limit and ask only the attendance support of its members.

Inspired by the example of our neighbor chapter in Detroit with its marvelous record extending over more than twenty years, we are planning a stag party at which we will raffle a TV receiver. All NRI men, students and graduates alike, within driving distance of Flint are requested to get in touch with either Warren Williamson, 1201 Allen Street, Flint, Michigan, or David J. Nagel, 3135 E. Mt. Morris Rd., Mt. Morris, Michigan. We welcome inquiries regarding future meetings.

Pittsburgh Chapter members had the benefit of another fine talk by Bert Bregenzer, President of State Federation Radio and TV Servicemen, who spoke on Synthesis of Sound. Mr. Bregenzer presented an RCA demonstration of Sound Analysis whereby sound waves can be recreated electronically. He gave an interesting lecture on the material he covered.

A big party is planned for our December meeting which will be held on the first of the month. Please keep the date in mind, December 1. We expect visitors from headquarters. This is to be one of the big socials of the year.

Meetings are held on the first Thursday of each month at 134 Market Place in Pittsburgh. For information contact Chairman Frank P. Skolnik, 932 Spring Garden Ave. or Secretary William L. Roberts, 2521 Wenzell Ave., Pittsburgh.

Hagerstown, Maryland, Chapter, better known as

the Cumberland Valley Chapter, had as visitors Mr. Rose, Mr. Menne and Mr. Tom Carswell from Headquarters. Mr. Carswell gave a very able demonstration of the use of an Oscilloscope. Mr. Carswell used the NRI Professional TV Oscilloscope, Model 56, for this demonstration.

After the talk, members were encouraged to ask questions. It was a very interesting meeting.

The Cumberland Valley Chapter is growing steadily under the able leadership of Chairman Edward M. Kemp, 618 Sunset Avenue. Information regarding future meetings may also be had through Secretary Leonard D. Thomas, 300 Bryan Place, Hagerstown, Maryland.

Springfield, Mass., Chapter members surprised Ted Rose and Lou Menne with an attendance of forty-two at a recent meeting. Membership is increasing rapidly.

This chapter is fortunate to have graduates of long standings such as Howard B. Smith, Vice Chairman Ray Nystrom, Secretary A. L. Brosseau and Treasurer L. Lyman Brown, any one of whom is capable of giving a high-grade talk without preparation. At each meeting Mr. Brown conducts an Open Forum and some friendly discussions ensue.

A 17-inch TV receiver was presented to the personnel of the U. S. Army Headquarters, where we meet. The presentation was made by Ray Nystrom on behalf of the chapter and it was accepted for the personnel by Col. Sullivan, officer in charge. A movie furnished by Capehart Farnsworth, titled "The Sale After the Sale" was shown. Following this a lively business meeting was held and several important matters were disposed of.



Chairman Howard B. Smith, Ted Rose and Lou Menne, visitors from Washington, Vice Chairman Ray Nystrom, Treasurer L. Lyman Brown, Secretary A. L. Brosseau, at Springfield, Mass. chapter meeting. Menne and Brown are each holding a prototype of Brown's new Electronic Condenser Leakage tester which was demonstrated by Brown.

The members are much interested in an invention of our L. Lyman Brown, an Electronic Condenser Leakage Tester, which was unveiled at the meeting. Mr. Brown demonstrated his invention to the members of Springfield Chapter. He has applied for a patent and says plans are under way to manufacture it.

Meetings are held on the first and third Friday of each month, beginning at 7 P.M., at the U. S. Army Headquarters Building, 50 East St., Springfield. These are comfortable quarters, warm and well lighted. Good seating. Ideal for our purposes. Chairman Howard B. Smith thanks the members for their loyal support and encourages other NRI men in the Springfield area to join with them.

Milwaukee Chapter continues to meet at the Radio-TV store and shop of S. J. Petrich, 5901 W. Vliet St. on the third Monday of the month. Chairman Philip J. Rinke has been doing an excellent job in keeping the chapter moving forward during these days when the chapter is feeling its growing pains. In this he has been ably assisted by Mr. Petrich, Mr. Kapheim, Mr. Bettencourt and Mr. Krauss. Mr. Krauss, by the way, has filled the vacancy as Secretary until the next election of officers.

The chapter is proud of its new publication which is printed for the benefit of its members. This publication will give complete details regarding proceedings at meetings and will contain other news of importance regarding members and developments in the Radio-TV industry as they pertain to the local area.

Mr. Bettencourt is arranging for tours through local TV stations and the American Telephone Company. Plenty of good, informative literature is available at all meetings. Good speakers have been lined up for meetings to take place in the immediate future.

Students and graduates in the Milwaukee area are requested to contact Philip J. Rinke, Route 3, Box 356, Pewaukee, Wisconsin, or Acting Secretary Robert Krauss, 2467 N. 29th Street, Milwaukee, for information regarding meetings. All NRI men in reach of this chapter are cordially invited to attend meetings.

New Orleans Chapter members are highly elated over the election of Chairman Louis E. Grossman as President of the NRI Alumni Association.

The chapter continues to hold its planned series of talks on TV. This has developed into a very interesting course.

Information pertaining to meetings may be obtained through Secretary Anthony H. Buckley, 305 Serpas Dr., Arabi, Louisiana, or through



Chairman Louis E. Grossman, 2229 Napoleon Ave., New Orleans.

St. Paul-Minneapolis Chapter, the Twin-City Chapter, is looking forward to a talk by well-known Mr. Mike Kushill of Raycraft, Inc., distributors of Philco's in that area. This is a meeting to again prove to our members that the best speakers in this area are being obtained and that we need only good attendance to continue these fine programs.

Lew Born Company donated the door prizes for last month's meeting. The big door prize drawing for a considerable amount of cash in the kitty is due to come up at any meeting now.

John Babcock gave an alignment demonstration. He has also donated a TV chassis to the chapter.

The bill to license Radio-TV technicians in the city of Minneapolis was discussed at some length. The officers of Twin-City chapter are on guard to do what they can to bring to the attention of Councilmen all sides of the question so that legislation will not be hurriedly passed that might handicap any technician.

We continue to meet at the very pleasant rooms in the Midway YMCA, in St. Paul. Students and graduates in the Twin City area are urged to attend meetings. Contact Chairman John Berka, 2833 42nd Ave., So., Minneapolis, Minn., or Secretary John I. Babcock, 3157 32nd Ave., So., Minneapolis 6, Minn.

Chicago Chapter has under way a series of talks on color TV Picture Tubes and the basic theory of operation. NRI students and graduates in the Chicago area are cordially invited to attend these meetings. The programs have been carefully planned to consume one and one-half hours under the able leadership of Mr. Walter Nicely. These talks are simply fascinating.

Officers nominated to serve during 1956 are for Chairman, Walter H. Nicely; Secretary, Charles C. Mead; Treasurer, Gordon L. Hull; Librarian, George J. Smutny and Sgt. at Arms, I. V. Webber.

Meetings are held on the second and fourth Wednesday of each month at American Furniture Mart Building, 666 Lake Shore Dr., 33rd Floor, Tower Space.

NRI Graduate Receives Award for Iron Lung Television Idea

"I have a salaried position with the Veterans Administration Hospital in Richmond, Virginia. I take care of all radios, driver amplifiers, power amplifiers, etc. We have a four channel distributing system consisting of: console, amplifiers, driver amplifiers, microphone assembly, control panel, meter panel, turntables, radio receivers, power relay panel, etc. As you can see, I have a fairly good size job and like my work very much.

"The NRI course has helped me more than I can say in many ways. About one year ago, I happened to remember something in one of my lessons which helped me very much. The Chief of Special Services asked if I could help a Polio patient to see his television like every one else does. I took the television set to my shop and began working on it. Then I remembered in one of my lessons about the horizontal lines running from left to right on the screen. I took the horizontal deflection leads and reversed them so that the lines would run right to left on the screen. It worked wonderfully for any patient who was confined to an iron lung and had to look back through a mirror. The V.A. Hospital liked it so much that they adopted it for all Army, Navy and VA Hospitals over the United States, and I received a \$50 award from the Government for this suggestion."

Mr. Wilbur R. Crouch, Jr.,
1213 North 38th St., Richmond, Va.





Here and There Among Alumni Members

Clark F. Conaway, of Knightstown, Indiana, is now selling both Philco and Westinghouse Television. Sold 14 new TV sets in last 30 days. Conaway's success is particularly inspiring, since he is confined to a wheel chair. At present he is employing two men.

— n r i —

Leo Balfur, of Oakland, California, is doing well in his Sales and Service business. He stresses that Radio servicing, in his business, is a mighty big factor as well as TV servicing.

— n r i —

Frank Roberts, of Nashville, Tennessee, reports that his Radio and Television Service business is growing by "leaps and bounds."

— n r i —

Donald G. Whitt is employed with Patterson Radio and TV Service, Tazewell, Virginia. Doing nicely.

— n r i —

Chief Radioman Charles K. Francis, USN, of Port Deposit, Maryland, is well pleased with his NRI course. Says it has qualified him for an eight week advanced course in military electronics.

— n r i —

Wynne E. Hampton, of Portsmouth, Virginia, is having real success with his spare time business. Taking in better than \$200 monthly.

— n r i —

Joe Olden, a member of Phila-Camden Chapter, passed out cigars. It's a girl—their fourth child.

— n r i —

Irv Miller, another Phila-Camden Chapter member, is in high spirits over his new job with Philco Corp. involving guided missiles.

— n r i —

Larry D. Sledge, of High Point, North Carolina, is now an engineer at Station WHPE.

— n r i —

Charley Fehn, of Philadelphia, past president of the NRI Alumni Association, is back home after an operation. Doing very well.

Harvey Morris, of Philadelphia, has Fred Mascairs, an NRI man, working for him. Harvey is getting along nicely in his TV business.

— n r i —

Victor Minchoff, of Webster, Massachusetts, is now the Purchasing Agent for Demambro Radio Supply Company, of Worcester, Massachusetts. Also has Ham call letters W1BHC.

— n r i —

Richard G. Lansing, of Northampton, Massachusetts, and his brother have a prospering part-time Radio-TV business. Name is Lansing Brothers Radio & TV. Plenty of work.

— n r i —

Thomas J. French, now a Chief Fire Control Technician with the U. S. Navy, is stationed with the NROTC unit at the University of Missouri. He is an instructor in "Naval Science."

— n r i —

Thomas R. Favaloro, of Norwich, N. Y., is now "Chief Inspector of Quality Control" with the Technical Appliance Corp. of Sherburne, N. Y.

— n r i —

Leon H. Hand, of West Winfield, N. Y., is now a department foreman in the assembly and test department for Univac with Remington-Rand.

— n r i —

Floyd Fetterly, of Austin, Minnesota, has opened his own full time business, known as Floyd's Radio and TV.

— n r i —

Graduate Ernest E. Jones, of El Dorado, Kansas, is employed by the Hudson Battery and Electric Co. In addition to selling and servicing Zenith and Magnavox, his firm services two-way communications radio and micro-wave.

— n r i —

George M. Kaneshigi, of Honolulu, Hawaii, is working with his father in their Radio and Television Sales and Service store. Reports repairing TV sets with confidence.

— n r i —

Edward L. Rawlins, of Tulsa, Oklahoma, writes that he's netting \$100 a week from his shop, and that he could double this if he should go into servicing full time. Something to contemplate!

— n r i —

Glenn A. Nofsinger, of Chouteau, Oklahoma, has done more than \$1,000 worth of business during his first year of spare-time servicing. He does not advertise, and has all the work he can do!



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