

National RADIO-TV NEWS



*Merry Christmas
From N.R.S.*



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Christmas is a season of gaiety. We enjoy the good cheer, the friendly smiles of strangers. It is the season for kindling the flame of good will in the heart.

For those less fortunate our sympathies are thoroughly aroused. We enjoy the privilege of giving. We appreciate more deeply the warmth of each other's handshake. We are moved by a spirit of good cheer, of kindness, understanding.

We live for a few days in a world as it should be.

It is a great satisfaction at this season of the year to have a little friendly magazine of this kind which is all our own—yours and ours—through which we have this opportunity to wish you, on behalf of our entire staff, a very Merry Christmas and the hope that the New Year will bring you new advancement, good health and happiness in abundance.

J. E. SMITH, President.





Leo M. Conner

Elimination of Electrical Interference

By LEO M. CONNER

NRI Consultant

SERVICEMEN are often called upon to eliminate interference, caused by electrical equipment, in radio or television sets. This kind of service call is apt to come in more often as more appliances are being used every day.

Before the serviceman can proceed with the work he must learn certain facts about the interference. Some information can be obtained from the customer. However, there are certain things that must be found by a process of elimination.

The actual location of the interference calls for infinite patience, a definite plan of attack, some equipment not ordinarily used in radio service work and, last but not least, time.

Before starting work on an interference problem you should provide yourself with a simple test filter. The circuit for a suitable line filter is shown in Fig. 1. The coils should be composed of 100-turns of number 12 enameled wire, close-wound on a one-inch diameter form. The form can be any insulating material—a one inch diameter hard maple dowel rod is ideal. The capacity of the condensers may require some experimenting to get best results. A capacity of .5 mfd. 600-working volts is a good starting value for each condenser. The whole filter should be enclosed in a tight shield. Of course, the wires entering and leaving the shield should be carefully insulated in order to avoid shorting the line.

If you happen to be in a locality with a large number of interference problems you might make a more deluxe version of the filter.

This would call for a slightly larger shield with

a group of condensers, selector switches and electrical receptacles built in. The parts values and schematic for a filter of this type are shown in Fig. 2. In using this filter, be sure that the switches are set so that the same amount of capacity is in use on both sides of the filter at the input and the same amount of capacity at the output. If you care to do so, you can use a two-gang switch at the input and a two-gang switch for the output. Sometimes the output capacity may be different from the input capacity. The coils are the same as those for Fig. 1.

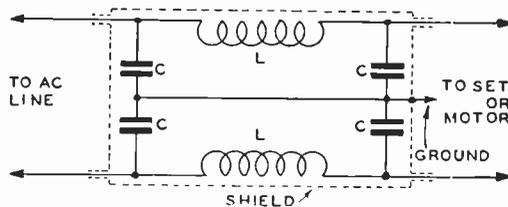


Fig. 1

A commercial shield box is suitable for a container. However, a box of this type does not have sufficient screws to make a good, tight shield. Put screws about every 2 inches around the edges to hold the sides down tight. Also remove all paint from the box edges and cover where they are in contact.

Suitable electrical receptacles can be obtained at radio supply houses.

Now, let us assume that you have reached the location of an interference problem and are

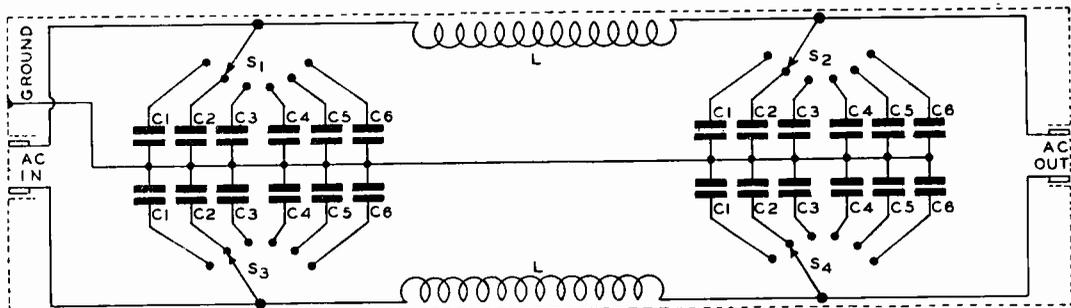


Fig. 2. S_1, S_2, S_3, S_4 —single pole, six-position selector switches. L —100 turns #12 enameled wire, 1" diameter. C_1 —.5 mfd. 600v. paper. C_2 —.3 mfd. 600v. paper. C_3 —.25 mfd. 600v. paper. C_4 —.1 mfd. 600v. paper. C_5 —.05 mfd. 600v. paper. C_6 —.005 mfd. 600v. paper.

ready to start work. If the interference is of the continuous type you can start right to work but, if it is intermittent you will have to wait until it starts.

Once the interference is present you should determine how it is reaching the set. It can come over the air—the same as a radio signal—or it can come over the power line.

If the set uses an outside antenna-ground installation, disconnect the antenna and ground leads and short circuit the antenna-ground terminals at the set. Tune the set over its tuning range and see if the interference has disappeared. If it is missing, then you can assume that the noise is coming in over the air. However, it is helpful to have a small portable receiver along so that you can be sure the noise is still on even though it is missing from the set under test.

The installation of a noise reducing type antenna might help. However, these antennas are by no means "cure-alls" and the best way to eliminate interference reaching the set through the air is to stop it at the source. This calls for a special approach and it will be covered later in this article.

For the time being let us assume that the noise is still present with the antenna and ground terminals short circuited. Now is the time to try the line filter.

If the set has a power transformer, reconnect the ground lead to the proper terminal and ground the shield of the test filter to the same terminal. Plug the set into the output of the filter and connect the input of the filter to the line. Turn the set on and see if the interference has decreased. If you are using the "delux" filter, try different capacities at both the input and output of the filter to see which gives maximum noise reduction.

Should you find a combination that gives good

noise reduction all you need do is build a duplicate filter and connect it in place.

If the filter does not stop the interference, it may be originating in the set itself—a partial open in a lead carrying current can cause terrific noise. Here is another case where a portable set would prove worthwhile.

If the noise is present in the portable and disappears when the regular set is turned off the noise is in the set itself and stage by stage servicing methods should enable you to find the cause and correct it.

There may be cases where the noise is not stopped by the filter and is not caused by a set defect. When this happens it will be necessary to find the cause of the noise.

Any electrical device can cause interference. A lamp bulb that is loose in its socket can cause a terrific noise. The thermostats in electric irons, heating pads or electric blankets can be the cause of intermittent noise.

If the noise follows a regular cycle, look for some controlled device such as a pump, water heater, or thermostatically controlled appliance.

Turn off, or disconnect electrical appliances or lights and see if the interference decreases. If you find one particular appliance that is causing the noise, you can try the filter in the supply line to the appliance.

Here is a good time to discuss electrical rules. If the device is operated through an ordinary plug and cord, then it is classed as portable and you do not need an electrician's license to install a filter. This rule applies even to water pumps that are held in place by pipes. If the supply line runs directly to the equipment and is permanently connected, then local regulations may require that a licensed electrician install the filter. It would be well to check the local

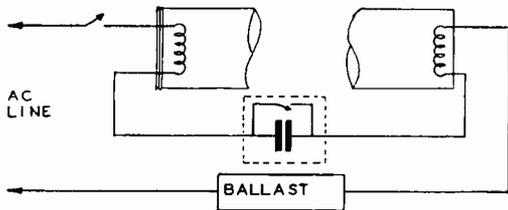


Fig. 3

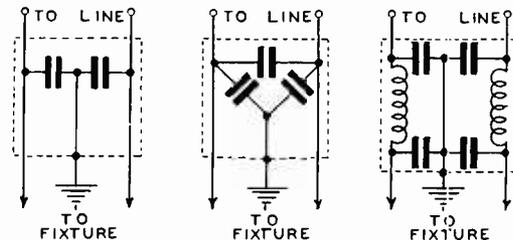


Fig. 4

regulations in this respect.

The shield of the filter should be connected to the frame of the device and grounded.

Different capacities should be switched into the circuit to see which gives the most noise reduction.

Should local regulations require it, the permanent connection of the filter should be left to a licensed electrician.

Fluorescent lights sometimes cause interference. Experience has shown that if these lamps are properly installed and used with high quality auxiliary equipment, only a small percentage of them will cause interference.

However, many people buy a fluorescent fixture and install it themselves or plug a semi-portable type fixture into a regular socket. In this case the odds are that the fixture is not properly installed.

Proper installation means that the auxiliary equipment should be enclosed in a steel channel: the wiring should be made up with tight connections; the lamps and starters should be firmly seated in the sockets and the fixture itself should be grounded. In some cases it has been found that grounding the fixture to gas pipe, metal lath or metal ceilings makes the interference worse! When you find radio interference caused by a fluorescent light check these points.

The standard fluorescent lamp starter includes a small condenser connected across the starter terminals for interference elimination. When the lamp is in operation the condenser is in parallel with the lamp and helps to reduce noise. Fig. 3 shows a typical lamp circuit.

In checking an installation which is causing interference, an effort should be made to isolate the unit or units causing the trouble. In some instances it will be found that most, or all of the interference is coming from a single lamp or lighting unit. This can be checked by turning on units one at a time until the unit causing the interference is found. If the trouble can be

isolated to one or two units in this manner, the first thing to do is to check the condenser in the starters.

The easiest way to do this is to use a new starter. If this does not change the interference, then you can assume that the original starter was in good condition. Another test for this trouble is to remove the starter while the lamp is operating. If the noise increases it shows that the condenser in the starter was working properly. It will then be necessary to look for the noise source at another location.

Keep in mind that the interference may be reaching the set in three possible ways, and that these can be a combination of any two or all three in any given case.

The three ways are:

1. Radiation direct from the lamp to the radio antenna.
2. Radiation from the power lines supplying the fluorescent units to the radio antenna.
3. Feedback from the fluorescent unit through the power line to the radio.

The filter circuits shown in Fig. 4 will cut interference appreciably. However, one filter may work in one case and be completely ineffective in another case. Try all three in stubborn cases. These filters are available in manufactured form at most radio supply stores. Ask for a fluorescent light line filter.

The interference may be originating at some point away from the home of the customer. This would call for cooperation of all parties concerned. For instance, the interference may be coming from a lighting fixture in the house next door. The neighbor may not want to pay for the filter installation. On the other hand, the original customer may not want to pay the bill! Usually an explanation that interference to his own set would be cleared up will make the neighbor see the light and have the filter installed.

Interference may also be caused by machine shop equipment, doctor's and beauty shop equipment and amateur transmitters. In all of these cases it is necessary to secure the cooperation of the

other party in order to make tests.

The amateurs have set up an organization to determine how interference can be eliminated. An amateur can secure this information free of charge by sending a request to the American Radio Relay League, 38 LaSalle Road, West Hartford, Conn. This information shows steps to be taken at the transmitter.

However, the transmitter can be "clean" and still cause interference to a TV set. It is then up to the serviceman and set owner to clear up the trouble.

When the TV set and the amateur transmitter are close together TVI can be caused by overloading of the receiver's front end by the fundamental output frequency of the transmitter. There is nothing the amateur can do about this and steps should be taken to prevent the fundamental from getting into the receiver.

Wave traps tuned to the transmitter frequency are not too good for this purpose because they are selective devices and therefore good for only the frequency for which they were designed. A better device for the purpose is a "high-pass" filter in the TV set antenna lead. These can be purchased ready made and properly tuned.

These filters not only reduce amateur TVI but frequently improve TV reception. The reason is that TV sets have rather poor IF rejection and a filter with a cut-off frequency somewhat higher than the i.f. of the set will prevent interference from other things such as high frequency broadcast stations, industrial heaters, and diathermy from getting into the set.

TVI may also be caused by harmonics of an amateur transmitter getting into the receiver. The amateur can correct this trouble by shielding and filtering his transmitter and installing a "low pass" filter in the antenna feed line.

The 15 Kc horizontal sweep oscillator in a TV set can cause interference in the set and in surrounding TV and radio receivers. The service man can cure this by installing additional shielding and filtering.

One thing that must be kept in mind is that any electrically non-linear device, such as a corroded TV antenna, copper gutter pipes, antenna masts, guy wires, or an r.f. tube in the TV receiver front end can rectify the fundamental signal and then generate harmonics that cause serious interference to a TV set. This type of interference looks like interference from a transmitter. However, it will only appear on one or two sets in a neighborhood. If it came from a transmitter it would most likely appear on all sets. In order to cure trouble of this nature it is necessary to locate the corroded connection, clean it

and make a tight connection. A high-pass filter should also be added to the TV antenna lead in.

TV sets may cause interference to other TV sets in the neighborhood. They can also interfere with regular broadcast sets. The interference takes the form of garbled sounds, squeals and howls.

Trouble of this nature is caused by the horizontal deflection circuits which operate at a frequency of 15,750 c.p.s. and where pulses of several thousand volts occur. These pulses are rich in harmonic content and the 35th harmonic of 15.75 kc. is 551.25 kc. which is at the lower end of the broadcast band. The 100th harmonic is inside the upper band limit at 1500 kc.

There are several solutions to this type of interference:

1. The horizontal deflection circuits can be shielded.
2. The yoke leads can be "dressed" inside the supporting brackets.
3. A shield or bottom plate can be put on the TV chassis.
4. The inside of the TV set cabinet can be shielded.
5. Filters can be installed in the power leads.
6. If the set is not of the AC-DC type the chassis can be grounded.
7. High pass filters can be installed in the TV antenna lead in.
8. The adjustment of the horizontal oscillator should be corrected.
9. A line filter should be installed at the broadcast receiver.
10. An outside antenna with a shielded lead-in can be used with the broadcast receiver.

Auto ignition systems, particularly in older cars and trucks, can cause terrific interference to TV sets. Of course, the cure is to install spark suppressors on the offending cars. If the set location is on a well traveled street or highway there is nothing much that can be done.

Old-type diathermy equipment usually consists of self-excited, self rectified oscillators. These oscillators operate at random frequencies in the r.f. spectrum. They can cause considerable interference because they are fairly high power and have plenty of harmonics.

The interference from these machines takes the form of a heavy black band across the picture when the signal is strong and on weak signals this changes to a light irregular S-shaped vertical pattern.

The FCC has ruled that users of equipment capable of causing TVI must take steps to cure the interference and that new equipment released by manufacturers be free from TVI.

The newly manufactured equipment is crystal controlled and uses a filtered dc power supply. It is assigned to a specific operating channel called the 27-mc diathermy band. Even the newest diathermy machines can cause severe TV i.f. interference but this can usually be cured with a high-pass filter in the TV set antenna lead in.

Unless you have had experience in working with high powered transmitting equipment, you should not attempt to work with diathermy machines. There is danger from r.f. burns as well as high voltage shock. The best way to handle cases of this type is to contact the manufacturer.

Since the FCC order applies to all machines it is reasonable to assume that the manufacturer has remodeling facilities for machines that were built before the order was issued. On some of the older types it might be cheaper to buy a new machine.

If you have had experience with similar equipment, then the interference may be reduced by two methods: (a) Shielding the equipment and treatment areas; (b) where certain treatments produce interference, those specific frequencies can be changed by spreading or compressing the turns in the coil of the tank circuit. Shielding part of the treatment leads is effective in lowering the frequency when it is not possible to compress the coil turns.

It might be necessary to change the frequency to avoid interference. Should this be done some form of frequency measurement equipment is necessary to make sure the output is in the diathermy band.

Actual Noise Location Techniques

At the start of this article we mentioned the use of some equipment not ordinarily used by radio servicemen.

There are interference locaters on the market but they are rather expensive. It is possible to use a battery, loop type portable set for noise location. For best results, the set and batteries should be shielded. Since it is difficult to judge noise intensity by ear, a meter type of indicator should be used. An a.c. voltmeter connected across the speaker voice coil is a suitable indicator. It is also possible to connect a dc voltmeter across the diode load resistor and use this voltage as an indication of noise intensity. In this case the volume control can be turned down to reduce noise.

Let us assume that you have a noise complaint to investigate and that the noise is present over a fairly large area. If at all possible, provide yourself with a street map of the area and a portable receiver with an output indicator.

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Fig. 5 shows the position of the loop for maximum and minimum noise indications. Note that the loop is bidirectional and that it indicates a line of direction. Two or more "bearings" are necessary to get the true direction of the noise.

Let us assume that your map looks something like Fig. 6 and that your customer lives in the house on "A" street. The procedure would be to take the portable to the corner of 1st and "A" streets, turn the set on and tune for maximum noise. Then carefully orient the loop for maximum intensity. If the maximum is broad then try minimum signal level.

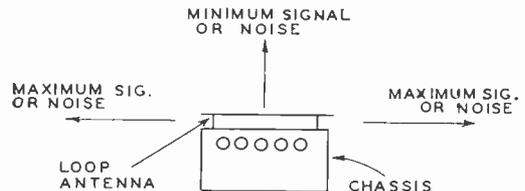


Fig. 5

Assume, for the time being, that you are able to get a reasonably sharp maximum signal along the line A-X. Draw this line in on your map. You have now established a line along which the

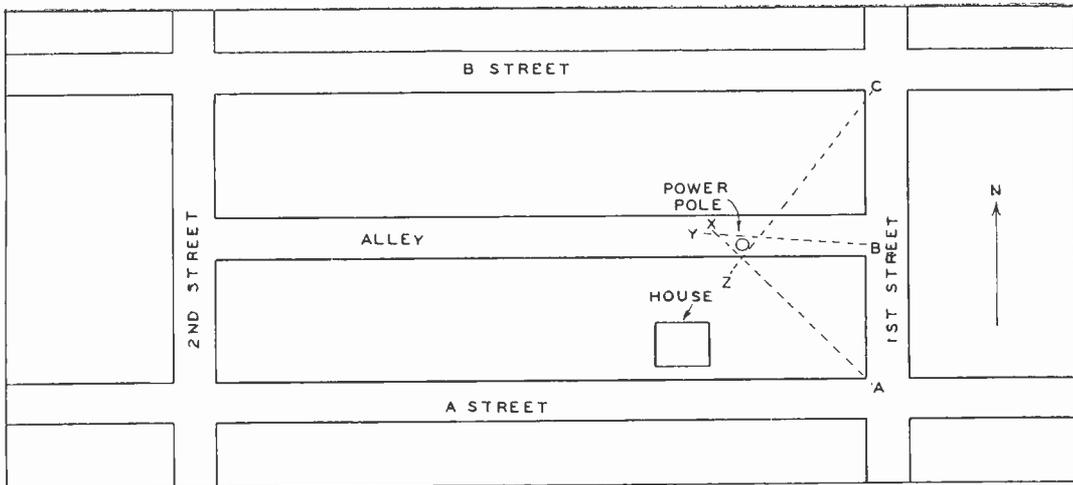


Fig. 6

interference is located. Now move up 1st street to the alley and again orient the loop for maximum signal. Draw in line B-Y. Now note that the two lines that you have drawn cross in the alley. The interference is approximately at the point where the lines cross. However, further "pin pointing" of the noise is possible by moving on up 1st street to the corner of 1st and "B" streets. The loop is again oriented for maximum noise and the line C-Z drawn in.

Notice that the three lines do not cross at a common point but that they do form a triangle. This is normal and should not cause concern.

After finding the point where the lines come together, go back to the alley and estimate, from the scale used on the map, how far the interference is from 1st street. Assume that you find a power pole at this approximate location and that the pole contains a transformer, primary fuses and other equipment. **DO NOT CLIMB THE POLE OR ATTEMPT TO WORK ON THE POWER POLE!** Instead, call the power company and ask them to send a "trouble man" to the location. He will have the proper equipment to make tests and help cure the trouble. Most power companies are cooperative in cases of this kind. Keep in mind that it may be necessary to make arrangements to meet the trouble man at a later time, especially, if he handles all complaints coming in to the company.

If, instead of a power pole, you found a ventilating fan or a place using power tools, you should contact the person in control of the place and explain that you are hunting the cause of electrical interference. Ask cooperation in the tests and then have various devices shut off to see if the interference stops. If the interference stops

when one certain device is shut off, then a filter on that device will probably stop the noise.

In some cases you may run into a lack of cooperation from either individuals or power companies. If at all possible contact some one "higher up" than the person who first turns you down.

As a last resort, when all other means fail, write the Federal Communications Commission, Washington 25, D. C. In your letter give the location of the interference, the name of the company or individual in control of the premises where the interference is caused and names and addresses of people concerned. Be sure that you sign the letter and give your own name and address. Since radio or television interference is illegal, the FCC will check and locate the trouble and give notice that the interference must be cleared in a specified length of time.



THE VETERAN'S PAGE

Devoted to news items and information of special interest to veterans taking NRI courses under the GI Bill of Rights.

Correspondence Training Must Be Worthwhile!

The VA has released figures showing that at the end of the summer of 1952 there were *still* 165,000 GI's taking correspondence training under the GI Bill. The most there ever were—even at the peak—was 200,000.

A system of training **MUST** be good when that many men continue their courses—without subsistence—and take time from their precious hours after the day's work is done.

This 165,000 *still* studying is just about equal to the population of cities like Spokane, Washington, or Springfield, Massachusetts, or Wichita, Kansas; it's equal to every man, woman, and child in one of these cities taking some kind of course at home.

Another piece of good news for readers of this column is that the *most popular* training among these 165,000 hard-working students is the field of radio and television.

NRI students will be reassured by this bit of evidence that correspondence training is good, and by the fact that most veterans think this field has more opportunity than *any other*.

In the past, railroading, auto and related industry, or aviation were each in turn the new, exciting and "coming thing." Today TV is it!

You may never again have the opportunity to qualify in a fast-growing field at virtually *no* cost to yourself, if you lose your NRI course now. It is certain you will never, never be younger, with as much life ahead, and unlikely that you will be more in need of supplemental income or a sideline to fall back on.

Won't you veteran students—discharged over 4 years ago particularly—keep studying, refuse to give up, push on a little longer? In the end you'll be glad you did.

Once More We Repeat "PROTECT YOUR BENEFITS"

For over a year this page has carried reminders that a veteran student decides whether to keep or lose his right to more training simply by studying or failing to study.

If you're training under the GI Bill and were discharged over four years ago, you just must keep studying to preserve your right to use your remaining entitlement. Only if you were discharged *less* than four years ago is it likely you'd be allowed to resume training if you should stop for any reason.

Here's what we said in past issues of the NEWS and it bears repeating:

June-July 1951. "The law states that no GI Bill education or training 'shall be afforded beyond nine years after the termination of the present war.' Termination date of the war, for GI Bill purposes, was July 25, 1947. Hence, the GI Bill program comes to an end on July 25, 1956."

December-January 1952. "Enrollments have ended under the GI Bill for veterans discharged over 4 years ago, but those men in training may continue to the end of their entitlement or until July 1956, whichever occurs first. This presumes continuous training. *If training is interrupted, qualifying for resumption is much more difficult than in early 1951 and re-entrance may be denied altogether.*

February-March 1952. "The most probable and least excusable reason for a veteran to lose benefits is due to inactivity—he simply didn't study. *The VA requires us to discontinue the training of any GI student who does not complete any lessons in 120 days.* If you want to preserve the right to go on with your course, don't allow more than 120 days to pass without submitting some work—better make it 90 days, to be on the safe side."

April-May 1952. "As a GI student this is your last chance. You will probably never again have the same opportunity to get ahead—to reach the top at no cost to yourself. If you should interrupt training before you graduate it is unlikely the course can be reopened under the GI Bill—(unless you were discharged less than 4 years ago.) Keep going—no matter if you must slow down—keep going!"

June-July 1952. "There's a tendency to look upon your GI benefits in terms of how much the VA pays for your training. A more accurate way to measure their value might be to measure how much earning power you get as a result of the VA payments."

How long has it been since *you* sent a set of answers or a report on a set of experiments?

WHAT'S AHEAD IN TV?

By JOHN H. BATTISON

NRI Director of Education



John H. Battison

THE first commercial UHF television station in the United States—in fact in the world—is now in operation in Portland, Oregon. This is Station KPTV. By the time that this article appears in print KBTV in Denver, Colorado will be on the air on Channel 9.

The first VHF television station to go on after the freeze was KFEL-TV in Denver, Colorado. Thus, we find that two stations are already transmitting in areas which before had no television service *at all*. This means that upwards of one and a half million additional people are now included in television reception areas.

By the end of this year about 17 new stations will have gone on the air—mainly in *new* television market areas. At the time of writing this we have only prognostications and estimates based upon station owner's statements and general experience in the field to guide us, so that we cannot be positive that as many as 17 stations *will be* on the air by December 31, 1952. However, it is equally likely that more stations will be on the air by then than we expect at present. Here are the stations which we expect to go on the air by the end of the year and the cities in which they are located.

Austin, Texas KTBC-TV: Channel 7
Spokane, Wash. KXLY-TV
Jackson, Mississippi: Channel 25
Bridgeport, Connecticut WICC-TV
Reading, Pennsylvania WHUM-TV
Springfield, Massachusetts WWLP
Holyoke, Massachusetts WHYN-TV
Denver, Colorado: Channel 26
York, Pennsylvania WSBA-TV
South Bend, Indiana WSBT-TV
Baton Rouge, Louisiana WAFB-TV
New Castle, Pennsylvania WKST-TV

Akron, Ohio WAKR-TV
Youngstown, Ohio WFMJ and WKBN
Peoria, Ill. WEEK-TV
Mobile, Ala. WKAB-TV

Some companies are bound to encounter difficulty in obtaining steel and other critical materials for erection and construction of their plants. In the radio and television broadcasting business there are many unexpected hitches which can occur and they sometimes take many days to overcome. If 75% of these 17 stations do go on the air by December 31, we think that the television industry will have been doing pretty well!

As the first UHF television station in the world, KPTV in Portland, Oregon is really going under the microscope. All the manufacturers are shipping literally car loads of television receivers to the dealers and television receivers are being bought as quickly as they reach the shelves. The same thing happened in Denver, Colorado when KFEL-TV *VHF* went on the air a little earlier this year. However, the main reason for such tremendous interest on the part of industry in the Portland area is the fact that it's the first *real* commercial UHF television station in operation.

Probably all of our readers have heard of the RCA experimental UHF operation in Bridgeport, Connecticut. This operation has been written up regularly almost every month since its inception in the beginning of 1950 when the station served as a testing and proving-out ground, for the Radio Corporation of America, in developing UHF television transmitting equipment.

The owners of KPTV bought the whole station from RCA and shipped it piecemeal from Bridge-

port to Portland, erected the station, and were on the air within a very few days of receiving the equipment. The speed with which this station went on the air is really eye-opening when we consider how long it took some of the early construction permit (CP) grantees and network stations to get going. Five weeks after the construction permit was granted Herbert Mayer, president of the Empire Coil Co., in New Rochelle, N. Y., who holds the construction permit for the Portland Station, had bought up the RCA-NBC experimental station at Bridgeport, had it dismantled, and shipped by truck and special freight cars to Portland.

He had a 200 foot tower erected and in almost two and one-half days after its arrival the station went on the air for the first *commercial* UHF television tests.

Eventually KPTV will have a power of 88kw. visual and 44kw aural power radiated from 1020 feet above average terrain, but at the moment its power is in the order of 15kw. radiated from 250 feet above ground. However even with this *comparatively* low power, UHF reception has been reported as consistently good all over the Portland, Oregon area. Salem, Oregon (40 air miles away from Portland) gets good reception and Vancouver, which is 15 miles away, has excellent pictures.

In general, television reception in the Portland area seems to be better than it was in Bridgeport. This is probably due to the fact that the antenna height is greater and the city is in a valley. So far, remarkably good correlation with the predicted coverage has been observed; although *some* shadows beyond local obstacles have been observed. In general, the signal "fills in" behind obstacles, and up to about 30 miles radius from Portland reception is consistently good.

The sets in this area are equipped either with ultra high frequency converters or strip type tuners to receive the UHF television channel. Many of the new sets have combination UHF and VHF tuners built in the set. TV receivers using the turret type of tuner, i.e. those using changeable strips on which the tuning coils are mounted, are probably at an advantage, since all one has to do to obtain UHF reception with this type of tuner is to substitute a UHF tuning strip for one of the unused VHF channels and modify the antenna for best UHF reception. We shall be writing more about these UHF problems in future issues.

Theatre Division

Strange as it seems, perhaps, in the light of our accustomed *free* radio and television programming, theatre television is catching on tremendously in those areas where it is available.

The Walcott-Marciano fight from Philadelphia September 23 was telecast to movie theatres from *coast to coast!* In all, fifty theatres in thirty-one cities sold tickets to see this fight on their screens at from \$3 to \$5 a ticket. A new angle for the drive-in movie theatre was added on this occasion when the drive-in theatre in Rutherford, New Jersey, installed a special theatre television projection system in a five ton truck and presented the fight as well as two feature films on its screen.

Of course, home television and radio sets were not able to receive this program since the full rights to the fight had been sold to the theatre television interest. However, use of television in this manner does seem to be an excellent idea since it makes it possible for people all over the country to see events which cost a lot of money to put on for which sponsored television cannot afford to pay. Here is another field where the alert and competent technician can cash in on his expert knowledge and training. Most of the projectionists in movie theatres do not know anything about television. In fact, there is a definite *shortage* of projectionists who know anything about television, and within a few years we feel we may see a large new field of employment opening up for qualified men.

Educational Television

In the field of education, television is stepping along, and so far nine construction permits for educational stations have been granted in addition to the fifty-four for commercial operation. In general, the educational television stations will not offer very much prospect for employment since they will tend to use one qualified and experienced chief engineer, and probably obtain their operating staff from students in their engineering schools. However, this is a field which should be watched and, if you happen to be living in a city or area where an educational construction permit has been granted, it might be well worth your while to investigate the possibilities of working with the school authorities in the installation and construction of the new station.

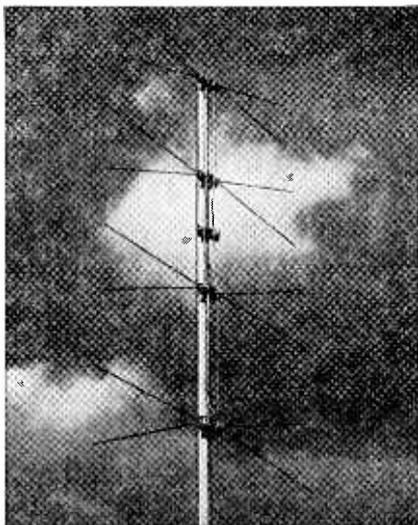
In future issues, the NATIONAL RADIO-TV NEWS will publish lists of new television construction permits as announced by the FCC.

We feel that this list will be of value to you, although those readers who live in areas where new applications have been granted will of course know about it from a local press. However, readers living nearby may not have read the paper, and knowing in advance where television operations are going to commence sometimes enables one to plan ahead and perhaps order television replacement supplies and receivers for sale to your new customers!

Our Cover Photo

Shows a rehearsal of a TV program of the **Colgate Comedy Hour**. The Christmas greeting from NRI was written in by us.

The photograph was supplied to us by NBC for which courtesy we wish to express our thanks.



TACO ANNOUNCES PRODUCTION
OF FIRST UHF ANTENNA

Technical Appliance Corporation of Sherburne, N. Y., manufacturers of Taco antennas and Tacoplex Master Antenna Systems, announce the availability of two new antennas.

The first straight UHF antenna, Cat. No. 3008, is known as the Taco Bow-Tie. This is a stacked four element antenna for maximum gain. The four elements are factory pre-assembled to a four-foot mast section complete with Q-Bars and standoff insulators and fits an additional four-foot section of mast which is included to provide clearance above the roof.

A companion model for full-channel coverage is Taco's Bow-Low consisting of a Bow-Tie antenna in conjunction with an ultra-efficient all-channel antenna designed to be mounted on an eight-foot mast.

A companion item, Taco's Magi-Mix

Page Twelve

Coupler, is designed to take the output of any UHF and all channel antenna and combine the signals into a single line.

Tubular twin-lead transmission line is recommended for use with all Taco UHF antennas whether used singly or in combination with the VHF models.



TRIPLE-CIRCUIT ANTENNA SELECTOR

A low-loss triple circuit antenna selector is also announced by Technical Appliance Corporation, Sherburne, N. Y. The new Selector, Cat. No. 873, has been designed primarily for selection at the receiver of signals from any one of three antennas.

Maximum transfer of energy with minimum loss is attained through positive contact points and an impedance closely matching the transmission line.

The unit is packaged ready for installation. A length of 300-ohm line is attached to the common side of the selector, while screw-terminals are provided for connections to the three selector points. A label on the unit indicates corresponding selector points and terminals. The switch is housed in a metal case with mounting facilities for easy installation on the rear of television cabinets, or on television tables.

In addition to the primary use of the unit, it may be used as a receiver selector in a television showroom by switching the signals from the antenna to any one of three receivers. Another use of the Taco Triple-Circuit Selector is in audio systems where the signals from the amplifier may be switched from one speaker to another at will. If interested in literature, write direct to the manufacturer.



Former NRI Student on Industry
Committee of the Office of Price
Stabilization



Harold Chase, President of the Television Service Association of Greater Detroit, was named to a special federal 12-man Industry Committee of the Office of Price Stabilization. The Committee is charged with formulating uniform service fees throughout the television industry.

Chase, who is President of the Television Service Association of Michigan and owner of the Chase Television Service, 16311 Grand River in Detroit, and his fellow committeemen, held their initial meeting in Washington on October 21 to map plans for a flat-rate TV service manual similar to the type used by auto repair firms. His appointment came from U. S. Price Administrator Tighe E. Woods.

Harold Chase is a former NRI Student and a past Chairman of Detroit Chapter of the NRI Alumni Association. While in Washington Mr. Chase visited NRI and conferred at some length with J. E. Smith.



Others may help us, and some may cause us hurt, but we can be sure that we get out of life exactly what we put into it, just as the mirror reflects the exact image placed before it. The mirror adds nothing, changes nothing, and takes nothing away. It merely gives back what is given to it. It is an old law but a true one that we reap what we sow.—W. G. Montgomery in *Weekly Unity*.

PLACE CHRISTMAS ORDERS NOW

EACH year at this time we receive many letters from students and graduates, members of their families and even friends inquiring about the NRI Professional Test Instruments, and other NRI services, with a view of purchasing them for Christmas presents. Anticipating this same interest this year we give, in the following several pages, condensed information about these items.

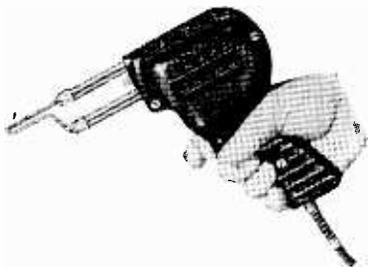
We urge our readers, who are prepared to send orders for these items at this season, to do so very promptly. For those who must wait until nearer Christmas, we promise to try to make shipments within one day of receiving order. That means Monday's orders, for example, are shipped Tuesday. Tuesday's orders are shipped Wednesday, etc., but Friday's orders are shipped Monday. The Institute is closed on Saturdays.

Mail moves slower at this season. A letter may take a day or two longer to reach us. Likewise, shipments move slower, too. We will do everything we can to rush shipments but please help us avoid impossible situations. Every year we receive orders within a few days of Christmas marked "Christmas present, please rush" or "Must get here before Christmas," with not enough time for the shipment to get there. That leads to disappointments.

One more important point. A father, mother, wife, sweetheart or friend may purchase these items for a student or graduate, but we should have the student's name and student number as part of our record. To keep the present secret from the student, the shipment may be sent to any address designated.

So, mail your orders early. We'll extend every possible cooperation to help make the lucky recipient of the shipment have a Merry Christmas.





WEN
"Quick-Hot"
SOLDERING GUN
250 Watts

110-120 volts, 60 cycle A.C.

- Heats in 3 to 5 seconds
- Cools quickly too
- Reaches "inaccessible" spots
- Built-in spotlight

Here is the ideal soldering tool for the Radio and Television serviceman. It eliminates those tedious minutes of waiting for your soldering iron to heat. Just plug in the WEN Soldering Gun, pull the trigger, and in 3 to 5 seconds you are ready to solder—a real time saver!

You'll save in operating costs. Many servicemen leave their regular soldering irons connected continuously, hour after hour, while actually soldering only a few joints. The WEN operates only while actually in use. This eliminates frequent replacing of oxidized and pitted soldering tips. Saves on electricity bills, too.

Plenty of heat—concentrated right where you want it—in a small tip. Getting into tight inaccessible places is easy with a WEN. In fact, you will solder in tight spots where an ordinary iron simply cannot reach. After trying your new WEN, you'll agree that a soldering gun is "the" solution to your soldering problem.

Each WEN gun is fully guaranteed against defects in material and workmanship. Tips are easily and economically replaced.

Only \$9.71, Complete

Shipped by parcel post, prepaid. Order blank is found on page 19.

Page Fourteen



NRI Professional Tool Kit

INCLUDES ROLL-UP CARRYING CASE

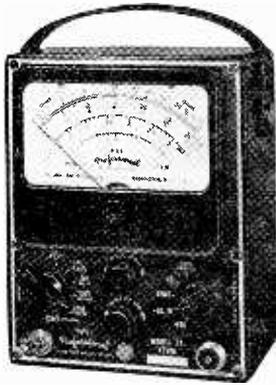
A kit of fourteen carefully selected, good quality tools, complete with roll-up carrying case. You will be proud to own this fine kit of tools. They are just what NRI recommends for doing your experiments. Will last well into your professional Radio and Television Servicing career.

This is a real money-saving value. If bought at dealer's net prices, it would cost well over \$10.00. Yet NRI's price is only \$8.95, including the strong canvas carrying case. The items included in the kit are as follows:

1. Long nose pliers. Professional grade, precision made, of tool steel. Polished head. Smooth handles.
2. Diagonal cutters. Precision made from tool steel. Professional quality.
3. Metal cutting saw. Removable, four position blade. Light, but very sturdy.
4. Eight inch file. An indispensable item.
5. Slip joint pliers. For general utility.
6. Double blade neutralizing tool. Designed for new miniature i.f. transformers.
7. Four-in-one bone fibre neutralizing tool. Necessary for aligning receivers.
8. Small screwdriver. Slender four-inch blade.
9. Nut driver. For five-sixteenths inch hex nuts. Good quality, plastic handle.
10. Nut driver. Same as above, for one-fourth inch hex nuts.
11. Phillips screwdriver. For Phillips screws widely used in Radio and TV. Plastic handle.
12. General utility screw driver. Good quality.
13. Plastic long nose pliers. Shock proof. Used to move "hot" wires in Radio and Television sets.
14. Volume control wrench. Correct size for tightening volume controls and toggle switches.

Only \$8.95

Tool kit shipped, complete with carrying case, by parcel post, prepaid. Individual tools or carrying case not sold separately.



MODEL 11

NRI Professional Vacuum Tube Voltmeter

IDEAL FOR RADIO OR TELEVISION WORK

This VTVM is a top performer among moderate priced instruments. It's accurate, good looking, and easy to operate. Five basic types of measurements are provided.

1. **D.C. volts**—six ranges, maximum 1200 volts.
2. **A.C. volts**—six ranges, maximum 1200 volts.
3. **Ohms**—six ranges, maximum 2,000 megs.
4. **D.C. Zero Center Scale**—for FM alignment.
5. **Output Measurements**—includes d.c. blocking condenser.

Specifications

Panel: Black enamelled; etched characters.

Case: Black molded bakelite; 7½" x 5½" x 3".

Meter: 200 micro-ampere, double-jewelled, large 4½" x 4¼" meter scale—easy to read.

Tubes: One 12AU7; one 6 x 4; and selenium rectifier.

Includes: Operating instructions; AC-DC-ohms cable with d.c. isolating probe and detachable alligator clip.

Power Required: 50-60 cycle, 110-120 volts a.c.

Actual Weight: 4 lbs. **Shipping Weight:** 6 lbs.

Warranty: Standard 90 day RTMA warranty. Shipped express charges collect. Use order blank on page 19.

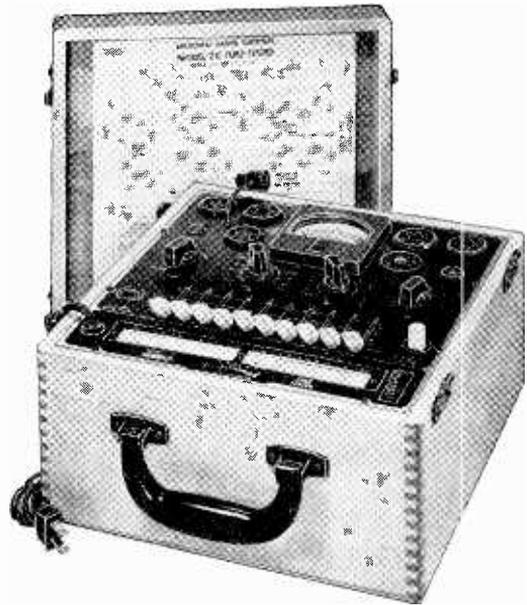
Only \$38.50

Optional Accessories for Model 11

High Voltage TV Probe. Extends d.c. volts range to 30,000 volts. \$8.00, postpaid.

Crystal Detector HF Probe. Reads positive peak sine-wave voltages up to 250 mcs., \$6.65, postpaid.

Custom Leather Case. Top grain cowhide. Has tool compartment. Water-proof, lined suede interior. \$9.50, postpaid.



MODEL 70

NRI Professional Tube Tester

WITH BUILT-IN ROLL CHART

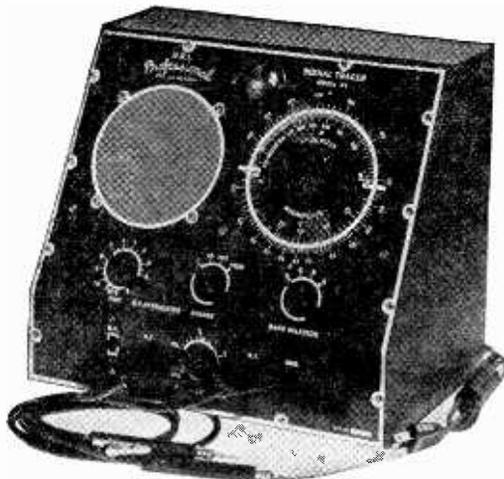
Designed to test the latest Radio and Television tubes. Convenient, built-in roll chart. Comes complete with detailed instruction manual. Approved RTMA emission circuit keeps the possibility of obsolescence at the very minimum. Specifications:

1. **Employs Standardized RTMA Emission Test Circuit**—Ten separate four-position tube element switches make tube prong connections flexible—take care of future electrode connections.
2. **Eight Tube Test Sockets**—Tests 4, 5, 6, 7, and 7L prong tubes; plus octal, octal, 7-prong miniature, and 9-prong miniature tubes.
3. **Fifteen filament Voltage Taps**—0.75, 1.5, 2, 2.5, 3.3, 5, 6.3, 7.5, 12.6, 18.9, 25, 35, 50, 70, and 110 volts; filament voltages for all receiving tubes.
4. **Filament Continuity Test and Open Element Test.**
5. **Handsome Professional Looking Hardwood Case**—Beautiful natural grain, clear lacquer finish. Size: 10¾" x 10¾" x 6¼".
6. **Actual Weight**—11 pounds. **Shipping Weight,** 13 pounds. Shipped express charges collect.
7. **Power Requirements**—50-60 cycle, 110-120 volts A.C. required.
8. **High Speed, Double Window Roll Chart.**
9. **Standard 90 day RTMA Warranty.**

Price \$49.75

Our newest model tube tester has been engineered and priced exclusively for NRI men. It is a truly professional test instrument—one which will give your customers confidence in your work. Ideal for beginners or "old hands."

Page Fifteen



MODEL 34

NRI Professional Signal Tracer

TUNED CIRCUITS—GIVE HIGH PERFORMANCE

Signals can be traced from antenna to loudspeaker. Trouble is quickly localized in dead receivers. Greatly assists beginners or experienced serviceman in finding stubborn cases of hum, noise, or distortion. Sources of oscillation in r.f. or i.f. stages can be quickly isolated. Two separate inputs make the instrument ideal for tracing down intermittent trouble.

One special use for this instrument is in measuring the "gain-per-stage." Also, because this instrument uses two stages of tuned radio frequency amplification, it can readily be used for alignment purposes. A Signal Generator is not essential. The actual broadcast station signal is used instead. The instrument is practically fool proof—anyone can safely use it. Detailed instruction manual is included. Specifications:

1. Power requirements—50 to 60 cycle, 110-120 volts a.c., only.
2. Sturdy maroon crackle finish case—12" x 8¼" x 10¼". Handsomely etched aluminum panel.
3. Tubes included: 2—6BA6; 1—6SQ7; 1—6K6-G; 1—6E5; and 1—5Y3-G.
4. Frequency coverage is 170 kc. to 11.3 mc., in four bands.
5. Five inch dynamic loudspeaker provides audio output. Also has visual output indicator.

Price \$57.50

Actual weight—15 lbs. Shipping weight—18 lbs. Shipped by express, collect. Please use order blank on page 19.

Page Sixteen



MODEL 112

NRI Professional R-C Tester

No Radio and Television service shop is complete without a reliable resistor-condenser tester. Such an instrument speeds up your service work, enabling you to increase your profits and your customer goodwill.

Here's what you can do with this instrument: (1) Measure power factor of electrolytic condensers. (2) Measure capacity of all types of condensers. (3) Check all types of condensers for leakage or break-down by applying actual d.c. working voltage. (4) Accurately measure resistor values in ohms and megohms.

Specifications:

1. Capacity Ranges: .0001 microfarad to 200 microfarad, in six ranges.
2. Resistance Ranges: 10 ohms to 20 megohms, in six ranges.
3. Bridge Type Circuit, linear calibrated main scale.
4. D.C. voltage up to 600 volts for leakage test.
5. Complete with four tubes: 1-V, 6Y6G, 6SL7, and 6E5.
6. Power requirements: 110 to 120 volts, 50-60 cycle a.c. only.
7. Maroon colored, crackle finish cabinet. Measures 10 inches by 8 inches by 7½ inches.
8. Actual weight 9 pounds. Shipping weight, 11 pounds.
9. Complete with instruction manual, rubber covered test leads, and special test plugs.

Only \$36.50

Shipped by express, collect.



MODEL 88

NRI Professional Signal Generator

FUNDAMENTALS: 170 KCS. TO 60 MCS.

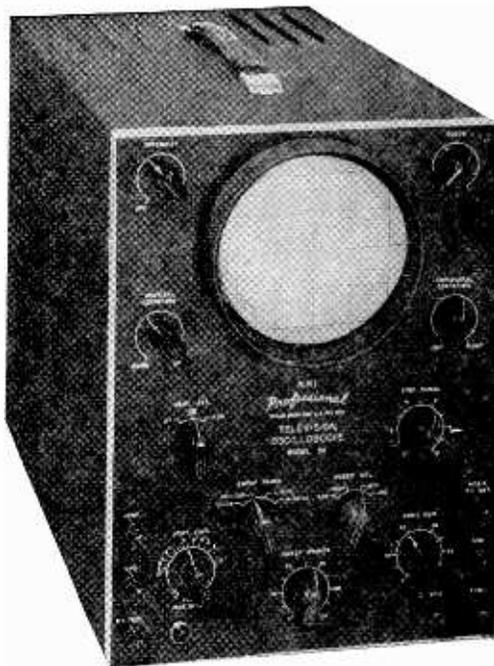
Designed specifically for rapid, easy alignment of radio receivers. Extremely accurate and easy to operate. Frequency coverage ideal for all AM servicing, as well as i.f. used in FM and Television. Strong harmonics and accurate calibration make the instrument useful up to 120 mc.

Invaluable in isolating the defective stage in a "dead" receiver, or in checking an audio amplifier. A stable Hartley electron-coupled oscillator circuit is used, with a cathode follower output stage. Single output jack with detachable coaxial lead. Coarse and fine r.f. attenuators. R.F. modulated, R.F. unmodulated, and 400 cycle audio output. Specifications:

1. Frequency coverage: 170 kc. to 60 mc. In six carefully selected bands.
2. Tubes included: 1—6BE6; 1—6SN7; 1—5Y3.
3. Sturdy maroon crackle finish case with handsomely etched aluminum panel. Size 12 inches by 8 $\frac{1}{4}$ inches by 10 $\frac{1}{4}$ inches.
4. Actual weight 12 pounds. Shipping weight 15 pounds. Shipped complete with detailed instruction manual.

Price \$42.50

Shipped by railway express, collect. Please use order form on page 19.



MODEL 55

NRI Professional TV Oscilloscope

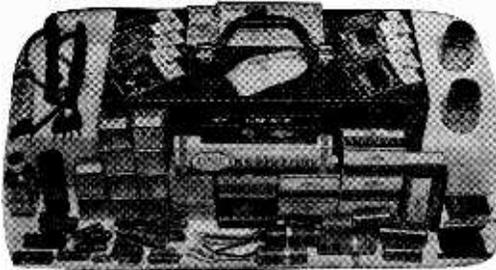
A sensational, *wide-band* 5-inch Television Oscilloscope at a remarkably low price. Designed to meet the exacting demands of TV servicing, and ideal for use on AM-FM receivers, audio amplifiers, and general electronic applications.

Outstanding specifications:

1. HIGH SENSITIVITY—one inch deflection with signal voltage of .014 volts (RMS).
2. WIDE-BAND RESPONSE— ± 3 db from 10 cycles to 4.5 mc. Useful to 7 mc.
3. PUSH-PULL DEFLECTION AMPLIFIERS—in both horizontal and vertical amplifier circuits.
4. WIDE-RANGE LINEAR SWEEP—10cps.-100 kcs.
5. FUSE PROTECTION.
6. VOLTAGE REGULATED POWER SUPPLY.
7. HIGH IMPEDANCE INPUT.
8. POSITIVE SYNC CIRCUIT.
9. FREQUENCY - COMPENSATED 3 - STEP VERT. ATTEN. CALIBRATED TO READ PEAK-TO-PEAK VOLTS DIRECT.
10. CALIBRATION TEST SIGNAL.
11. INTENSITY MODULATION — RE-TRACE BLANKING.
12. EMPLOYS 13 MODERN TUBES.
13. POWER—50-60 cycle, 110-120 volts A.C.
14. DETAILED INSTRUCTION MANUAL.

Only \$127.50

Shipped by express, collect.



Radio Replacement Parts Kit

INCLUDES STURDY STEEL TOOL BOX

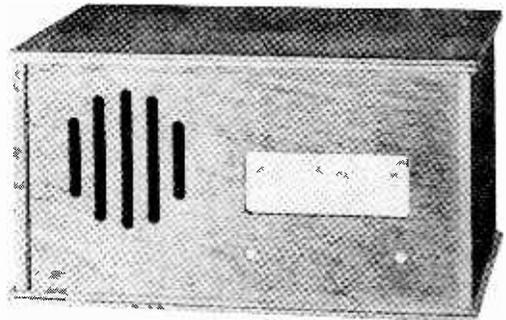
Commonly needed Radio replacement parts. Ideal for the man who wants to get an inexpensive start. Also just the thing for a man already doing Radio and TV service work. If this kit were bought from a Radio parts distributor, it would cost approximately \$35. We offer it for only \$19.75. The parts are standard, fresh, first-quality—they are not surplus. Made by well-known manufacturers. Many parts packed in manufacturer's cartons. Here is what the kit includes:

1. Sturdy steel tool box, 16 inches by 7 inches by 7 inches, with pop-up tray.
2. Two 456 kc. i.f. transformers, one standard size, and one miniature size.
3. A matched set of 2 r.f. replacement coils for t.r.f. receivers.
4. Two 25 ft. rolls of flexible indoor antenna wire, wound on antenna hanks.
5. One antenna coil and one oscillator coil (matched) for either a.c.-d.c. or a.c. sets.
6. Box containing 10 assorted pilot lamps.
7. Dial cord and belt replacement kit, including springs, fasteners, and other hardware.
8. Paper tubular condensers—twenty-five most popular sizes, rated at 600 volts.
9. Fixed resistors—one hundred popular sizes and wattage ratings.
10. Electrolytic condensers -- eight widely used types for a.c. and a.c.-d.c. receivers.
11. Two high-grade plastic line cords.
12. One universal output transformer for either single-ended or push-pull output.
13. One A.C.-D.C. output transformer.
14. Scratch filler, for hiding cabinet scratches.
15. One tube of speaker cement and one bottle of solvent.
16. Volume control kit—six popular volume controls, four switches, eight assorted shafts.
17. Two popular types of selenium rectifiers.
18. Two jars full of standard radio hardware.

Only \$19.75

Shipping weight is 15 pounds. All Replacement Parts Kits are shipped express, collect. Please use order form on next page.

Page Eighteen



A Beautiful Cabinet For Your NRI Radio

The cabinet is well seasoned natural wood, unpainted. You can, if you wish, give it two or three coats of clear alcohol resistant lacquer, or paint it your favorite color to match the room. Four neat rubber bumpers prevent scratching or marring furniture on which you may set your Radio.

The sides, top, and bottom are made of $\frac{3}{8}$ inch 5 ply White Gum sanded to a smooth finish. The front panel is attractive Philippine Mahogany. The grille cloth is rich green, harmonizes with the color of the dial scale. The back is open.

Mailed knocked down. Easy to assemble.

Notice the cabinet will come to you knocked down. That is to avoid possible damage in shipment. The sides, top and bottom, are rabbeted. Everything slips perfectly and securely into place. It's fun to assemble—a five minute job. No dirt, no fuss. No nails or screws. You simply apply a bit of glue into the grooves, use a little hand pressure and your cabinet is complete.

Slipping it into the cabinet is a two minute job. You'll notice a big improvement in your Radio's tone immediately. You'll have an attractive Radio for your den, living room or bedroom.

Sent parcel post, prepaid. Read important note below. Please use Order Blank at right.

Only \$4.95

Be sure to check whether you have the NRI Radio built from parts supplied with Kit 7RK or from Kit 7E. This is important because there is a slight difference in size in the two cabinets.



NRI Service Manuals Save You Time and Money

NOW—TWO BIG NRI SERVICE MANUALS

NRI service manuals contain radio circuit diagrams and information which is most frequently requested from NRI. This is our answer to your radio diagram problem. More than 10,000 NRI students and graduates have already purchased one or both of these manuals. Volume II follows Volume I to bring this diagram service up to date. They are companion books you will be proud to own.

Volume I contains most frequently needed diagrams of receivers built before 1946.

Volume II contains most frequently needed diagrams of receivers built during 1946-1949.

These are big, sturdy manuals. Circuit diagrams are in detail, with parts values, and many illustrations. I.F. values and alignment data are included. A complete, cumulative index is also included with each manual. (These manuals do not include Canadian receiver diagrams.)

\$14.50 Each

Sent parcel post, prepaid. Please use Order Blank at right.

Use Order Blank Below For Ordering NRI Equipment

All test instruments and the NRI Parts Kit are shipped by Railway Express, charges collect. This is for fast, safe service. Tool kits, Soldering Guns, Diagram Manuals, Radio Cabinets and VTVM Accessories, are shipped by parcel post prepaid. Indicate on your order blank the amount of your remittance. Check those items requested. Give name, student number, address, and express office. Make remittance in the form of a certified check, money-order, or bank draft.

ORDER BLANK

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

I enclose _____ (certified check, money-order or bank draft). Send me the following material, as checked.

- WEN Soldering Gun, parcel post, prepaid. Price \$9.71.
- NRI Professional Tool Kit, parcel post, prepaid. Price \$8.95.
- Model 11 NRI Professional Vacuum Tube Voltmeter, express collect. Price \$38.50.
- High Voltage Television Probe for Model 11. Parcel post, prepaid. Price \$8.00.
- Crystal Detector Probe for Model 11. Parcel post, prepaid. Price \$6.65.
- Leather Case for Model 11. Parcel post, prepaid. Price \$9.50.
- Model 70 NRI Professional Tube Tester, express collect. Price \$49.75.
- Model 34 NRI Professional Signal Tracer, express collect. Price \$57.50.
- Model 112 NRI Professional Resistor-Condenser Tester, express collect. Price \$36.50.
- Model 88 NRI Professional Signal Generator, express collect. Price \$42.50.
- Model 55 NRI Professional TV Oscilloscope, express collect. Price \$127.50.
- NRI Professional Replacement Parts Kit, express collect. Price \$19.75.
- 7RK Radio cabinet, shipped unassembled, parcel post prepaid. Price \$4.95.
- 7E Radio cabinet, shipped unassembled, parcel post prepaid. Price \$4.95.
- Volume I NRI Service Manual, parcel post, prepaid. Price \$14.50.
- Volume 2 NRI Service Manual, parcel post, prepaid. Price \$14.50.

Name Student No.....

Address

City Zone.... State.....

Express Office

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

You Can Do What These NRI Graduates Are Doing



Doing Great
In His
Own Business

"I have come a long way in Radio and Television Servicing since graduating from NRI in August, 1948. I have had my own business for three and one-half years.

"I am located on Main Street, opposite Sears, and doing great. Your course was the start of my success. I sure am glad I took it."

JOE TRAVERS
500 Main St.,
Asbury Park, N. J.



Makes \$25
To \$30 a Week
Spare Time

"I am pleased to say that I am making between \$25 and \$30 a week, just nights, mind you. I am servicing and selling radio and television sets.

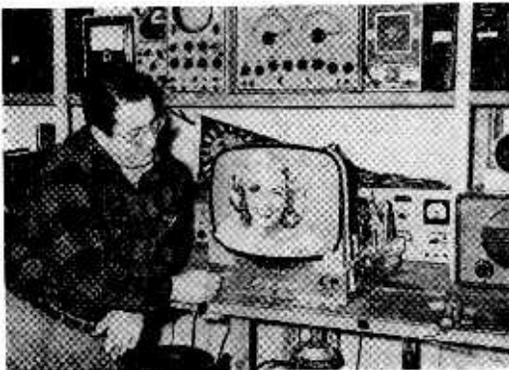
"I have about \$2000 worth of equipment now, and hope to add more. My aim is to open a store of my own. Also belong to the Radio-Electronic Technicians Association of Ontario. All of this I owe to NRI."

DOUGLAS E. BRADSHAW
22 Normandy St.,
Hamilton, Ont. Canada

— n r i —

— n r i —

Former Plasterer, Tired of Hard Work, Now Succeeding in Television



"I was a plastering contractor for the past twenty-five years, and got tired of hard work. I am now in full-time radio and television service. Television sales alone make up as much as I earned in plastering. Sales and installation of electronic equipment bring in extra money.

"Of course I have PA rentals, radio and television service, and install intercoms. Have just purchased a new panel truck and have opened a new TV sales store and TV supply company."

FRANK CAPPOTTO,
Station Street
Rock Creek, Ohio



**Former Laborer
Now First-class
Mechanic**

"Before taking your course, I was a laborer in the Norfolk Navy Yard. After graduating, I opened a business of my own. Got along okay. Later, I was called back into Government work, not as a laborer, but as a mechanic. Now I am a 1st class mechanic, at \$1.92 per hour. Without your training I could not have mastered my job.

"The happiest moment of my life was when I enrolled for your Advanced Television Practice. I enjoyed going through the many experiments. It was more than I had ever dreamed of. No one can be a Radio or a Television man and be successful unless he has the proper training."

J. M. HALL
835 Partridge Ave.,
South Norfolk 6, Va.

— n r i —



**Earned Money
In Spare Time
While Studying
NRI Course**

"I made from \$5 to \$10 a week while taking the NRI course. It was not too hard, and I would not hesitate to recommend NRI to anyone wishing to take up Radio and Television Servicing.

"I have my own spare time shop now, and can find a defect in minutes, where I formerly spent hours locating the same trouble. I am really proud of my diploma. Have had no advertising except word of mouth. Thank you for the cooperation received during my training."

BERNICE W. ASKEW
Box 88
Dunmor, Ky.

— n r i —

**Obtained First-class Radiotelephone
License Without Further Instruction**

"After completing your Radio and Television Communications Course, I was able to pass the examination for a first-class radiotelephone license without further instruction. Also, I was able to start my first tour of duty alone, without ever having been in a radio transmitter building before, and I was familiar with all the equipment I had to work with.

"I am now a member of the staff of Station KTOW, in Oklahoma City, Oklahoma. Two of the three engineers on our staff are NRI graduates. Thank you for all the personal attention that was given to my problems by your Instruction Department."

THOMAS F. LINDSEY
210 East Boeing,
Midwest City, Okla.



As space permits, from time to time, we plan 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.

How to Test Selenium Rectifiers

By DONALD E. KLINE

NRI Laboratory Instructor

EVEN though selenium rectifiers are comparatively new to the practicing serviceman, the units are a familiar sight to most industrial engineers. Since selenium rectifiers were first introduced to this country in 1938 they have been providing economical, reliable, and efficient service in many types of industrial equipment.

The basic unit of the rectifier is the "cell" consisting of an aluminum base plate coated with selenium over which a special alloy is sprayed. The aluminum plate serves as the negative electrode, and the alloy coating as the positive. Current will readily flow from the base plate to the alloy coating, but will encounter high resistance in the opposite direction. This phenomenon is the basic principle of operation underlying all selenium rectifiers regardless of application.

Scientists have not been able to determine exactly why a selenium rectifier operates, but they believe that further study of the molecular structure of metals will answer the question. At the present time research is in progress in an attempt to find the answer.

The efficiency of the device is roughly dependent upon the ratio between the resistance in the conducting direction to that in the blocking direction. This accounts for the popular—though erroneous—testing method: "Check the resistance in one direction and record the reading; reverse the ohmmeter leads, and again check. The larger resistance should be at least ten times the smaller." This testing method is not recommended because the results are often useless in determining the true condition of the unit.

Many servicemen have difficulty in deciding when they should suspect defective selenium rectifiers. Basically, any complaint that would lead a serviceman to suspect a defective rectifier would lead him to suspect the selenium rectifier when one is used.

For example, consider the case of a 3-way portable that is intermittent when used on ac; in modern sets using selenium rectifiers, the complaint is frequently caused by a defective rectifier. The output voltage decreases and this, of course, decreases the filament voltage applied to the battery-type tubes. When the filament voltage of the oscillator-mixer drops below a crucial point the oscillator stops operating, and the set is dead.

When a complaint of this type is encountered, the serviceman should check the selenium rectifier with the tester to be described later in this article, and if it is in good condition, the filter condensers should be checked. (The simplest means of checking the filters will be by temporary substitution of new ones.) Also the series resistors should be measured with an ohmmeter to see if they have changed in value.

Many modern TV sets use selenium rectifiers in the power supply, and failure of these rectifiers will cause a number of effects depending upon the circuits used in the particular receiver.

A frequent complaint is decreased width—this can be caused by a defect in the horizontal oscillator-amplifier circuit, or *by a decrease in the B+ voltage*. If voltage measurements show that the B+ is low, the serviceman should check the selenium rectifier(s) before proceeding.

There is one complaint that is peculiar to selenium rectifiers. Frequently a customer will call the serviceman and complain that the set "smells like rotten eggs"—this is a sure sign of a defective selenium rectifier. Replacement of the defective unit will return the set to normal operating condition.

Testing Procedure

Since the advent of the selenium rectifier in units for home entertainment, numerous articles have been published on safety precautions, causes of failure and replacement hints. However, one topic has been sadly neglected—"How to Test the Selenium Rectifier."

The simplest means of testing a selenium rectifier is by checking the output voltage. However, this test can be misleading if the filter condensers are defective.

Briefly the procedure is as follows:

- (1) Check the ac input voltage to the unit.
- (2) Check the dc output voltage from the unit.
- (3) The two voltages should be substantially equal.

If the output voltage is lower than the input voltage, connect a high capacity condenser across the input filter, and again check. If that brings the voltage up to normal, the input condenser is defective; if it does not bring the

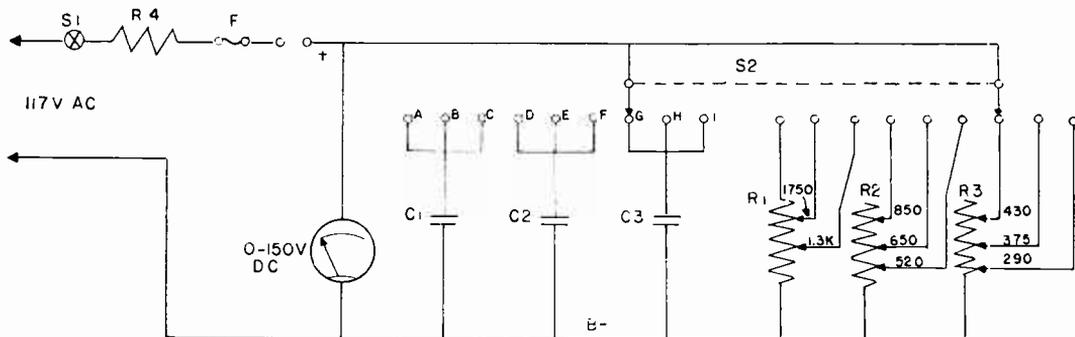


Fig. 1. The selenium rectifier tester explained in this article.

- C₁ 50mfd/150v
- C₂ 125mfd/150v
- C₃ 350mfd/150v
- R₁ 2000 ohms/25 watt (2 sliders)
- R₂ 1000 ohms/50 watt (3 sliders)

- R₃ 500 ohms/100 watt (3 sliders)
- R₄ 5 ohms/5 watts
- S₁ SPST Toggle switch
- S₂ 2 deck, 9 position switch
- F 2 ampere fuse

voltage up to normal, the selenium rectifier is defective, or is being overloaded.

As implied by the above sentence this method is inconclusive because further testing is required to determine whether or not the rectifier is being overloaded. This involves connecting a milliammeter in series with the output lead of the unit and checking the current drain. The current drain is then compared with the current rating of the rectifier.

Fig. 1 shows a device that will accurately—and quickly—check selenium rectifiers under conditions of normal load. Rectifier condition is determined by the dc voltage which they develop across a large filter condenser when delivering approximately full load current. By means of a multi-tap switch, all rectifiers from the midget 65 mil units used in three-way portables to the large 450 mil units in TV receivers can be tested. (The resistance values indicated on the diagram show the setting for the taps on the adjustable resistors. Values given are from the tap to B—.)

Table I shows the proper setting of the selector switch and the proper output voltage, for each rectifier. (A check with the manufacturer's data may be necessary to determine the approximate current rating of the rectifier.)

To use the tester:

1. Disconnect both leads of the unit to be tested.
2. Connect the rectifier to the tester. Be sure that the polarity is correct.
3. Set the selector switch to the correct position for the rectifier being tested.
4. Turn the instrument on.
5. Reject those rectifiers which, within five minutes from the time the voltage is applied,

do not deliver approximately the voltage that is listed in the table.

It is not necessary that a separate meter be used for this instrument. Jacks can be included so that the voltmeter used for other servicing work can be connected into the circuit.

Probably the most convenient way of connecting the rectifier under test to the instrument would be by having banana jacks on the test instrument, and test leads with alligator clips on one end and banana plugs on the other. The rectifier could then be clipped into position. (It would be well to have one red alligator clip and one black alligator clip: In this manner, an easy check for proper polarity may be made. The positive, or output side of the rectifier is usually marked “+” or “cath.”)

Standard parts are used in the construction of this device and they should be obtained from your local wholesale distributor or from one of the large mail order radio supply houses. NRI CANNOT SUPPLY PARTS FOR BUILDING THIS UNIT.

Current Rating of Rectifier	TABLE I Selector Switch Setting	DC Output Voltage (Approximate)
65 ma	A	130v
75 ma	B	130v
100 ma	C	125v
150 ma	D	130v
200 ma	E	130v
250 ma	F	130v
300 ma	G	125v
350 ma	H	125v
450 ma	I	120v

The setting of the selector switch and the voltage output for each rectifier size.

SCIENCE QUESTION BOX

By Scientists of the General Electric Research Laboratory

Q: What chemical elements are found in sea water?

A: One authoritative work lists 44 elements that have been detected in sea water, some in extremely small amounts. Chlorine is most abundant, with about 19,000 parts per million by weight, while sodium is second, about 10,600 parts per million. Next in order come magnesium, sulfur, calcium, potassium, bromine, carbon and strontium, all more than 10 parts per million. Among the least abundant are gold, with about six parts per trillion, and radium, which is present to the extent of about one part in ten quadrillion parts of sea water.

Q: How fast does a glacier move?

A: During the warm season the ice near the edge of a glacier may move forward a few inches per day, on the average, while several feet per day would be considered rapid. The record for speed seems to be that of the Black Rapids Glacier in Alaska. For several months in 1936 a speed of 115 feet per day was recorded, probably on account of an exceptionally heavy snowfall. This glacier is about 18 miles long.

Q: How is it that some flies can become used to DDT and pass on their immunity to the next generation thus producing a DDT-resistant strain? I thought that characteristics acquired during an animal's lifetime are not inherited.

A: It is true that acquired characteristics are not inherited. However, random variations, called mutations, occur in animals, and these may be transmitted to the next generation. From time to time, no doubt, mutations have occurred which have produced flies resistant to DDT, but in earlier days this had no particular value. It might even have been somewhat disadvantageous, and such flies would have been eliminated from the general population. Now those which are sensitive to DDT would be gradually exterminated, but the resistant ones would survive, even passing the resistance on to some of their progeny. In this way a population of flies that can tolerate DDT would be gradually established.

Q: Is it true that the Empire State Building sways in a high wind?

A: No, the motion of the building in a high wind is not appreciable. Thorough tests have shown that it would take a wind of 100 miles per hour, blowing steadily for two hours or more, to cause the building to deviate from the

vertical as much as 1.45 inches, measured at the top. Only twice in the past 25 years have winds of this speed been recorded in New York.

Q: How is the voltage of lightning measured?

A: There is no known way of measuring the actual voltage existing between clouds and the ground, which results in the discharge of lightning. Formerly it was estimated that these voltages reached a billion or more volts. However, it has been discovered that lightning does not travel in one single huge spark, but in a series of steps, and this makes it appear likely that something like 50 million volts is developed.

Q: Is there any good way of keeping farm machinery from rusting while it is stored over the winter?

A: There are two types of rust preventive compounds that might be used on farm machinery and similar equipment. One is brushed on and dries in a day or two to form a hard film. This offers protection even under moderately severe conditions for a considerable time. Another type, lower in cost, forms a soft, grease-like coating on the surface. In each case, it is necessary to have the surface clean and dry before applying the coating, in order to get the best results. Which type is used depends on the type of article to be protected, the storage conditions, the length of time protection is desired, etc. Most of the large oil companies, as well as other firms, make a line of rust preventives.

Q: Who discovered the atom?

A: The idea that matter is composed of tiny units called atoms goes back to some of the ancient Greek philosophers, but the modern version of the theory began in 1808 with an English chemist named John Dalton. His ideas, of course, have been greatly modified, particularly as to the structure of the atom itself, but the basic idea has been amply verified. Scientists can estimate the size of atoms, and the number in a given volume. Moreover, they can do this in many different ways, all of which lead essentially to the same result, and no one has been able to propose an alternative theory which fits all the observed facts, so the theory is considered as proved.

Q: Do scientists consider seals and whales to be descended from some earlier land animals?

A: Yes; according to zoologists there is good evidence that all mammals, whether they now inhabit land or sea, originally lived on the land. The first mammals, it is believed, were descended from land-living reptiles whose own remote ancestors, probably, originally came from the sea. Experts on development of the mammals think that whales have developed from ancient hoofed animals, strange as this may seem.

Q: How do the yellow "bug lights" used out of doors at night around drive-in restaurants and similar places keep the insects away?

A: Yellow has become the accepted color for outside lighting in many applications because it attracts insects less than white light. However, there is no evidence that yellow, or any other color, will actually drive them away. To reduce the bug nuisance at night, lighting experts recommend the use of a white lamp at a distance, and a yellow one where people will be congregating.

Q: Are snakes immune to the venom of other poisonous snakes?

A: There seems to be no such thing as blanket immunity among snakes and experiments have indicated that they are not necessarily immune to their own venom. While there are cases on record where snakes have bitten one another, or even themselves, without any apparent ill effects, there are others where they have been bitten by venomous species and have developed symptoms of snake bite. Some cases were fatal.

Q: Why should something cold be applied to a bruise on the body?

A: In general the application of something cold to a bruise is helpful because the lowered temperature tends to close down the blood vessels. This in turn decreases the amount of swelling and internal bleeding.

Q: Can a thing get so cold that it can't get any colder?

A: Yes; this is the temperature of absolute zero, about 460 degrees below zero, Fahrenheit, or minus 273 on the Centigrade scale. Heat is a movement of the molecules of which a material is made, and the faster they are moving the higher is the temperature. As a thing cools, these molecules slow down in their motion, and at absolute zero they would come to rest. Obviously they cannot move any more slowly than when they are standing still, and that is why absolute zero is the limit of coldness. Scientists have been able to reach temperatures within a few thousandths of a degree of absolute zero.

Q: How do we know that the Moon has no light of its own?

A: The best proof is that the half of the Moon on which the sun's rays are shining is always bright, while the opposite half is always dark. At the new phase the Moon is nearly between the Earth and the Sun, the Moon's sunlit hemisphere is turned away from us, and we cannot see it. A few days later it has moved a little to the east of the Sun, so it remains visible in the west after sunset and a narrow crescent of the bright half is turned to our view. At this stage we can often see the dark half shining with a faint light, but this is due to "earthshine," or

light from the Sun which the Earth reflects back to the Moon. At full Moon, when it is opposite to the Sun, the entire illuminated portion is visible from Earth.

Q: What makes the image appear in a photographic negative when it is developed?

A: The sensitive part of the film is an emulsion of silver bromide. Development is a chemical process in which silver bromide is converted to metallic silver. This change occurs most easily where the emulsion was exposed to light, thus producing the developed image. After development the film is "fixed," with a chemical such as "hypo," or sodium thiosulfate, to remove the unexposed and undeveloped silver bromide. The fact that the silver in the image is finely divided into microscopic grains is the reason that it does not appear "silvery," as it does in a coin or teaspoon, where the silver is in one solid piece.

Q: What was the first astronomical observatory in the United States?

A: It is believed that the first U. S. Observatory, that is, a building specially erected for astronomical observations, was one constructed by David Rittenhouse near Philadelphia in order to observe the transit of the planet Venus across the face of the Sun in 1769. This was only temporary, but a few years later he built, near his home in Philadelphia, a brick observatory from which he made observations until his death in 1796.

Q: Can you tell me anything about a method of killing off rabbits by inoculating some of them with a disease to which they are sensitive?

A: The Fish and Wildlife Service of the U. S. Department of the Interior says that such methods have been used in Australia where rabbits have become a serious pest. The disease used is myxomatosis, which is transmitted by mosquitoes and possibly other blood-sucking insects. It seems to be quite specific for the European hare, but does not affect the native wild rabbits in the United States. In the spring of 1950 the Australians liberated large numbers of infected rabbits, and by December the disease appeared in many widely scattered areas. In some cases, it is said, the rabbit population was reduced by as much as 90 per cent. An over-all reduction of 50 per cent has been claimed.

Q: What is the bright star I can see low in the southwest just after sunset?

A: This is the planet Venus, which is now coming into view as an evening star. It will become increasingly prominent during the fall and winter, and will reach its greatest brilliance in early March, 1953. A month later, it will have disappeared from the evening sky but by late spring and summer it will be prominent in the eastern sky before sunrise. In the spring of 1954 it will be back in the evening sky again.

Test of TV Role in Railroad Operation Viewed by Officials of Major Roads

Chicago—New uses of television in railroading which may save time, money, and wear and tear on both rolling stock and personnel were explored in tests conducted by the Baltimore & Ohio Railroad and the RCA Victor Division of Radio Corporation of America.

RCA used three of its newly developed "pint-size" Vidicon industrial TV systems to enable personnel in sheltered fixed locations to perform functions normally requiring both extra movement of freight cars and walking by employees over considerable distances.

Instead of walking among trains and over tracks to list car numbers on an incoming train, for use in switching to make up trains destined for various sections of the country, a checker sat before a television screen and listed the numbers as cars passed before a small unattended camera. Similarly, supervisors in a single location were enabled to observe on the screens of two TV receivers, for the purpose of coordinating various activities, the disposition and movement of all cars and switching engines in the big classification yard. These views were picked up by two of the new small TV cameras, mounted atop the yardmaster's tower on bases that could be rotated at will by means of controls at the receiver location.

At a luncheon preceding the special demonstration, W. C. Baker, B & O vice president in charge of operation and maintenance, envisioned numerous other railroad applications of television and said that the medium may play an important role in the railroading of the future.

Speaking for RCA Victor, W. W. Watts, vice president in charge of the RCA Engineering Products Department, reported that railroading is the newest and one of the most challenging of a growing list of industrial and scientific fields in which television promises increased efficiency, improved products and services, and elimination of risks and hardships for human observers. He said that the use of television in such places as factories, mines, laboratories, and railroad yards may some day be as common and as significant as its use today for home entertainment.

"The object of this experiment," Mr. Baker said, "is to determine whether industrial television will be able to contribute to greater efficiency in the operations of a railroad classification yard. There are other possible uses, however. For example, industrial television may prove to be useful at large railroad-marine terminals, such as the B & O has in Baltimore. There, television might be used to help supervise the load-

ing of ore at our import ore pier. Or, at the tipples of coal mines, television cameras might be adjusted to enable a clerk in a distant office to record the serial numbers of cars which are being loaded. There may be uses for industrial television, also, along the line of road. All of these avenues have yet to be thoroughly explored.

"Someone once said that a railroad is no better than its communications. And, the better its communications, the better the railroad. If this is true, then the great new communications medium of television should have an important role to play in the railroading of tomorrow."

The New RCA Vidicon equipment is designed to afford maximum simplicity, compactness, and ease of operation; good picture quality; low-cost operation. The system consists of only two units: a small, light-weight camera, about the size of a 16mm home movie camera, and a combination monitor-power supply-control unit housed in a luggage-type case smaller than a home table model TV set.

The equipment is designed around a new RCA camera tube, the Vidicon, which is only one inch in diameter and six inches long, yet is almost as sensitive as the much larger studio-type Orthicon tube. The camera uses only two other tubes, and the entire industrial TV system uses only 22 tubes, compared to the 60 now needed for a broadcast studio camera chain. The scanning frequencies of the new system are the same as those of standard broadcast television.

— n r i —



"Let me go—you brute!"



Alexander M. Remer	President
F. Earl Oliver	Vice Pres.
Claude W. Longstreet	Vice Pres.
Harvey W. Morris	Vice Pres.
Louis J. Kunert	Vice Pres.
Louis L. Menne	Executive Secretary

NORMAN KRAFT OF PERKASIE, PA., IS PRESIDENT-ELECT OF THE NRI ALUMNI ASSOCIATION

Thomas Hull, of New York, Harvey Morris of Philadelphia, Earl Oliver of Detroit and Oliver B. Hill of Burbank, California are elected Vice-Presidents.

THE polls are closed and the results are in. The election of officers to serve our NRI Alumni Association during the year 1953 has been completed. Norman Kraft of Perkasio, Pennsylvania was the winner in a friendly contest with Claude W. Longstreet of Westfield, New Jersey. Kraft, long a leader in our Alumni Association, made a strong race. Longstreet, although not able to match the strength of Kraft, ran a surprisingly good race and he is sure to be heard from in the future.

Old-timers in our NRI Alumni Association are familiar with the work of Norman Kraft. He has been a mainstay in Philadelphia-Camden Chapter, in which local he has held just about every office. He is highly regarded in Radio and Television circles and may be depended upon to give us an administration that will keep our Alumni Association moving forward as it has from year to year.

Considering the time and effort that has always been put forth by Earl Oliver of Detroit it is not at all surprising that he is again elected a vice-president. Earl has many responsibilities in addition to his daily job. He is an officer in other organizations and it is surprising how he finds time to do all the things he does for his fellow man. He is the type of person who is extremely loyal to any organization in which he becomes associated. All of us are very much indebted to him for his unselfish devotion to the cause of advancing Radio and Television men in the Detroit area.

As much may be said for Harvey Morris of Philadelphia who was re-elected a vice-president.

Oliver B. Hill of Burbank, California previously served as a vice-president and it is good to have him re-elected to that office. He represents that great body of members on the West Coast where we have no chapter affiliation.

A newcomer in our field of National officers is Thomas Hull, Jr., of New York. Tommie is outstanding as a lecturer at meetings of New York Chapter. He is an excellent teacher of Radio and Television and is in a large measure responsible for the good attendance enjoyed by New York Chapter. Tommie can always be counted upon to give the members a very informative talk.

These officers will be installed effective January 1. They will serve during the year 1953. In passing it is proper that a few words be said for Alexander Remer, the retiring President. Alex was very conscientious in his efforts to be of real aid not only to our own members but to Radio and Television men every where. He kept in close touch with Legislation as proposed and went far out of his way to contact officials to give his views regarding the merits and demerits of some of the proposed bills. Our NRI Alumni Association owes a vote of thanks to Alex Remer, our retiring president. Alex will continue to be active in the affairs of our New York Chapter where he is extremely popular with our members.

Once again fellow NRI members, our organization is in good hands. Our best wishes to the retiring officers and a big hand of welcome to the new.

Chapter Chatter

Chicago Chapter has elected officers to serve during 1953. They are Chairman, Charles C. Mead; Secretary, Frank Ziecina; Treasurer, Clark Adamson; Librarian, Barney Grivetti; and Sergeant-at-arms, Joseph Kaldin.

With the election out of the way and with Mr. Mead returned to office as Chairman, we are sure to have another good year in 1953. The entire slate of officers are men who have shown a genuine interest in the affairs of our local and who are willing to respond whenever called upon to help make our meetings interesting and beneficial.

Lloyd Straessle and Edward Dudek, two of our members, gave interesting talks and demonstrations. Mr. Straessle spoke on "Practical Uses of Voltmeter in Radio Servicing."

Students and graduates of NRI in the Chicago area are invited to visit us as guests. We meet on the second and fourth Wednesday of each month, thirty-third floor, Tower Space, in American Furniture Mart Building, 666 Lake Shore Drive, Chicago. Use West entrance.

Detroit Chapter held its annual stag at the Crymoto Club in Windsor, Ont., Canada. Arrangements for this meeting were made by Clarence McMaster and a vote of thanks is due him for the courtesies extended to us by this club.

At the stag party we were pleased to have as our special guest from Washington, Mr. J. Mor-



risson Smith and Mr. L. L. Menne. Both visitors from headquarters spoke briefly.

It was good to see many old timers who have done so much for Detroit Chapter. Included in these is Harold Chase, now President of the Television Service Association of Greater Detroit, John Stanish, Past Chairman of Detroit Chapter, Val Guyton, Bob Mains, Charley Mills, all former officers of the Chapter. Some of these men mentioned are, of course, still very active in the Chapter, but these stags always bring out a few we do not see regularly. Clarence McMaster arranged for excellent refreshments. This was a most successful party.

Members of Detroit Chapter, in a body, attended open house of the K.L.A. Laboratories, 7422 Woodward. Here they had an opportunity to see the latest in audio sound equipment. Demonstrations were performed and special attention was given to questions by our members. Mr. John Nagy, one of our Chapter members, was on hand to answer questions and see that everyone was properly taken care of.

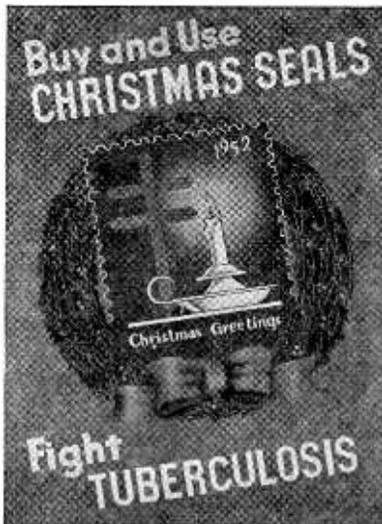
Two new members are Mr. Joseph Rossman and Mr. Paul Lorenz.

Meetings are held on the second and fourth Friday of each month at Electronics Institute, 21 Henry St. at Woodward.

Philadelphia-Camden Chapter is growing steadily. Since our last meeting we are pleased to report the addition of thirteen new members. They are Fred C. Regett, Philadelphia; Gerald A. Rowan, Philadelphia; Oran H. Tonge, Philadelphia; Joseph Miller, Philadelphia; Reuben Friedman, Philadelphia; Raymond Helm, Philadelphia; John Krepol, Philadelphia; John A. Lightcap, Philadelphia; Harry Rothwell, Jr., Oakford; H. Krauss, Barrington, New Jersey; David S. Gillon, Pennsgrave, New Jersey; Frank Kaufman, Essington; and William V. Schaulé, Wildwood, New Jersey.

Harvey Morris continues to give his interesting lectures on Television servicing. Mr. Bernard Bycer gave a talk on general trouble-shooting in TV, using three TV sets brought in by members for demonstration purposes.

Our members are delighted to know that Norman Kraft has been elected President of the NRI Alumni Association for the year 1953. We





Detroit Chapter Meeting, held at Crymoto Club, in Windsor, Ont., Canada.



J. Morrison Smith leading the chow line.

think very highly of him.

We were pleased to have had a visit by J. Morrison Smith, son of J. E. Smith. He was accompanied to our meeting by L. L. Menne, who told us about the fine work Morrison Smith has been doing as Secretary of the National Radio Institute. Sixty members were present at this meeting to greet Mr. Smith.

As usual, Philadelphia-Camden Chapter meets on the second and fourth Monday of each month at K of C Hall, Tulip and Tyson Streets, in Philadelphia. Meetings start promptly at 8:30 P.M. Students and graduates in this area are cordially invited to attend.



In center is Harold Chase, Detroit Chapter member, and President of Television Service Association of Michigan, in conversation with L. L. Menne and Morrison Smith.

New York Chapter is pleased with the news that Thomas Hull has been elected a vice president of the NRI Alumni Association. He was strongly supported by Chairman Wappler, Vice Chairman Alex Remer, Secretary Louis J. Kunert, and Assistant Secretary-Treasurer, Frank Zimmer, all of whom have held office for many years and feel Tommy Hull deserves the recognition.

Morris Friedman outlined some of the things he plans to do to assist members in servicing TV receivers. He will introduce trouble in the receiver and then guide the members in locating the source of the trouble.

Alex Remer gave a very splendid talk on "Television Simplified." Thomas Hull, at another meeting, spoke on his experience in reactivating a picture tube. William Fox gave another of his very interesting talks on his unusual experiences in servicing Radio and Television receivers. These talks are light and entertaining, but beneficial, nevertheless.

Cres Gomez, another interesting and entertaining speaker, gave us a nice talk. Ted Durante delivered a talk on the aligning of an Admiral tuner. Very good. At still another meeting, Tommy Hull conducted our Radio clinic after which he delivered a talk on A.V.C.

All NRI students and graduates in this area are invited to attend our meetings which are held on the first and third Thursday of each month, at St. Mark's Community Center, 12 St. Mark's Place, between Second and Third Ave., in New York City.

Baltimore Chapter is winding up a good year under Chairman H. C. Voelkel and things are bright for 1953.

For the most part the members of Baltimore Chapter devote themselves to trouble shooting and actual servicing of Radio and Television receivers brought in by members.

Meetings are held on the second and fourth Tuesday of each month at 745 West Baltimore Street. Our meetings are on the second floor of Redmen's Hall. Visitors are always welcome.



Job Opportunities

Television Repair Man—write to Mr. M. H. Barnes, Western Auto Associate Store, Winchester, Tenn.

Television Bench Repair Man—qualified man, need not have experience but must know theory. Write to Mr. Sol Feldman, Firestone Dealer Store, Leesburg, Virginia.

Radio-Television Service Man—to take charge of shop. Write Kincl Hardware, 200 W. 2nd. St., Taylor, Texas.

Radio Technicians for Micro-Wave System owned by Transcontinental Gas Pipe Line Corp., of Houston, Texas. Extends from Texas-Mexico border to New York. A minimum of FCC 2nd class radiotelephone license is required. Starting salary \$335 per month. Write to Mr. H. A. Rhodes, Supt. Communications, Transcontinental Gas Pipe Line Corp., 3100 Travis St., Houston 6, Tex.

Radio and TV Men. Rohrer Electric Co., 1313 Main St., Niagara Falls, N. Y. Write Earl Weiss, Service Manager (an NRI Grad).

Radio Station WGAA. (A chain of radio stations) 1st. 'phone required. Someone interested in becoming a "combo-man." Write to Mr. G. J. Lund, General Manager, Station WGAA, Cedartown, Georgia.

Radio Station WIRB, Enterprise, Okla. Announcer-engineers. 1st. 'Phone.

Radio Station WADE (and WADE-FM), Wadesboro, N. C. 1st. radiotelephone license required.

Radio Station WDSC, Dillon, S. C. Requires 1st. 'phone license.

Radio Station WKBH, La Crosse, Wis. Need two men to start in control room—not necessarily licensed. This station has a TV application pending.

Bankhead Broadcasting Co., c/o Station WWWB, Jasper, Ala. (Also operate stations WWWR and WWWF.) Need 2 1st. class operators.

Radio Station WRFS, Alexander City, Ala. Engineer-Announcer, or straight engineer. (1st. class radiotelephone—no experience required.)

Radio Station WRLD, West Point, Ga. 1st. class radiotelephone operator.

Radio Station WPNF, Brevard, N. C., Combo-Man, 1st. 'phone required.

Radio Station WGGA, 2400 Athens Rd., Gainesville, Ga., 1st. 'phone.

Radio Station WHAN, Charleston, S. C., 1st. 'phone required.



Here And There Among Alumni Members

Peter B. Campbell, of Redondo Beach, Calif., who is a mechanical engineer by profession, writes that due largely to his NRI training and part-time servicing experience he has been assigned the important task of coordinat-

ing the mechanical, electrical, and electronics aspects of an important defense project. Graduate Campbell has completed both our servicing and communications courses.

Jesse W. Parker got his First Class Radiotelephone license and immediately secured a position with Station WCOC in Meridian, Mississippi.

Graduate M. M. Koerin, who formerly managed a radio wholesale house in Norfolk, Virginia, has accepted a position as manager of Miller's TV and Appliance Co., in Kinston, North Carolina.

Floyd Buehler, NRI graduate, who has had wide experience as an instructor, including some great work while in the armed service, has been promoted to Chief Instructor at Electronics Institute in Detroit.

Earnest Hall of Hackett, Arkansas, writes to tell us that he is now employed by a large Furniture and Appliance store in Ft. Smith, Arkansas. Enjoys his servicing work, and is nearly doubling his previous salary.

New amateur call letters for graduate Vincent Weaver, of Round Hill, Virginia, are WN4WDF.

SFC Joseph A. Bernard, of Ft. Benning, Ga., is serving as a Radio Repair Supervisor in the Signal Corps.

Alumnus Frederick B. Uzzle, of Jacksonville, Florida, has a new job at Radio Station WJVB. He has also been issued amateur call letters WN4WEI, and is using the transmitter which he built as a part of the NRI Communications Training as his amateur rig.

Robert R. Reyers, with Pioneer Television Co., in Philadelphia, writes to thank us for giving him his start in electronics.

George C. Reefer, of Columbus, Ohio, is doing a steadily increasing Radio and TV business. It is pleasing to get so many reports of businesses that developed into full time from spare time beginnings.

William Niver, of Philadelphia, Pennsylvania, is working in Microwave Research at the Frankfort Arsenal, and mentions that NRI Communications lessons on microwaves are coming in mighty handy. Niver has amateur call WN3TZD.

Congratulations to Wilbur E. Reber, NRI graduate, who has received his first-class Radiophone license. He is from Shreveport, La.

Heard from Brouse H. Rinehart, who is president of Rinehart, Inc., in Richmond, Ind. He graduated in 1928 and has been in business ever since. Has a large establishment on Main Street and growing all the time. Handles leading brands of Radio, Television and Electrical Appliances.

Paul F. Dontje worked for The J. K. Company as a serviceman, when he was located in Michigan. When they opened a store in Denver, Colorado, they made him such an attractive offer to come with them as Serviceman, he couldn't refuse. Likes Denver very much.

Marlin S. Sickels, of Sun Prairie, Wisconsin, is an outside parts salesman for Radio Distributors, of Madison, Wisconsin. Says he often has a real advantage over other salesmen who are not technically trained.

M/Sgt. Myron H. Mayer, who is stationed at the United States Military Academy, West Point, New York, writes that he is doing very well in part-time Radio and TV Servicing.

Benny McGehee, and his charming wife, of Arcadia, Florida, visited NRI recently. Benny owns a prosperous Radio Shop, and has recently moved to a larger business location.

Arthur J. Hurlbert of Rockville, Yarmouth County, N. S., Canada, would like to correspond with graduates in his vicinity. He is manager and trouble-shooter in a Radio and Appliance shop in his home town.

Graduate Rex Byars writes from Ward 4E, Veterans Hospital, Fresno 3, California, to tell us that he had no trouble with the General Amateur License exam. Plans to get the Commercial Ticket as soon as he gets out of the hospital.

Paul Bartles, Jr., formerly of Hyattsville, Md., has purchased Acme Radio and Television Service, 337 South Queen St., Martinsburg, West Virginia. Prospects for a prosperous business are very good. Good luck to Graduate Bartles.

Lyndon E. Wilcox, of Watervliet, New York, is now employed as service manager with the Smith Electric Co., Cohoes, New York.

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L. L. MENNE, EDITOR
H. L. EMERSON, ASSOCIATE EDITOR
J. B. STRAUGHN, TECHNICAL EDITOR

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