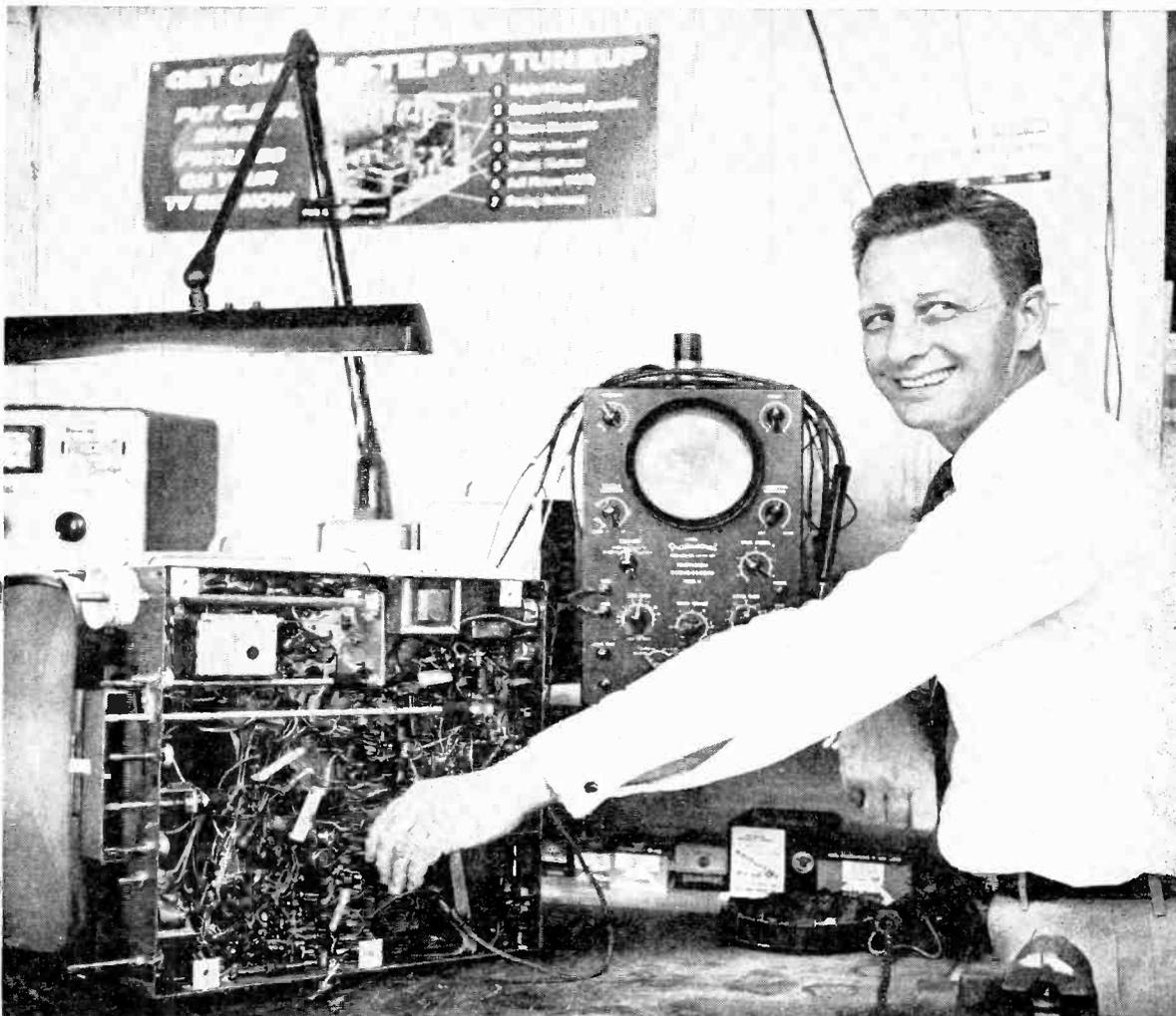


National RADIO-TV NEWS



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NRI Alumni Association News

Aug.-Sept.
1955

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No. 10



Do You Believe

THERE ARE NO LAZY PEOPLE?

Recently, I sat in on some conferences of my staff members and supervisors. The conferences were a series of weekly noon meetings. The purpose was to exchange ideas, to keep fresh our supervisory methods, to give our best services to our students at all times.

The leaders of these discussions were staff members of George Washington University who are experts in the field of Human Relations.

I was rather startled when our leader at one of these meetings, a Professor of Education, said: "There are no lazy people. People who seem lazy are either ill or without goals to motivate them."

The more we think about that, the more we are inclined to agree. There are no lazy people—simply people who aren't going anywhere because they have no goal.

We must all have a goal. We must see something in the not too distant future that we want to reach. We need to plan and prepare for it.

We know we need training to meet the keen competition of today. We know we can get it. But we need to keep going to reach that goal.

The football coach inspires his team with such slogans as: "When the going gets tough, the tough get going." Slogans of this kind can also be made realities in the laboratories, and in your job. An attitude of wanting to do one's best oftentimes accomplishes the seemingly impossible.

Be a self-motivated leader. Set your goal high and shoot for it. "A man that won't be beaten, can't be beaten."

J. E. SMITH,
President

TV Troubleshooting With the Receiver's Picture Tube

By William F. Dunn
NRI Director of Education



William F. Dunn

THE picture tube in a receiver can serve as a very effective test instrument. Since so many signals and voltages terminate at the picture tube, the absence of one or more of these components will produce a characteristic picture defect. Thus, with a knowledge of what signals are required at the picture tube and how they influence the picture, you can isolate troubles to a defective section of the receiver almost immediately. In fact, as you increase your knowledge and understanding of how the television receiver operates, you will probably be able to isolate defects to a specific part merely by observing the picture on the screen.

As in radio receivers, tube failure is the most common receiver defect. Therefore, you can repair many sets quickly just by understanding a block plan of the receiver. For example, the block plan of a receiver shown in Fig. 1 demonstrates the procedure for localizing defects to just a few stages. Let us consider each major section and see how a failure in each of them will affect the receiver performance.

Antennas

The antenna is a very important part of any receiver, but it is particularly important in fringe areas and in localities with reflection problems or high interference levels. The two major defects that can occur in an antenna system are an open or intermittent connection and a shift in antenna orientation.

A broken or shorted connection somewhere in the antenna system can produce weak and erratic pictures. Often certain channels are affected more than others; generally speaking, the weaker stations will be affected the most, as

shown in Fig. 2. A poor connection in the antenna and transmission line system can cause flashing and jumpy pictures. A windy day will often make an antenna defect intolerable because the wind will shake the antenna and cause the defective connection to "make and break" very rapidly.

Antenna defects, and improper orientation in particular, can bring about other picture disturbances. It can cause smeary pictures or reflections and ghosts.

Tuners

Since the tuner is the first section of any television receiver, it must amplify both the picture and the sound signals that are picked up by the antenna. A serious tuner defect, therefore, will affect both the picture and the sound reproduction.

The two most common tuner defects are faulty tubes and mechanical selector troubles. Defects in the converter section also are common. For example, failure of the local oscillator tube in some receivers causes the loss of both picture and sound because there is no mixer action. A failing local oscillator tube will result in weak pictures and a weak sound output. This oscillator trouble often affects the high-band channels (7 to 13) more than the low-band channels (2 to 6). Because of the much higher frequency, many tuner disturbances will affect the high-band performance earlier or more drastically than the low-band performance.

An important point to remember is that in the earlier sections of the receiver only those failures that upset the dc operating voltages will in any

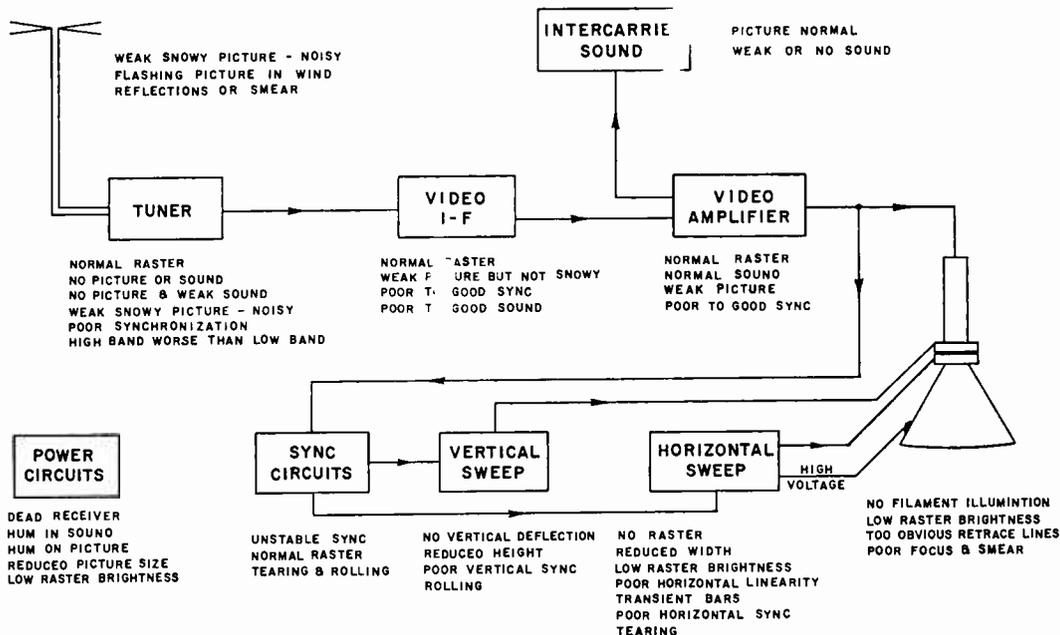


FIG. 1. Block diagram of receiver, showing effect of defects in each section on the picture and sound.

way disturb the scanning raster. Thus, the raster size and brightness will usually remain normal when there is a tuner defect.

Contact troubles in the selector switch are quite common. Like other tuner troubles, worn or dirty switch contacts often will affect reception on the high-band channels while the low-band channels operate satisfactorily.

Video I-F Amplifiers

Many defects in the video i-f amplifier of the television receiver affect the picture and sound in much the same way as a tuner defect. As with the tuner, faulty tubes in the i-f amplifier section are the most common complaints. Also, defects in this section will usually have no effect on the raster.

Most i-f amplifier defects result in a weakened picture and a weak to fair sound. This condition usually will help you to distinguish between defects in the i-f amplifier and in the tuner. Most tuner defects influence both the picture and sound—often in the form of a complete failure of picture and sound; furthermore, a tuner defect often affects the high-band channels more than the low-band channels, whereas an i-f amplifier defect has an identical influence on the picture regardless of the channel. Likewise, with *many*

i-f amplifier troubles, some trace of the picture still may be seen on the picture tube along with weak sound from the speaker.

A tuner defect generally causes a higher noise level (more snow in the picture and a noisier sound), while a defect in the i-f amplifier causes just a weakened picture and sound. Notice in Fig. 3 that high noise components are not present in the picture.

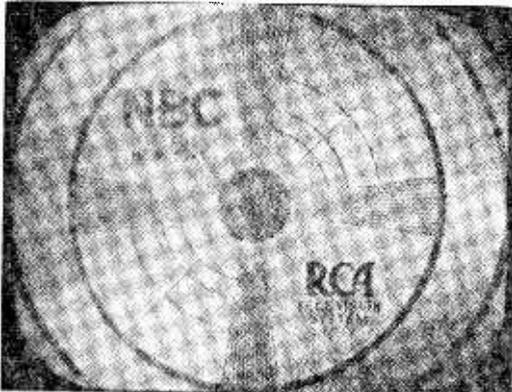
Sound Channel

A sound channel disturbance is quite obvious; the picture will be normal, but the sound may be weak or there may be no sound at all. When you encounter this condition in a television receiver, you can isolate the trouble to either the sound take-off point in the video i-f section or to the actual sound channel itself.

Occasionally, a drift in the local oscillator frequency of the tuner can produce a good picture, but you may not be able to tune in the sound on certain channels. This type of defect is common, particularly in the old dual i-f channel receivers.

Video Amplifiers

Most failures in the video amplifier section of the receiver produce a weak picture and/or poor syn-



Courtesy RCA

FIG. 2. Weak, snowy picture—defect in antenna or tuner.

chronization. However, the raster and the sound are usually normal.

Most video amplifier defects cause a weak picture and improper contrast and brightness ranges. There are certain types of video amplifier defects that clip off the sync pulses that rise above the video signal itself. When the synchronizing pulses are lost, the picture becomes unstable which causes it to roll or tear.

Notice that with just a fundamental knowledge of what goes on in the receiver and by actually observing the picture, you can isolate troubles rather quickly to a few stages. Many receivers may be repaired by substituting tubes in the suspected section. We must stress, however, that although this procedure applies to any types of defects, troubles may arise occasionally in the receiver that appear to be caused by a defect in one section when it actually is in another. This is due to interaction between the sections of the receiver (often a characteristic of a particular model of receiver). These troubles can be misleading because they create the same disturbance in the picture that would ordinarily be associated with a different section.

Picture Tube

It is frequently difficult to decide whether or not a picture tube is bad, because a number of signals and voltages from other sections of the receiver are used to operate it. Often you cannot obtain the final answer, even after making other tests, until you substitute a new picture tube.

The following are some of the tell-tale signs of a picture tube failure:

1. No filament illumination at the rear of picture tube.



Courtesy Philco

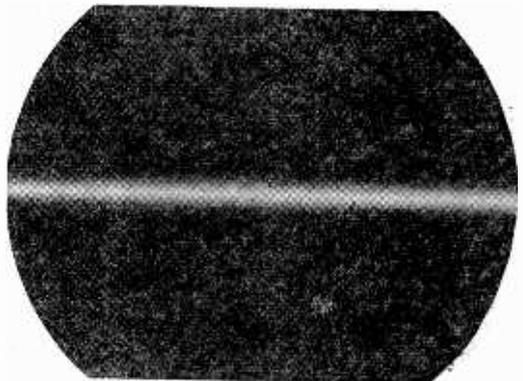
FIG. 3. Weak picture only—more characteristic of video i-f defect.

2. Normal raster and the sound, but inadequate picture brightness and poor focus.

3. No changes in raster brightness with changes in the setting of the brightness control. Inability to adjust brightness and contrast to eliminate retrace lines.

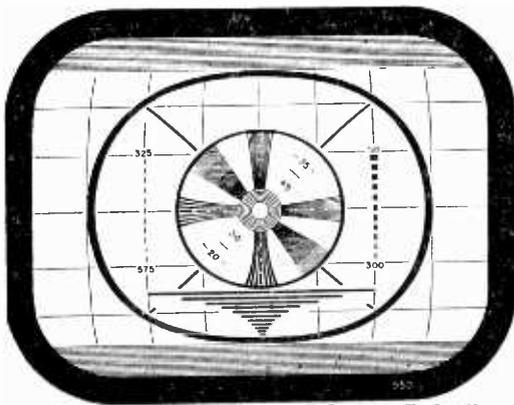
Vertical Sweep System

Most defects in the sync and sweep systems of the television receiver cause disturbances in the raster. They do not affect the sound or the video signal that is applied to the grid circuit of the picture tube. When the video signal fed to the picture tube is normal, you will notice that the fluorescent screen contains ample black and white information. This information, however, may be distorted or unstable, or the picture size may be reduced.



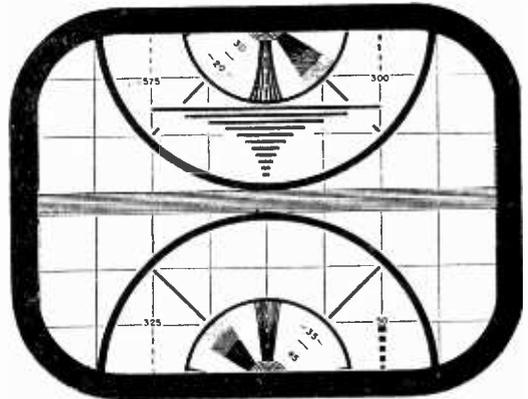
Courtesy RCA

FIG. 4. Loss of vertical deflection.



Courtesy Belemont Radio Corp.

FIG. 5. Reduced picture height.



Courtesy Belemont Radio Corp.

FIG. 6. Loss of vertical sync.

When there is a defect in the vertical sweep system, either a straight horizontal line will appear on the tube face, as in Fig. 4, or the height of the raster will be reduced, as illustrated in Fig. 5. You can see the video information in the picture, but it is not possible to obtain a picture of full and linear vertical dimension.

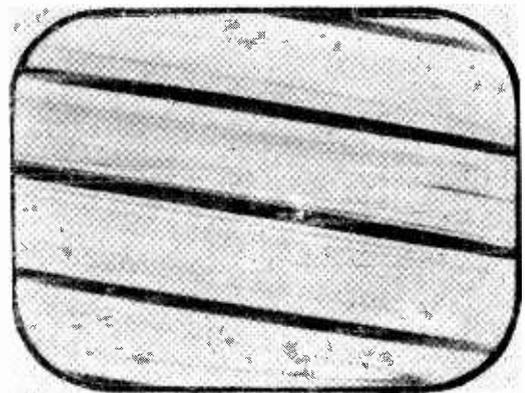
Horizontal Sweep System

A complete failure of the horizontal sweep system not only results in a loss of picture width, but also in the complete loss of the picture raster. Since the high voltage for the picture tube is generated in the horizontal sweep system, the failure of this system results in the loss of the high voltage. Consequently, the picture tube is not illuminated.

Some horizontal sweep system defects can occur which prevent you from obtaining full picture width or proper raster brightness. Horizontal defects also can cause picture non-linearity or spurious vertical bars in the raster.

Sync System

When there is a synchronization defect in the receiver, the sound is normal, the raster size is normal, and a strong video signal component appears on the screen. If the sync defect appears in the earlier stages of the sync system, or is in the form of sync clipping in the video amplifier, both the horizontal and the vertical stability of the picture are affected. However, if the sync defect occurs after the horizontal and vertical sync components have been separated from each other, the synchronization of only one portion of the sweep system is affected. A loss of vertical sync causes the picture to roll, as in Fig. 6, while a loss of horizontal sync causes the picture to tear out horizontally as in Fig. 7.



Courtesy RCA

FIG. 7. Loss of horizontal sync.

and, at times, the picture brightness may be reduced.

The two hardest working tubes in the receiver are the power rectifier and the horizontal output tube. They are the first tubes that should be substituted in the event of the loss of picture width
(Page 15, Please)

Technical Ramblings

By B. VAN SUTPHIN

NRI Consultant

Question: In what direction does current flow?

To one who has just learned the actions occurring in a vacuum tube, it is a definite shock to read in a magazine or technical article a statement to the effect that current flows from positive to negative, or from the plate of a tube to its cathode. It makes one wonder if current flow and electron flow are different things, but of course they are not.

To see just why some radiomen speak of the current as flowing from the plate to cathode, it will be necessary to go back and look at the early beginnings of electricity.

The first experimenters concluded that the application of a voltage to a circuit caused a movement of something through the circuit. For want of a better name, this something was spoken of as current. They knew that when the connection to a battery was reversed, the magnetic field was reversed. In order to tell the two battery terminals apart, one was always marked positive and the other negative.

This method of marking arose from the fact that batteries were used in electroplating. In this process the object to be plated and a pure metal, such as silver, are suspended in a chemical solution. A battery is connected to the two objects, and particles of the metal object connected to the positive battery terminal are carried through the solution, being deposited on the negative object. If the battery polarity is reversed, the action is reversed and the plating will be stripped off and will return to the metal now connected to the negative battery terminal. Since the particles always flowed from the positive object through the solution to the negative object, it was natural for everyone to say that current flowed from positive to negative.

Electrical men usually are not interested in the direction of current flow as such, but they are quite interested in the direction and polarity of the magnetic fields caused by current flow. Laws were made up based on the movement of current from positive to negative which allowed them to determine the polarity of magnetic fields and lines of force.

These laws work when correctly applied. For example, to find the direction of lines of force around a wire, grasp the wire in your right hand, with your thumb extended and pointing in the direction of the current flow (from + to -). Your fingers will then be wrapped around the wire in the same direction as the lines of force. Try this on a lead pencil instead of a live wire with your right hand and then do it with your left hand, this time pointing your thumb in the opposite direction (the direction of electron flow). In each case, your fingers curl around the wire in the same direction.

No one bothered further about the direction of current flow until experiments with radio tubes showed that electrons flowed from *negative to positive*—exactly opposite to the current in an electrolytic solution and the assumed direction of current in a wire. This made us revise our ideas about current flow. It was found that current consisted of charged particles moving through a conductor. These particles could be charged either positive or negative. A negative particle (an electron) moving in one direction will cause exactly the same magnetic effects as a positive particle moving in the opposite direction.

Now, unless a right-hand rule were used for positive particles and a left-hand rule for negative particles, it would be necessary to disregard the negative particles and their direction, and stick to only one rule. Electrical men did this since the actual direction of current is of little importance to them.

In radio, we are interested in the direction of current flow, and since the current in wire and vacuum circuits consists of electrons moving from negative to positive, it upsets anyone not in the "know" to have some old-time radioman or one who has also had electrical training speak of current as moving from plate to cathode. Now that you know the facts of the case, such statements shouldn't trouble you so much. Just remember that in solid conductors such as wire and in vacuum tubes the current consists of electrons moving from negative to positive.

J. E. Smith Receives Honorary Degree of Doctor of Laws

On Wednesday, June 8th, 1955, Mr. J. E. Smith received the Honorary Degree of Doctor of Laws. The Degree was conferred by Southeastern University of Washington, D. C.

The Dean of the University conferred the Degree with the following citation:

JAMES ERNEST SMITH

Teacher, Electronics Leader, School President, Humanitarian, Personable Gentleman.

"Born in Rochester, New Hampshire, February 3, 1881; educated in the public schools of his native state. He graduated with a Bachelor of Science degree in Electrical Engineering from Worcester Polytechnic Institute in 1906 and worked for the Westinghouse Electric and Manufacturing Company.

"Mr. Smith was an instructor of steam engineering and applied electricity at McKinley High School, Washington, D. C., from 1907 to 1918. In addition to his high school teaching, he operated a Radio School at 14th and U Streets, N. W., Washington, D. C., which was the beginning of the National Radio Institute of which he is founder and president. This school has operated since 1914. During the First World War, Mr. Smith, a well-known leader in the field of Radio, was selected to direct the instruction of radio to two groups of over eight hundred Howard University Students.

He is a Life member of: American Institute of Electrical Engineers, and Radio Engineers; Fellow, Radio Club of America; Member--Adult Education Association of the U.S.A.; American Radio Relay League;

Worcester Polytechnic Institute Alumni Assn., Washington Board of Trade; Engineers' Club of Washington; Advisory Board of the Y.M.C.A. He is past president of the Round Table International. He is a member of the University Club; Washington Golf and Country Club; and the Round Table. For many years, Mr. Smith was chairman of the Y.M.C.A. of the City of Washington World Service Committee, which supports Y.M.C.A. work in foreign fields.

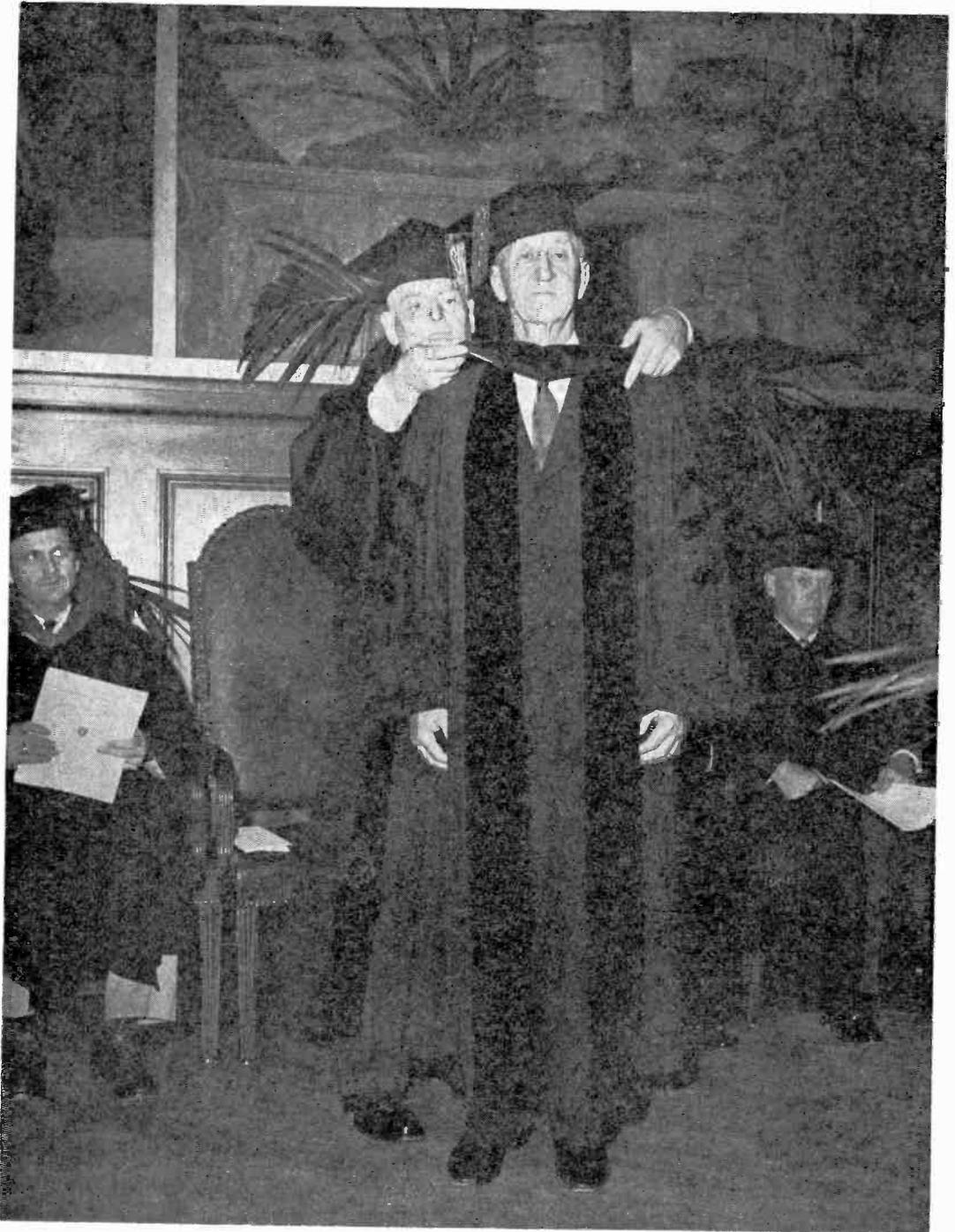
"Mr. Smith has two daughters and one son and is a member of the Congregational Church. He resides at 'MACAMOR,' near McLean, Va., and has his offices at the National Radio Institute, 16th and U Streets, N. W.

"Mr. President, it gives me great pleasure to present this outstanding civic leader, teacher, school president, YMCA leader and Christian gentleman to receive the Honorary degree of Doctor of Laws."

The President of the University then added:

"Mr. Smith, by the authority vested in me by the Board of Trustees it is a distinct pleasure for me to confer upon you the degree of DOCTOR OF LAWS, HONORIS CAUSA, with all the benefits accruing thereto and to admit you into the Society of Scholars.

"Southeastern is honored to have you accept this degree at my hands. Please accept it as a symbol of our appreciation for the inspiration and help you have given to those around you. With this Degree goes our best wishes for your continued success in your efforts to serve your God and your fellowmen."



A Tour of Television Station CHCH-TV

With NRI Graduate J. T. Stacey,
Assistant Chief Engineer

In April, 1950, an inspector-aligner of domestic receivers in Montreal named J. T. Stacey enrolled in NRI. Within a short time his employer, RCA Victor Co., Ltd., promoted him to radar technician. His ability and training next took him to Rediffusion Inc., as Duty Engineer and Maintenance Engineer on video terminal equipment. Then, just three and one-half years after enroll-

ing with NRI, Thomas Stacy was appointed Assistant Chief Engineer of Television Station CHCH-TV in Hamilton, Ontario.

When Graduate Stacey arrived in Hamilton, in November, 1953, CHCH-TV was still in the planning and early construction stages. The next six months were filled with hard, but satisfying work.

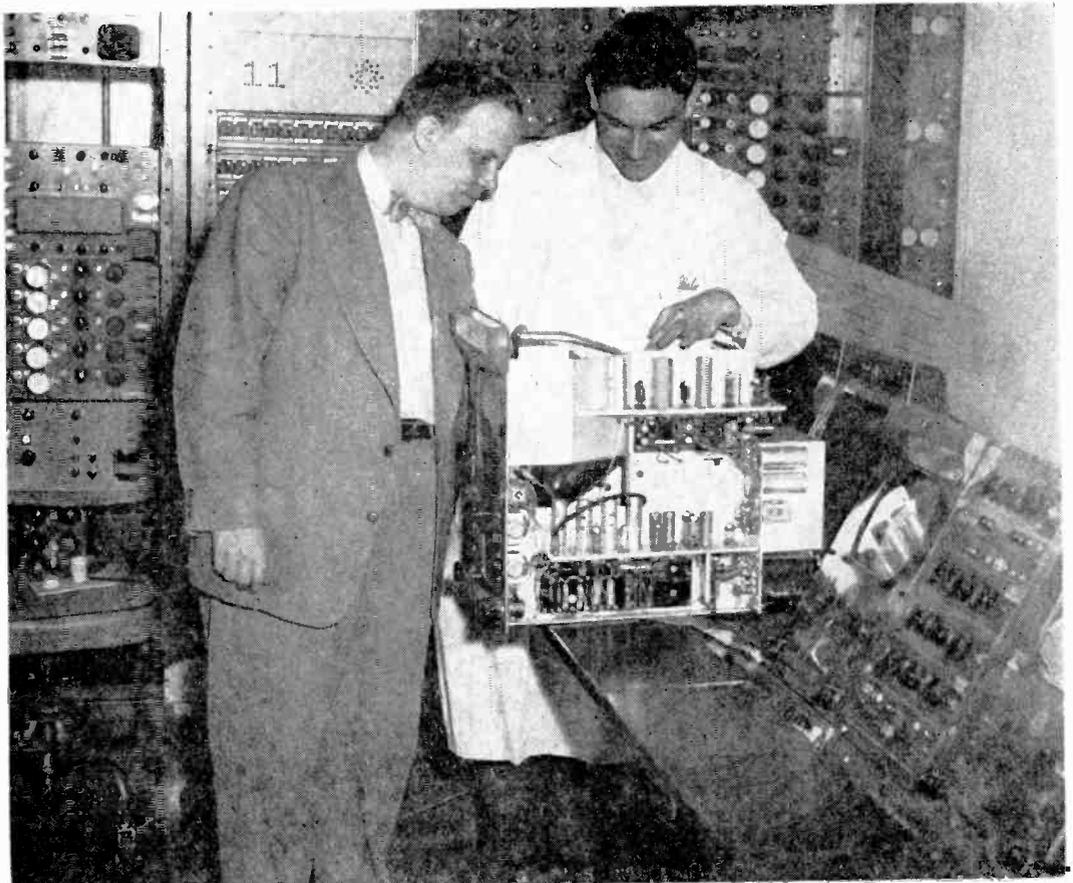


Fig. 1. Assistant Chief Engineer J. T. Stacey (left) and Technician Leslie Meszaros (right), both NRI graduates, are shown inspecting video equipment in Master Control of Television Station CHCH-TV, in Hamilton, Ont., Canada.

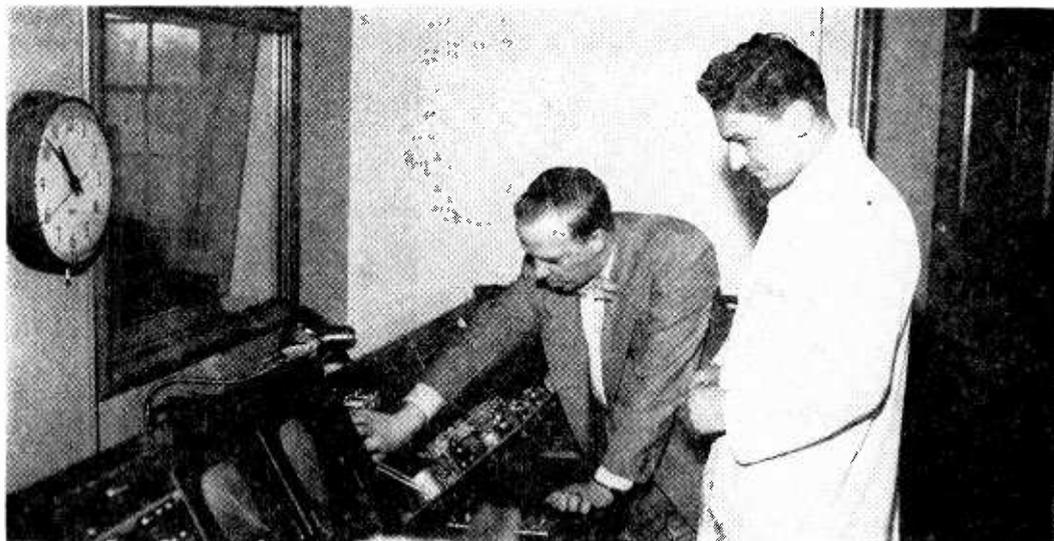


Fig. 2. Graduate Stacey (left) and Meszaros (right) looking at audio equipment in Master Control of station CHC 1-TV.

On June 7, 1954, when CHCH-TV began regularly scheduled telecasts, the engineering staff had reason to be proud. The layout design and all installation work, with the sole exception of the antenna, the staff had done themselves.

CHCH-TV operates on Channel 11, with a radiated power of 42.9 kw video and 25.75 kw audio. The studios are located in the city of Hamilton and the transmitter is five miles east of the city on a 900-foot escarpment.

There are four studios available: Studio "A" 50'x50'x18', Studio "B" 30'x15'x14', Studio "C" 13'x11'x11', and Studio "D" 200'x80'x30' with space for an audience of 4,000 people. Four RCA studio cameras are used for live pick-ups. Two Eastman Model 250 16-mm film projectors, a Grey Telejector for 2"x2" slides and a Grey Telop for 3¼"x4¼" slides and opaque material working in conjunction with two RCA Iconoscope chains provide film and slide sources.

The station is affiliated with the Canadian Broadcasting Corporation, and also receives originations from NBC, ABC and DuMont.

The engineering staff is made up of about twenty men. A second NRI Graduate, Leslie Meszaros, holds a key position on this staff as maintenance technician.

Assistant Chief Engineer Stacey has kindly arranged a guided tour for us by means of photographs of the station.

The engineering operation of the station centers in Master Control. At this point all audio and video signals are switched and routed around the station and all sources are monitored for quality and level. In Fig. 1, we see Mr. Stacey and Leslie Meszaros inspecting one of the Master Monitors. Also in view on the console are the Master Video Switcher and Monitor, Preview Switcher and Monitor, and Remote Controls Panel. Behind the men are the film control units, special effects generator and the racks holding the video patching facilities, distribution amplifiers and the amplifiers associated with the switchers.

Fig. 2 shows us the audio end of the master control console containing an RCA three-channel audio switcher, which our hosts are inspecting, and beyond that an RCA Audio Consolette.

In the projection room one film projector and the Grey Telejector feed into the same iconoscope, while the Telop and second film projector fed the remaining camera. The physical arrangement of the projectors and cameras is shown in Fig. 3. Since the Telop and Telejector are both magazine loaded, and all equipment can be controlled remotely, extreme speed and programming flexibility can be achieved even during periods of peak operation.

The main studio control room (Fig. 4) is so arranged and equipped that the production staff may preview all studio and film cameras without switching and still obtain an unimpeded view of

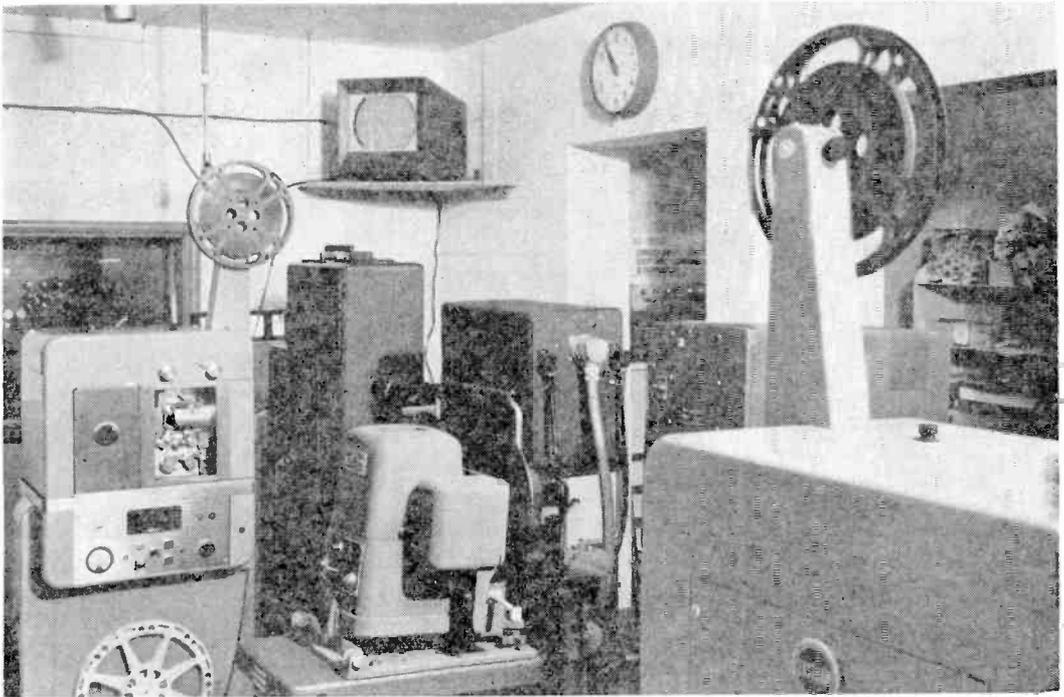


Fig. 3. Projection Room at Television Station CHCH-TV.

the studio. Along the far side of the room is the video operating position where the studio cameras are controlled.

The audio man operates in a raised booth in the rear, walled off from the rest of the main studio control. From this booth the audio man has a clear view of the studio floor and is protected from the distracting noises of the main control room.

Duplication of facilities in Master Control and Main Studio Control provides for transfer of program switching from one to the other. This duplication of switching facilities, together with flexible switching and patching, makes it possible to feed video to the transmitter line over four routes and audio over five routes.

All operating locations are tied together by multiple intercommunication circuits. The freedom from fixed signal channeling and complete coordination obtained by means of the intercoms simplify special operations and help to maintain program continuity in the event of equipment failure.

A five and one-half mile cable and microwave link connects the studio with the transmitter.

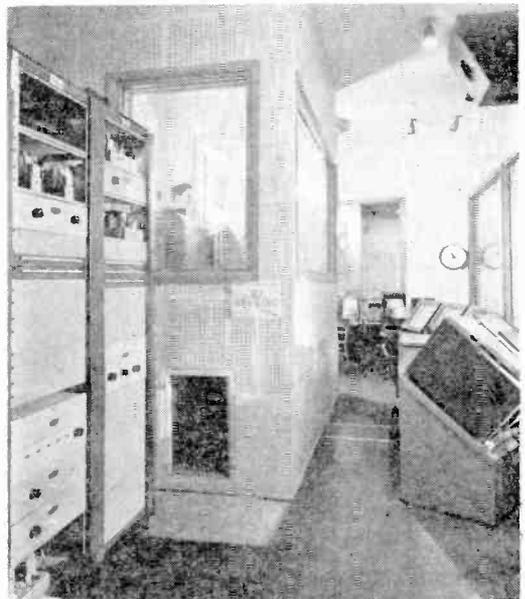


Fig. 4. CHCH-TV's Main Studio Control Room.



Fig. 5. CHCH-TV Audio and Video Transmitters and Transmitter Control.

The transmitters used at CHCH-TV are RCA Model TT10A. The three bays comprising the audio transmitter, the power control panel, and the power bay for the video transmitter may be seen in Fig 5.

The outputs of the two transmitters are fed to the diplexer where they are combined and fed to the antenna in a common transmission line. The diplexer and its connecting lines are shown in Fig. 7.

The transmitter console has audio and video switching facilities, a picture monitor and two turntables which are used to furnish recorded music during test pattern periods.

The antenna rises to a height of 540 feet above the ground. This antenna is of the type known as the "wave stack." As can be seen in Fig. 6, this antenna resembles a factory chimney. Instead of a conventional transmission line between the transmitter and antenna, the center of the stack forms a wave guide. Power is coupled into the stack by means of a probe and coupled to the radiators in a similar fashion. To comply with Government regulations, the antenna is highly directional with maximum radiation to the west of Hamilton.

Since going on the air, station CHCH-TV has re-

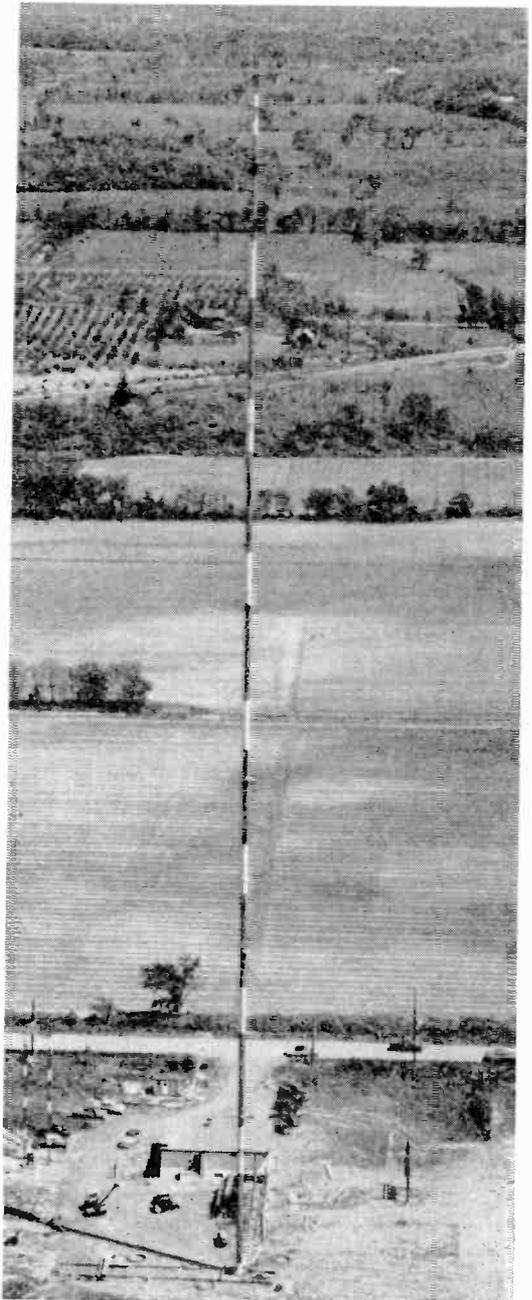


Fig. 6. CHCH-TV "Wave Stack" Antenna. Notice the resemblance to an ordinary factory smoke stack. The antenna is actually a hollow wave guide, probe fed at its base.

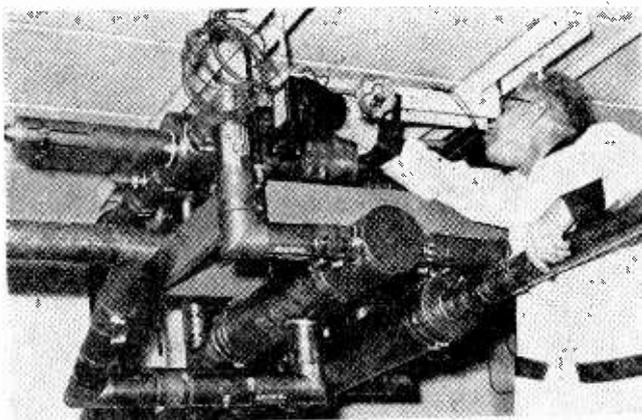


Fig. 7. "Plumbing" for the diplexer; the pipes are simply coaxial transmission lines, with appropriate impedance matching connections.

corded many notable accomplishments. Among these are the first 12-hour broadcast day in Canadian TV, and the successful programming of up to 70 live telecasts a week, including three remote originations. The training and back-

— n r i —

Our Cover Photograph

NRI Graduate Harry W. Merchant, owner of Merchant's Radio and Television Service, 5200 Wilson Blvd., Arlington, Virginia, is shown at the service bench of his well-equipped shop.

We were especially interested in what Graduate Merchant has to say in regard to his Model 56 NRI Professional TV Oscilloscope which occupies a prominent place on his service bench. We quote Mr. Merchant as follows:

"My Model 56 NRI Professional TV Oscilloscope is a great aid to me in my full-time Radio and Television Servicing business. The low price appealed to me. The performance is all I would expect from scopes costing much more."

Our congratulations go to Graduate Merchant who has built an excellent reputation for himself and his business in giving skilled and reliable Television and Radio service. As do many of our successful graduates, Mr. Merchant says that the only real form of advertising as far as he is concerned is that of the satisfied customer.

ground of the engineering staff will assure a succession of additional achievements and the steady advancement of the station as the art of telecasting develops. The staff is already looking forward to, and making the necessary plans for color telecasting.

Graduate Stacey has some sound advice for all of us. He says: "I have never really stopped studying and still devote a good amount of time to self-improvement. All in all, I am quite proud of the progress I have made since enrolling with NRI in April, 1950. At that time, I was employed as an inspector in a factory. Quite frankly, I don't think that I could get out of bed today at the time of morning I used to, punch a time clock, and start to work. And, financially, I have advanced by about \$3,000 per year since that time. NRI

opened the door and paved the way for me toward my present position. I will always be one of your staunch supporters and consider my membership in the NRI Alumni Association to be a worthwhile investment."

— n r i —

"While I was out to a poker game last night, a burglar broke into my house."

"Did he get anything?"

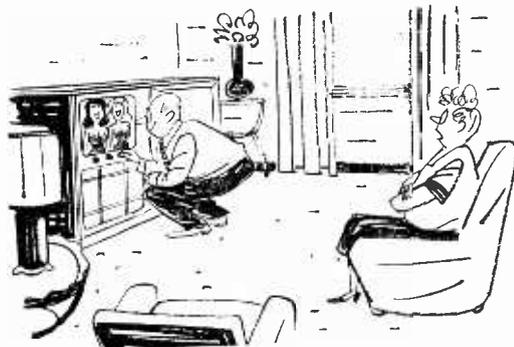
"I'll say he did! My wife thought it was me!"

— n r i —

First devil: "Ha, ha! Ho, ho!"

Satan: "Why all the mirth?"

First devil: "I just put a woman into a room with a thousand hats and no mirror."



"I notice it only needs adjusting when the girls are on."

Reprinted from *Technician Magazine*, Culdwell-Clements, Inc., 480 Lexington Ave., New York, N. Y.

Civil Service Examination for Laboratory Electronic Mechanic

G.E. Announces New Portable TV Sets

Openings for laboratory electronic mechanic positions in various Government laboratories in Washington, D. C., and vicinity are available until further notice. No written test is required. Applicants must have had appropriate experience in the assembly, operation, or repair of laboratory and experimental electronic apparatus. Appropriate education and mechanical experience may be substituted for part of the required experience. Openings exist in grades GS-3 through GS-11 with annual salaries ranging from \$2,950 to \$5,940 per year. Application is made on form 5001-ABC, which can be obtained from a post office furnishing civil service information, or from the U. S. Civil Service Commission, Washington 25, D. C. The completed applications are to be forwarded to the Executive Secretary, Board of U. S. Civil Service Examiners, National Bureau of Standards, Washington 25, D. C. (NRI cannot furnish these application forms.)

Civil Service Opportunities at U. S. Naval Ordnance Test Station, China Lake, California

The above activity is in real need of electronic mechanics and electronic technicians. Further information about these openings can be obtained by writing directly to Mr. George R. Hickman, Head, Employment Division, U. S. Naval Ordnance Test Station, China Lake, California. Applications for this work should be submitted on the regular Civil Service application Form 57 which is available at most post offices. This form can be obtained by writing to the above address. Please do not direct your inquiry to NRI.

TV Troubleshooting

(Continued from Page 6)

or horizontal instability. They must be replaced occasionally in almost all receivers. The two tubes that require the next most frequent replacement are the horizontal oscillator and the local oscillator. Therefore, remember to check these four tubes in the receiver you service because peak performance can be obtained only if all of these tubes are operating efficiently.

The picture tube in many instances is your most effective test instrument in localizing receiver defects. When you understand exactly what goes into the formation of the picture and what each circuit contributes to the final result, you will be able to analyze the picture speedily and effectively, and decide what is the best procedure to

Syracuse, N. Y.—Light-weight portable television has been introduced by the General Electric Co. as its answer to the growing demand for a second TV set in the home. Engineered for use in primary reception areas, three 32-pound portable TV sets, with suggested list prices starting at \$99.95, have been added to the G-E line.

All three portables have fourteen-inch picture tubes. Model 14-T007, the price leader of the new series at a suggested list of \$99.95, has a brown metal cabinet; 14T008 and 14T009 are two-tone ivory and gray and two-tone ivory and terra cotta, respectively, and are equipped with carrying handles. They list at slightly higher prices. Overall size of the sets is approximately 10½ inches high, 13¾ inches wide and 17 inches deep.

G. E.'s portable series is engineered around a vertical chassis, over fifty percent printed circuit and ninety percent dip soldered. These features, in addition to contributing to the compact size and light weight of the sets, reduce the possibility of faulty chassis wiring and improve reception. The chassis has twelve "long-Life" receiving tubes plus three rectifiers and black daylight fourteen-inch picture tube. The chassis is mounted vertically.

Additional features include use of the G.E. pioneered 41 mc I.F. This is considered of prime importance in a television set designed primarily for second set use because it prevents interference with and from other TV sets. Each portable is equipped with a built-in antenna, an area control switch, and will be available for both VHF and UHF reception.

The new portable is an interesting example of the development of TV in the past five years. In 1949, when TV had reached the 10-inch picture stage, a table receiver weighed in the neighborhood of 130 pounds and cost the consumer \$325. The new G.E. sets, more than 100 pounds lighter, at one third the cost, occupy shelf space only slightly larger than a tabloid newspaper and are superior in performance.

Available with the set is a cross-leg folding table, designed by the company's Components Department. As an additional accessory, an eight-ball antenna, disappearing behind the set when not in use, has been especially designed for the G.E. portable.

In addition to filling the second set requirements in the home, the small screen sets are expected to be useful in hotels, for children, in game rooms, kitchens, bedrooms and on porches or outdoor living areas.

Servicing with the NEW Model 113 NRI Professional Resistor-Condenser Tester

By B. VAN SUTPHIN
NRI Consultant



B. van Sutphin

THIS article was, in part, taken from the Instruction Book for the new Model 113 NRI Professional R-C Tester which has just been added to the line of instruments offered by the NRI Supply Division. Many students and graduates have

expressed a wish for more articles on test equipment and how to use them in radio and TV servicing work. The following article is presented to help satisfy these requests.

Some of the information given here applies only to the new Model 113 NRI Professional R-C tester, while other parts can apply to any similar instrument.

The Model RC-113 Resistance-Capacitance bridge is shown in Fig. 1. A set of insulated test leads and a pair of special banana plug binding posts are included with the instrument. These banana plug binding posts are used in measuring extremely small capacitors where lead capacity would be too large to permit accurate measurements. They are important to proper operation of the instrument when measuring capacities below about 500-mmf. The regular leads are used in measuring higher capacity and in measuring resistance.

The Model 113 is designed to operate from a 50-60 cycle, 110-120 volt power source.

The outstanding feature of the Model 113 is its extremely wide range—much wider than that available with most instruments designed for service work. You can measure all the condensers you are likely to encoun-



FIG. 1. The new Model 113 NRI Professional R-C Tester. Notice the banana plug binding posts provided for use in measuring extremely small capacities. (See page 23 for price and order information.)

ter in service work, including the high-capacity electrolytics used in battery eliminators and special power supplies, and the extremely low-capacity condensers used in modern TV receivers. Further, the wide resistance measuring range allows you to check all the resistors you are likely to encounter—from the high resistance units used in the high-voltage double circuits of some TV receivers to the low-resistance units used in some special applications.

What The Model 113 R-C Tester Will Do. The following tests can be made on condensers and resistors with the instrument.

1. Measure the capacity of mica, ceramic, paper, oil-filled and electrolytic condensers. The range is from .00001-mfd to 1500-mfd.
2. Check the leakage of mica, ceramic, paper, oil-filled and electrolytic condensers.
3. Measure the power factor percentage (P.F.%) of electrolytic condensers.
4. Measure the ohmic value of resistors. The range is from 1-ohm to 150-megohms.

How a Resistance Bridge Works

The operation of the bridge circuit is important both to help you understand the instrument and to help you use it more effectively. Also, it might be necessary for you to service an R-C bridge at some time in the future and this knowledge is sure to prove useful then.

A basic bridge circuit is shown in Fig. 2. With minor modifications, this bridge can be used to accurately measure resistance and capacitance. First, let's see how the basic resistance bridge works.

A potential, either ac or dc, is applied between points A and B. When the range setting resistor R_s and the bridge resistor R_b are adjusted so that the proportion existing between the range setting resistor R_s and resistor R_b is the same as the proportion existing between the unknown resistor R_x and resistor R_a , the bridge is balanced and zero potential exists between points C and D. Notice that under these conditions the voltage drop across the unknown resistor R_x and resistor R_a are equal. Also, the voltage drops across range resistor R_s and bridge resistor R_b are equal.

The indicator shown in Fig. 2 can be a milliammeter or a sensitive voltmeter. In most commercial bridges, a "magic eye" vacuum tube is used

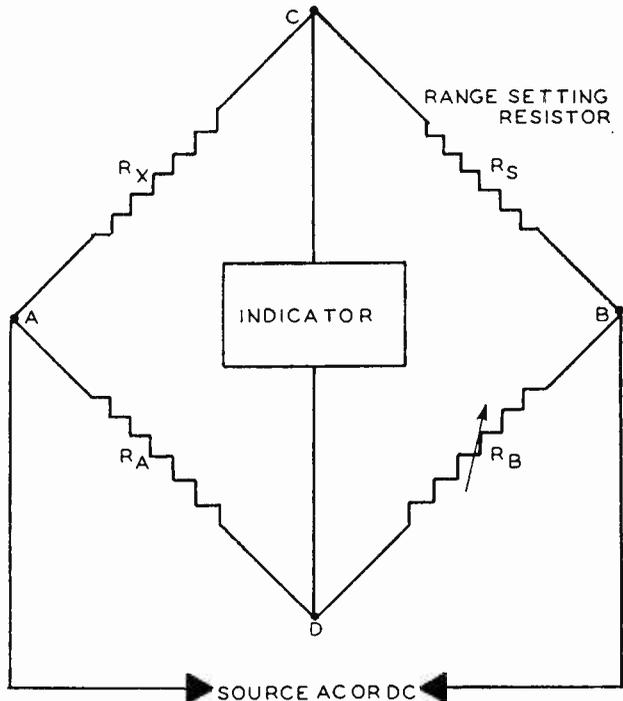


FIG. 2. Basic bridge circuit.

as a voltmeter in this circuit for both convenience and low cost. A "magic eye" tube is a very sensitive device and causes negligible circuit loading. Therefore, highly accurate results are obtained without the use of an expensive milliammeter.

When an a.c. signal is fed to the grid of a "magic-eye" tube, the grid is biased by the grid-leak method and the tube will serve as both a detector (rectifier) and an indicator. The "magic-eye" tube in the Model 113 operates this way.

By using an ac source for the bridge circuit, and substituting a capacitor of known value for resistor R_s , the basic resistance bridge can be converted to measure capacity. A milliammeter, of course, cannot be used when the source voltage applied to the bridge is ac unless a meter type rectifier is employed. A "magic eye" tube, however, is perfectly satisfactory since it is self rectifying.

Of course, numerous refinements of the basic bridge circuit are possible. For example, greater stability is obtained when one side of the indicator is grounded. Also, both resistor R_a and resistor R_b can be made variable to obtain wider range. These refinements are included in NRI's

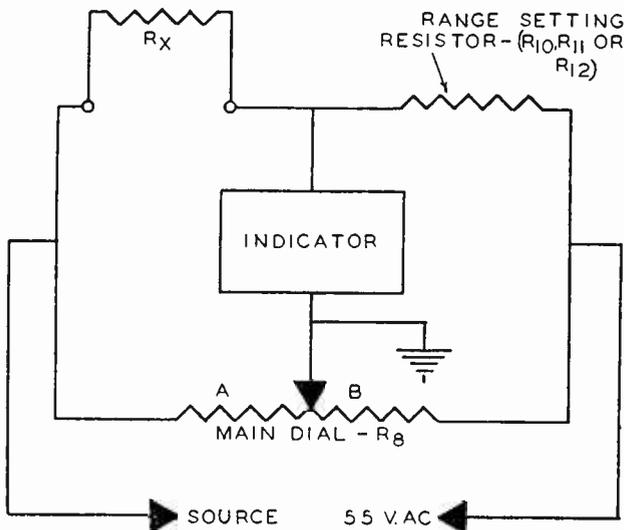


FIG. 3. Simplified circuit of Model 113 when set for resistance measurements.

new Model 113 R-C Tester.

How the Model 113 R-C Tester Works

Fig. 3 shows a simplified circuit of the Model 113 when set for resistance measurements. Notice that one side of the indicator is grounded. Also, notice that variable resistor R8 replaces both resistor Ra and resistor Rb on the original sche-

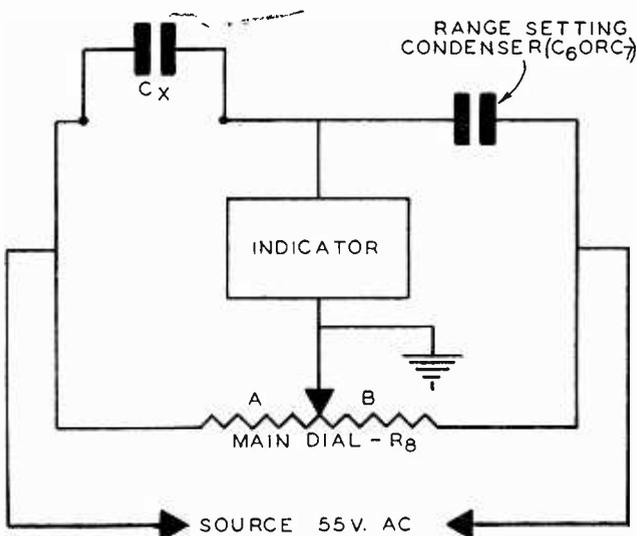


FIG. 4. Simplified schematic of Model 113 when set for capacity measurements.

matic. By varying the resistance in both these legs of the bridge simultaneously, an extremely wide range is obtained.

The range setting resistors in the instrument are R10, R11, and R12. By switching the correct resistor into the circuit, the various ranges are obtained.

When the SELECTOR switch is set to the 1.8 Meg.-150 Meg. position ("Extended" range), range setting resistor R12 is still used but an extra resistor (R9) is switched into the circuit between section B of resistor R8 and the 55-volt ac source. This increases the range in the instrument so that very high resistance values can be measured.

Fig. 4 shows a simplified schematic of the instrument when it is set for capacity measurements on the .00001-.005 mfd range or the .001-.5 mfd range. Notice that a condenser, instead of a resistor, is used in one leg of the bridge. In the instrument itself, condenser C6 or C7 is used in this application. On the two highest capacity ranges, 18-1500 mfd and 0.1-50 mfd, the circuit is changed slightly so that a resistor is switched in series between the range setting condenser and the indicator. This variable resistor is the POWER FACTOR control on the panel of the instrument. This extra control allows you to balance out the unavoidable internal resistance of an electrolytic condenser and thereby determine the power factor. The circuit is as shown in Fig. 5 when the instrument is set to the two highest capacity ranges. Both resistor R8 and the POWER FACTOR control must be adjusted to obtain maximum opening of the eye when checking electrolytic condensers.

The basic operation of the bridge is the same whether it is used for resistance measurements or capacitance measurements. When the instrument is set to the proper range, the dial is adjusted so that balance is obtained. Balance is indicated by maximum opening of the eye of the NULL INDICATOR.

The Leakage Test Circuit

Fig. 6 shows a simplified schematic of the leakage test circuit used in the Model 113. This is a special new type of circuit which is designed to give more accurate results with less chance of error. Notice that the leakage re-

sistance of the condenser under test is connected in series with either resistor R5 and R6 together or resistor R6 alone (depending upon the setting of the SELECTOR) forming a voltage divider across a variable dc voltage source. The dc voltage existing at the junction of the condenser under test and resistor R5 (or resistor R6) is fed to the grid of the NULL INDICATOR as bias. As this voltage depends upon the leakage resistance of the condenser under test as it is related to R5 and R6, and also upon the d.c. voltage being applied, the circuit will check the leakage of a condenser under the d.c. voltage selected by the operator. When the LEAKAGE TEST VOLTAGE control is set the working voltage specified by the manufacturer, the condenser is tested under actual operating conditions.

When the SELECTOR is set to the ELEC. leakage position, resistor R6 is connected in series with the leakage resistance of the condenser. The voltage at the junction is fed to the grid of the NULL INDICATOR through resistor R4 and resistor R5. If the condenser under test has considerable leakage, there is a large voltage at this junction and this bias causes the eye of the NULL INDICATOR to close. If there is only slight leakage, however, the eye will remain open.

When the SELECTOR is set to the PAPER-MICA position, the leakage resistance of the condenser under test is connected in series with the combination of resistors R5 and R6. Because the resistance of the lower leg in the voltage divider has been increased, the circuit is more sensitive. Therefore, the circuit can now be used to check condensers when even slight leakage would cause trouble in the particular application. For example, even slight leakage in a coupling condenser will cause distortion and the PAPER-MICA position of the SELECTOR must be used in checking all coupling condensers. Also, it should be used when checking ceramic and mica condensers.

The Discharge position of the SELECTOR is provided so that the operator can discharge the condenser before making further tests and thereby remove the danger of accidental shock when disconnecting a condenser from the instrument.

A complete schematic diagram of the

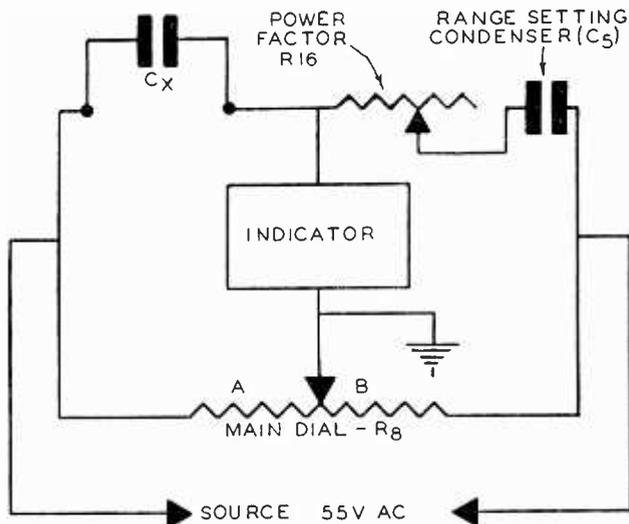


FIG. 5. Simplified schematic of Model 113 when set to the highest capacity ranges (18-1500 mfd or 0.1 mfd-50 mfd).

Model 113 is shown in Fig 7.

How to Use the Model 113 R-C Tester

Fig. 8 shows the panel of the Model 113. Refer to this photograph as you read the instructions

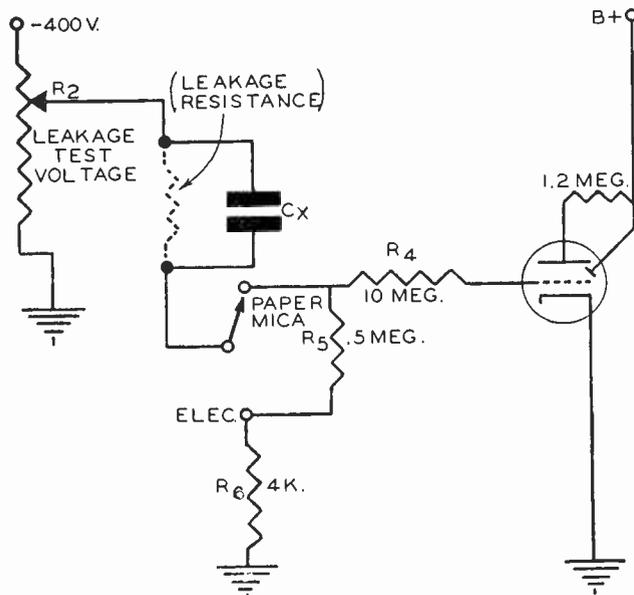


FIG. 6. Leakage test circuit in Model 113.

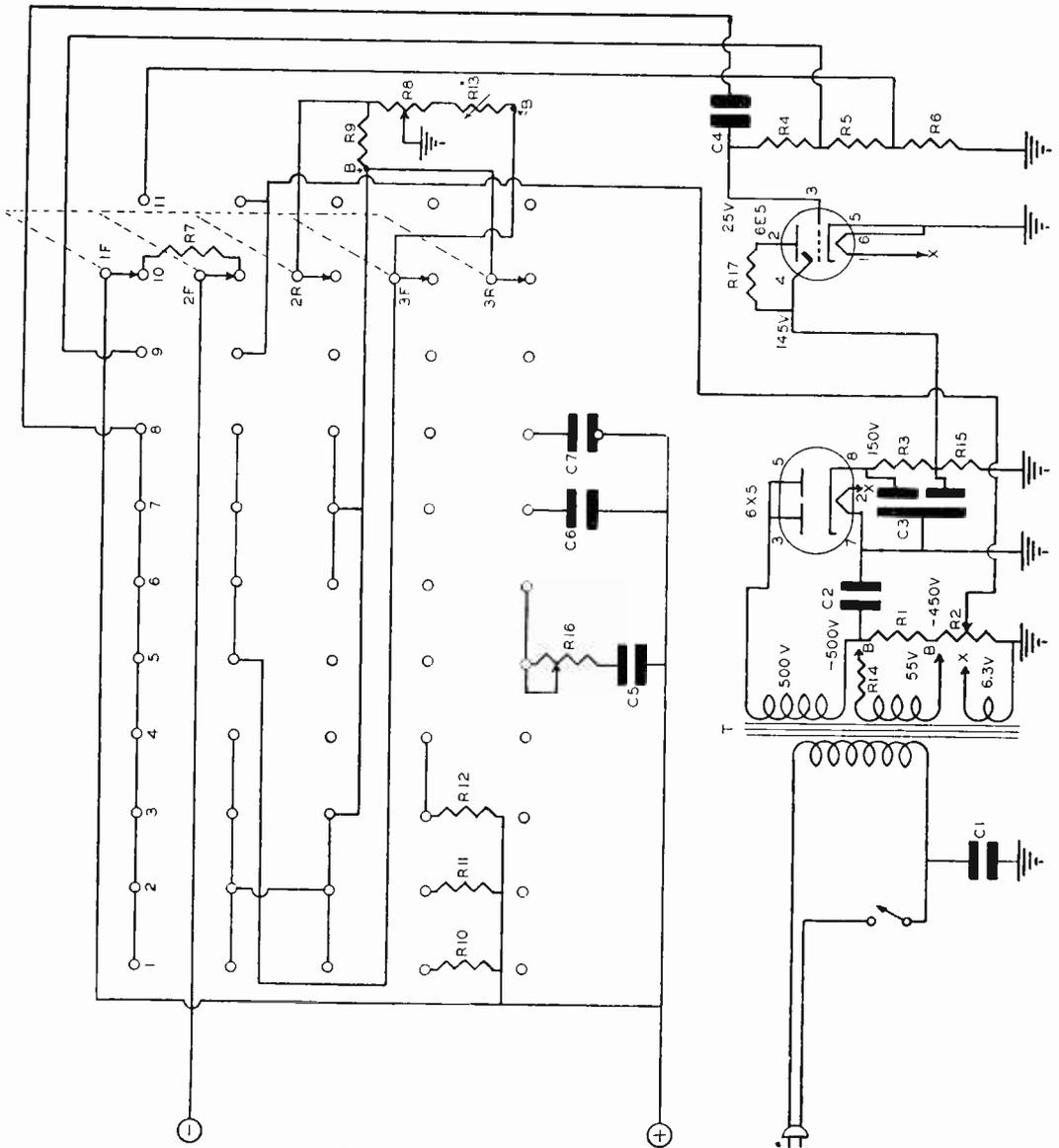


FIG. 7. Complete schematic of Model 113.

for performing the various tests. Before discussing the individual tests, however, it would be well to review the operations of the individual controls on the Model 113.

NULL INDICATOR: The opening of the eye indicates bridge balance when the Model 113 is used for resistance and capacity tests, and it indicates comparative leakage when the instrument

is used for leakage tests.

SELECTOR: This switch sets the instrument for resistance measurements, capacity measurements, or leakage tests. Also, it sets the range. Between tests, this control should be set to the DISCHARGE position. Whenever possible, this control should be set to a position which allows you to balance the bridge with the MAIN DIAL.

Parts List

- C1 —.05-mfd, 200-volt
- C2 —8-mfd, 500-volt, electrolytic
- C3 —Dual-section 4.4 mfd, 500V electrolytic
- C4 —.01-mfd, 200 volt
- C5 —2-mfd "standard" condenser (two 1-mfd units in parallel)
- C6 —.02-mfd "standard" condenser
- C7 —250-mmf "standard" condenser (set to calibrate the instrument on the .00001-.005 mfd range)
- R1 —25K-ohm, 2-watt
- R2 —250K-ohm potentiometer (LEAKAGE TEST VOLTAGE)
- R3 —1.5K-ohm, 1/2-watt
- R4 —10-megohm, 1/2-watt
- R5 —500-ohm, 1/2-watt
- R6 —4K-ohm, 1/2-watt
- R7 —100-ohm, 1/2-watt
- R8 —10K-ohm potentiometer (MAIN DIAL)
- R9 —90K-ohm
- R10—20-ohm "standard" resistor
- R11—2K-ohm "standard" resistor
- R12—200K-ohm, "standard" resistor
- R13—100-ohm flexible resistor (this part is used only when it is necessary in calibrating the instrument at the factory)
- R14—100-ohm, 5-watt
- R15—270K-ohm, 1/2-watt
- R16—1000-ohm potentiometer (POWER FACTOR)
- R17—1.2-megohm, 1/2-watt
- SW1—SPST switch (on R2)
- SW2—5-deck, 11-position switch (SELECTOR)
- T —Special power transformer

near the middle of its range.

MAIN DIAL: When the selector is set for resistance or capacity measurements, the scale reading—after the correct multiplying factor is applied—indicates the value of the condenser or resistor under test. When the SELECTOR is set to any one of the "normal" positions (marked with white letters on black background) the outer scale is used; when it is set to either of the "Extended Range" positions (marked with black letters on a white background) the inner scale is used.

POWER FACTOR: When the SELECTOR is set to the 18-1500 mfd "Extended Range" position or the .01-50 mfd "normal" position, this control is in the circuit. After the MAIN DIAL has been adjusted for balance, the POWER FACTOR control must be adjusted for maximum opening of the NULL INDICATOR eye.

LEAKAGE TEST VOLTAGE: This is a variable control that adjusts the voltage applied to a condenser during leakage tests; also, the ON-OFF switch of the instrument is on this control. To turn the instrument on, rotate the control clockwise until you hear a click. Except when making leakage tests, this control should be turned as far counter-clockwise as possible without turning the instrument off.

How to Measure the Value of Resistors

The resistance bridge in Model 113 can be used to accurately measure the value of any resistor up to 150 megohms. It cannot, however, be used to measure the resistance of iron-core choke coils or speaker fields because an ac source is used in the bridge circuit and the inductance of the coil would upset your readings. It can, however, be used to measure the resistance of air-core coils because the inductance will not be high enough to upset the readings.

To measure the value of an unknown resistor, connect the test leads to the jacks provided on the instrument panel and connect the resistor to the rubber-covered alligator clips. In most cases, it is possible to measure the value of a resistor without removing it from the equipment, but you should always disconnect one end to avoid the chance of parallel paths in the equipment upsetting your results.

Turn the instrument on and wait for the NULL INDICATOR to glow with a soft green light. If you have any idea what the value of the resistor is, set the SELECTOR to the appropriate position, and adjust the MAIN

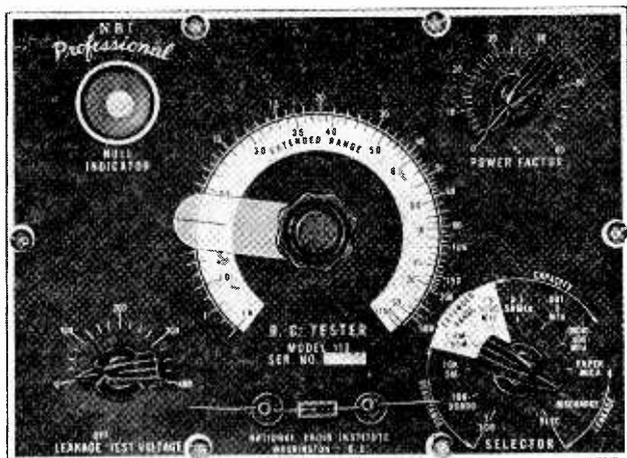


FIG. 8. The Model 113 panel showing the controls. Refer to this when reading the instructions for performing the various tests.

DIAL for balance, indicated by maximum opening of the eye.

If you have no idea what the value of the resistor is, set the SELECTOR to the lowest position (1-500 ohms) and adjust the MAIN DIAL over its range. If a null is reached, the NULL INDICATOR eye will open. Set the MAIN DIAL for maximum opening of the eye and read the resistance value from the scale.

If no null indication is obtained over the entire range of the MAIN DIAL, set the SELECTOR to the next highest position (100-50,000 ohms) and again adjust the MAIN DIAL over its range until you obtain a definite null indication. Then read the scale and apply the correct multiplying factor.

If it is impossible to obtain a null indication except when the SELECTOR is set to 1.8-150 Megohm "Extended Range" position and the MAIN DIAL is turned all the way clockwise, the resistor under test is open. If balance can be obtained only with the SELECTOR set to the 1-500 ohm and the MAIN DIAL turned all the way counter-clockwise, the resistor is shorted.

When measuring extremely high values of resistance, it is always best to use the special banana plug binding posts. Connect the leads of the resistor under test directly to these binding posts. This will avoid the problem of ac pickup in the circuit which would prevent your obtaining satisfactory results.

Capacity Measurements

Because there are some differences in the methods of measuring the capacity of condensers, this will be discussed with separate headings depending upon the type of condenser.

How to Measure the Capacity of Electrolytic Condensers. Turn the instrument on and wait for the eye to glow green. Set the SELECTOR to the "Discharge" position and be sure that the LEAKAGE TEST VOLTAGE control is turned as far as it will go counter-clockwise without turning the instrument off. Connect the condenser you wish to test to the leads. Be sure to connect the negative lead of the condenser to the black test lead and positive lead of the condenser to the red test lead. This is not too important during capacity measurements but if the condenser is connected with the proper polarity you will not have to reverse the test leads before making leakage tests.

Then set the SELECTOR switch to the 0.1-50 mfd position. Adjust the MAIN DIAL over its range and try to obtain a null indication. If no null is obtained, switch to the 18-1500 mfd "Extended" range and again vary the MAIN

DIAL over its range.

When you have obtained a null indication, adjust the POWER FACTOR control so that maximum opening of the NULL INDICATOR eye is obtained. You can then determine the condenser capacity by applying the proper multiplying factor to the MAIN DIAL reading and you can determine the condenser power factor directly from the POWER FACTOR control dial.

If it is impossible to obtain a null indication with the SELECTOR SWITCH set to either of these positions, either the condenser capacity has dropped to a very low value, or the condenser power factor is extremely high.

To check this latter possibility, set the POWER FACTOR control to "20" on the dial and again vary the MAIN DIAL over its range. If you can then obtain a null indication, adjust the POWER FACTOR control so that maximum opening of the eye is obtained. As will be explained a little later, however, the power factor of the condenser under test is probably so high that it should be discarded.

The normal power factor for an electrolytic condenser in good condition is below 10%. In general, condensers should be replaced when the power factor rises above 15%. In some cases you will find that a condenser with higher power factor will do the job satisfactorily. However, if the power factor is greater than 15%, it is well to replace the condenser to reduce the chance of future trouble.

How To Check Electrolytic Condensers For Leakage. Set the SELECTOR to the ELEC. position on the Leakage part of the scale. Be sure that you have the negative lead of the test instrument connected to the negative lead of the condenser and the positive lead of the test instrument connected to the positive lead of the condenser. This is very important. Then turn the LEAKAGE TEST VOLTAGE control clockwise to the specified working voltage for the condenser under test. The eye will probably close. It should, however, open in a minute or two if the condenser is in good condition and if it has not been idle for so long that the oxide coating in the condenser has deteriorated. If the condenser has not been used for a long time, leave it connected for two or three minutes and see whether the eye opens. If it does, the condenser is good; if it does not, the condenser has excessive leakage and must be replaced.

If the condenser under test is shorted, the eye will close as the pointer of the LEAKAGE TEST VOLTAGE control passes the zero mark. In this case, it is not necessary to make any further tests. Be sure that you observe the polarity markings when testing electrolytic condensers

as applying voltage of the wrong polarity will prevent your obtaining proper results and possibly damage the condensers you are testing.

After you have checked the condenser for leakage, it is often desirable to again check the capacity and power factor if excessive leakage does not exist because the application of voltage to an electrolytic condenser will sometimes restore the oxide coating and bring the capacity up to normal.

How To Check Ceramic, Mica, and Paper Condensers. The basic method of measuring capacity is the same as in the case of electrolytic condensers, except that the POWER FACTOR control is not used. Set the SELECTOR to the proper position, and vary the MAIN DIAL over its range until a null indication is obtained. Then read the scale and apply the correct multiplying factor to determine the condenser capacity.

When measuring the capacity of condensers it is usually not necessary to remove the condensers from the equipment. Simply disconnect one end of the condenser and then connect the test leads to the two ends of the condenser to be tested. When measuring the capacity of mica condensers, ceramic condensers, and extremely small paper condensers, however, it is best to remove the condensers from the equipment and use the banana plug binding posts to connect the condenser to the test instrument.

If the condenser is extremely small—less than .0005 mfd—it is possible to mentally convert the dial readings to micromicrofarads (mmf) for convenience. The .0001-.005 mfd range of the instrument covers a range between 10 mmf and 500 mmf. By multiplying the outer scale readings by the factor 10, you can readily convert your readings to micromicrofarads.

When the SELECTOR is set to the .00001-.005 mfd position, you will notice that a null indication is obtained when the MAIN DIAL nears "1" on the scale. This is an indication of the internal capacity of the instrument, and is normal. When measuring the value of condensers that are below 500 mmf, you should— to obtain best accuracy—subtract the internal capacity of the instrument, which is a very simple thing to do. Above 500 mmf, this error is negligible.

How To Check Ceramic, Mica, And Paper Condensers For Leakage. As mentioned previously, the leakage test circuit used in the Model 113 is extremely sensitive. Even the slightest amount of leakage in a condenser will cause the eye to close partly. For this reason, some care must be exercised in making leakage tests of non-electrolytic condensers.

Even the slightest leakage in a coupling condenser will generally upset the circuit operation. The same amount of leakage in a bypass condenser, however, might not adversely affect the circuit operation. For that reason, we recommend that you use the PAPER-MICA setting of the SELECTOR when checking all ceramic condensers, all mica condensers, and all coupling condensers but use the ELEC. setting of the SELECTOR when testing paper condensers. used in by-pass applications. For further information about this instrument, send a postcard to Supply Division, National Radio Institute, 16th and U Sts., N.W., Washington 9, D. C.

-----n r i-----

Orders can now be placed for the NEW Model 113 NRI Professional Resistor-Condenser Tester— Price \$39.95

New Model 113 R-C Testers are in stock and available for immediate delivery. The price of \$39.95 includes test leads, special binding posts, and instruction manual. Use the order blank below.

ORDER BLANK

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

I enclose \$39.95 (money order, check, or bank draft) for which send me, express collect, one Model 113 NRI Professional Resistor-Condenser Tester.

Tell me how I can buy this Resistor-Condenser Tester on monthly terms.

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Express Office

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

Page Twenty-three



N.R.I. ALUMNI NEWS

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

NOMINATIONS FOR 1956

ATENTION, all members of the NRI Alumni Association. You are urged to exercise your privilege to vote for officers to serve the NRI Alumni Association during 1956. We will vote for a President and four Vice-Presidents.

First, we must select our nominees. The two men receiving the greatest total of votes for the office of President will be declared nominees. The eight men receiving the largest number of votes for Vice-Presidents will be declared nominees. The names of the nominees will be published in the October-November issue of NR-TV News. That, of course, will be our next issue.

Our members then will be asked to choose from among the nominees, a President and four Vice-Presidents. The election will take form during the month of October. The final day for voting will be October 25. However, before we get to that, we must hold our primary to select our nominees. The final day for voting in the primary is August 25, 1955. So please get your ballot in early. At this point, it will be interesting to our members to quote from our Constitution. The following portion of our Constitution is taken from Article VI, pertaining to the election of officers. Here it is.

letter, or through the columns of the National Radio-TV News, on or before August first of each year that names of all nominees shall be filed in his office not later than August twenty-fifth following.

5. Each Member shall be entitled to submit, in writing, one nomination for each office, and the two nominees receiving the highest number of votes shall be the nominees for the office for which nominated.

6. The Executive Secretary, before placing any name on the ballot, shall communicate with each nominee, to ascertain his acceptance of the office, if elected. If such tentative acceptance is withheld, the eligible nominee having the next highest number of votes shall be the nominee for that office.

7. The Executive Secretary, on or before October first of each year, shall furnish Members a ballot listing the names of the nominees for each office.

8. No Member shall be entitled to vote if he is in arrears in the payment of dues.

9. Ballots, properly executed and valid according to the instructions plainly printed thereon, shall be returned to the Executive Secretary on or before midnight of October twenty-fifth of each year.

10. The Executive Secretary shall designate three Election Tellers from the staff of the Institute, who shall count the ballots and certify the results, together with the return of the ballots, to the Executive Secretary.

11. In the event of a tie vote for any office, the Executive Secretary shall cast the deciding ballot.

12. The nominee receiving the greater number of votes for the office for which nominated shall be declared by the Executive Secretary to be elected to that office, and notice of such election shall be forwarded in sufficient time, prior to January one, to permit such elected officer to enter upon the duties of said office on that date.

One of the finest men in our association will bring his term of office as President to a close

1. The election of the President and the Vice Presidents shall be by ballot.

2. The President shall be eligible for re-election only after expiration of at least one year following this existing term of office, and when not a candidate for President, may be a candidate for any other office. Other officers may be candidates to succeed themselves, or for any other, but not more than one, elective office in the Association.

3. The election of officers shall be held in October of each year, on the day designated by the Executive Secretary, but not later than the twenty-fifth of the said month.

4. The Executive Secretary shall advise Members by

Vice President Louis E. Grossman



Louis E. Grossman

Mr. Louis E. Grossman, one of the four national Vice Presidents of the NRI Alumni Association for 1955, is also Chairman of our New Orleans Chapter. In fact, Mr. Grossman organized the New Orleans Chapter.

He was a Corporal in World War I, and a Captain in World War II, stationed in Khoramshahr, Iran, Persian Gulf.

He completed the NRI course in Radio and Television Servicing. This was followed by enrolling for our Advanced course in Television and now Mr. Grossman is enrolled for the NRI course in Radio and Television Communications. He is an Ex Ham and is preparing himself to again get a license.

He is widely known in Louisiana in the field of banking. He is a member of the Board of Directors of the Raceland Bank and Trust Co. His hobbies are Electronics, saddle horses, gardening and the NRI Alumni Association.

on December 31. Of course we refer to Thomas Hull of New York, Tommy, as he is known by the members of our New York Chapter and all of us at headquarters, is deeply devoted to the Alumni Association. He is Chairman of our New York Chapter. He is not only a good administrator but he is an excellent teacher as well. Tommy's lectures and blackboard talks are a big feature in New York Chapter. He will continue his deep interest in our Alumni Association and particularly in New York where he is extremely popular and very likely to be re-elected chairman for 1956.

A leading candidate for President during 1956 is Mr. Louis E. Grossman of New Orleans, La. A brief sketch regarding Mr. Grossman is given above on this page. Mr. Grossman is a solid businessman. He has accomplished a great deal in his lifetime and our members are fortunate to have men of this caliber who are willing to serve as officers of our Alumni Association.

All of our present Vice Presidents, namely F. Earl Oliver of Detroit, Elmer E. Shue of Baltimore, Herbert Garvin of Los Angeles and Louis E. Grossman of New Orleans are candidates for re-election. If Mr. Grossman should be nominated for President, a good man to succeed him as Vice-President could be either Willy Fox of New York or Emil Ruocco of West New York, New Jersey. Other suggestions are Joseph Dolivka of Baltimore, Howard B. Smith of Springfield, Mass., John I. Babcock of Minneapolis, Frank Skolnik of Pittsburgh, S. J. Petrich of Milwaukee, Jules Cohen of Philadelphia. Still others are listed under "Nomination Suggestions" on pages 26 and 27. These names are sub-

mitted merely to help our members choose candidates. You may vote for any person of your choice just so he is a member of the NRI Alumni Association and can qualify for office. It will be noticed that the suggestions are merely to give names of members from various parts of the United States and Canada.

Vote for whom you please but be sure to send your ballot to headquarters before August 25, 1955.

It will be greatly appreciated if you will take part in this election by exercising your privilege to vote. A convenient ballot is on page 27.

— n r i —

Junk It!

JUNK something every day. Junk your worries, junk you fears, junk your anxieties, junk your little jealousies, envies and hatreds. Whatever interferes with your getting up and getting on in the world—JUNK IT! Every night before you go to sleep, put in the junk heap all your disappointments, all your grudges, your revengeful feelings, your malice—JUNK EVERYTHING that is hindering you from being a strong, fine character. The great trouble with most of us is that we haven't any junk heap of this sort. We pull all our mental enemies, all our handicaps, our discouragements, our losses, our misfortunes, our troubles, worries and trials along with us. That eats up more than 50 per cent of our vitality and energy, so that we have only the smaller amount left for the great achievement.—Let's Go.—

HERE AND THERE AMONG ALUMNI MEMBERS

"Operation TV" is the title of an interesting book, now on the market, which was written by NRI graduate Stephen A. Madas. It is strictly non-technical for the layman. The book outlines most of the do's, don'ts, why's and how's of operating a receiver.

— n r i —

Graduate Roy L. Rockwell, owner of Rockwell Appliances, Mt. Vernon, Ohio, is justly proud of last year's sales record—a gross of over \$72,000. Says he does a lot of Radio-TV service along with sales.

— n r i —

Mr. R. L. Sollenberger, who holds the important position of Executive Vice President of Conveyor Equipment Manufacturers wrote an article "What to Expect from Automation," which appeared in our June-July issue. It develops now that Mr. Sollenberger is an NRI graduate of Sept. 12, 1923. We find our graduates in all places—some mighty high.

— n r i —

Graduate Angelo Tomalino, of Glendive, Montana, owner of Tomalino's Radio & TV, Inc., now has two stores, one in Glendive and the other in Miles City, Montana.

— n r i —

Alvin H. Smith, of Sioux City, Iowa, is now chief Engineer of Television Station KTIV.

— n r i —

Graduate Allen Learned of Cazenovia, N. Y., was recently promoted to TV-FM Transmitter Supervisor, Station WSYR-TV, Syracuse, N. Y.

— n r i —

Graduate Charles Wilhelm has been promoted to Service Manager of the Atomic Electronics Corp. of Baltimore, Md., a large TV sales and service organization.

— n r i —

C. H. Mitchell, of Florien, La., writes that he has all the Radio and TV work he can do, plus servicing electric irons, tape recorders, and practically anything Electronic.

— n r i —

O. J. Uhlar, of Victoria, Texas, has amateur call letters W5QVQ. He is also doing two-way radio installation work with the Tennessee Gas Transmission Co.

— n r i —

Harold Sanner, of Lima, Ohio, has been doing all the bench TV repair for the Hoover Appliance Co. since he completed his NRI course.

— n r i —

Frank Zimmer of New York Chapter, with Mrs. Zimmer spent his vacation in Canada. Frank was intrigued with the direction markers in French and by the hospitality of the people.

Nomination Suggestions

T. E. Berryhill, Pomerene, Ariz.
Gordon E. DeRamus, Selma, Ala.
Don Smelley, Cottondale, Ala.
Myron Rhodes, Little Rock, Ark.
A. R. Waller, Keo, Ark.
Jos. E. Stocker, Los Angeles, Calif.
Herbert Garvin, Los Angeles, Calif.
A. W. Blake, Denver, Colo.
Chas. Bost, Leadville, Colo.
Albrecht Koerner, Stamford, Conn.
Joseph Medeiros, Hartford, Conn.
Gary Robinson, Stamford, Conn.
Eric Woodin, Naugatuck, Conn.
Wm. F. Speakman, Wilmington, Del.
Jos. Certesio, So. Wilmington, Del.
Max Yacker, Washington, D. C.
Wm. G. Spathef, Washington, D. C.
Glen G. Garrett, Bonifay, Fla.
Fred Sandfort, Winter Park, Fla.
Stephen J. Petruff, Miami, Fla.
W. P. Collins, Pensacola, Fla.
Raymond Marsengill, Atlanta, Ga.
R. R. Wallace, Ben Hill, Ga.
Joseph Bingham, Twin Falls, Idaho
H. C. Eskridge, Gannett, Idaho
Erwin Andrews, Batavia, Ill.
R. A. Holtzauer, Joliet, Ill.
Fred J. Haskell, Waukegan, Ill.
Jerry C. Miller, Skokie, Ill.
Herbert Lausar, Chicago, Ill.
John Janesick, Chicago, Ill.
Harold Bailey, Peoria, Ill.
Dick Michael, Hartford City, Ind.
Chase E. Brown, Indianapolis, Ind.
Paul Knapp, Evansville, Ind.
H. E. McCosh, Charles City, Iowa
E. C. Hirschler, Clarinda, Iowa
C. Hopkins, Hutchinson, Kans.
Wm. B. Martin, Kansas City, Kans.
K. M. King, Wichita, Kans.
George Springmeier, Covington, Ky.
R. B. Robinson, Louisville, Ky.
L. H. Ober, Alexander, La.
Louis E. Grossman, New Orleans, La.
Walter Dinsmore, Machias, Maine
Harold Davis, Auburn, Maine
Ralph E. Locke, Calais, Maine
Elmer E. Shue, Towson, Md.
Jos. Dolivka, Baltimore, Md.
Edwin Kemp, Hagerstown, Md.
G. O. Spicer, Hyattsville, Md.
Manuel Enos, Fall River, Mass.
Louis Crestin, Boston, Mass.
Howard B. Smith, Springfield, Mass.
Omer Lapointe, Salem, Mass.
John I. Babcock, Minneapolis, Minn.
Warren Schulze, St. Paul, Minn.
Arthur J. Haugen, Harmony, Minn.
Ray Williams, Minneapolis, Minn.
F. Earl Oliver, Detroit, Mich.
Chas. H. Mills, Detroit, Mich.
Harry R. Stephens, Detroit, Mich.
Robert Kinney, Detroit, Mich.

Walter Jenkins, Biloxi, Miss.
 Robert Harrison, West Point, Miss.
 C. S. Burkhart, Kansas City, Mo.
 A. Campbell, St. Louis, Mo.
 C. W. Wichmann, Inverness, Mont.
 Earl Russell, Great Falls, Mont.
 V. S. Capes, Fairmont, Nebr.
 Albert C. Christensen, Sidney, Nebr.
 C. D. Parker, Lovelock, Nev.
 L. R. Carey, Elko, Nev.
 Arthur Cornellier, Dover, N. H.
 Geo. Stylianos, Nashua, N. H.
 J. A. Stegmaier, Arlington, N. J.
 Delbert Delaney, Weehawken, N. J.
 Claude W. Longstreet, Westfield, N. J.
 C. Evan Yager, Albuquerque, N. Mex.
 Solomon L. Ortiz, Raton, N. Mex.
 Willy Fox, New York, N. Y.
 Emil Ruocco, W. New York, N. J.
 Thomas Hull, New York, N. Y.
 Phil Spampinato, New York, N. Y.
 Robert Lawson, Poughkeepsie, N. Y.
 James Outlaw, Greensboro, N. C.
 Irvin Gardner, Saratoga, N. C.
 Max J. Silvers, Raleigh, N. C.
 Arvid Bye, Spring Brook, N. Dak.
 Wilbur Carnes, Columbus, Ohio
 H. F. Leeper, Canton, Ohio
 Chas. H. Shipman, E. Cleveland, Ohio
 Byron Kiser, Fremont, Ohio
 L. O. Marcear, Tulsa, Okla.
 Emil Domas, Ritter, Oreg.
 Folia T. Hall, Portland, Oreg
 Jules Cohen, Philadelphia, Pa.
 Frank Skolnik, Pittsburgh, Pa.
 Elmer E. Hartzell, Allentown, Pa.
 Chas. J. Fehn, Philadelphia, Pa.
 Frank Mendes, Providence, R. I.
 James F. Barton, Greer, S. C.
 Edw. K. Lukkes, Springfield, S. Dak.
 John Wenzel, Gettysburg, S. Dak.
 Newell M. Comer, Tullahoma, Tenn.
 Matthew Duckett, Memphis, Tenn.
 Oscar C. Hill, Houston, Texas
 Dan Droemer, Ft. Ringgold, Texas
 N. G. Porter, Cedar City, Utah
 M. S. Galloway, Portsmouth, Va.
 Frank Chory, Norfolk, Va.
 Floyd Goode, Richmond, Va.
 R. C. Bryant, Alburg, Vt.
 C. R. Thompson, Vancouver, Wash.
 Alfred Stanley, Spokane, Wash.
 C. Blomberg, Aberdeen, Wash.
 Edgar Maynard, Red Jacket, W. Va.
 S. J. Petrich, Milwaukee, Wisc.
 Harold Brown, Laramie, Wyo.
 Charles A. Smith, Cheyenne, Wyo.
 M. Martin, New Westminster, B. C., Canada
 E. D. Smith, Winnipeg, Man., Canada
 H. V. Baxter, St. John, N. B., Canada
 W. F. Arseneault, Dalhousie, N. B., Canada
 Donald Swan, Springhill, N. S., Canada
 C. McMaster, Amherstberg, Ont., Canada
 G. Favreau, Montreal, P. Q., Canada
 Thos. Croke, Saskatoon, Sask., Canada

Nomination Ballot

L. L. MENNE, *Executive Secretary*
 NRI Alumni Association,
 16th and You Sts., N.W.,
 Washington 9, D. C.

I am submitting this Nomination Ballot for my choice of candidates for the coming election. The men below are those whom I would like to see elected officers for the year 1956.

(Polls close August 25, 1955)

MY CHOICE FOR PRESIDENT IS

.....
 City State

MY CHOICE FOR FOUR VICE-PRESIDENTS IS

1.
 City State

2.
 City State

3.
 City State

4.
 City State

Your Signature

Address

City State

Student Number

Chapter Chatter

St. Paul-Minneapolis Chapter celebrated its first anniversary. J. B. Straughn and L. L. Menne from Headquarters were visitors. Secretary John I. Babcock expressed the sentiment of the members when he said "We are proud of the fact that we have, in one year, progressed from an idea into a well-founded organization based upon fraternal spirit and unity. Our members and officers are anxious to share with each other the experiences and knowledge each possesses.

John I. Babcock, 3157 32nd Avenue, So., Minneapolis 6, Minn. The Chairman is John Berka, 2833 42nd Avenue, So., Minneapolis, Minn.

Hagerstown, Maryland Chapter members went on a group tour of the Potomac-Edison Company, their local power company, to inspect the microwave installation at Marlowe, West Virginia. This firm uses this system for inter-communication between its various sub-stations to eliminate dependence upon wire communication. It operates on a fixed frequency slightly less than 1000-mc.



Warren Schulze, past chairman, John Berka, chairman, J. B. Straughn and L. L. Menne, visitors, John Babcock, secretary and Walter Berbee, treasurer, at first anniversary meeting of our St. Paul-Minneapolis chapter.

We are proud to have such a parent organization as the National Radio Institute behind us. We have studied hard to graduate and these sacrifices have taught us also to share our knowledge with our fellow graduates."

At a recent meeting, our past Chairman, Warren Schulze, manufacturers' representative, spoke on various Radio-TV products which are handled by his concern. Mr. Schulze also donated a soldering pencil as a door prize, won by Conrad Frank, and a picture tube test adapter which was won by Ray Thompson of Amery, Wisc., a distance of about 65 miles from our Chapter Headquarters. Mr. Thompson is a regular member.

Throughout these pages are reproductions of photographs taken at the first anniversary celebration of our Chapter. Our meetings are held on the second Thursday of each month at the Midway YWCA in St. Paul. The Secretary is

Page Twenty-eight



Walt Berbee, J. B. Straughn, John Babcock and two unidentified members at St. Paul-Minneapolis chapter meeting huddle in a relaxed mood.



The above two groups are members of St. Paul-Minneapolis chapter at the banquet table.

The chapter is gaining strength each month. Students and graduates in this area are invited to attend meetings. The Chairman is Edward M. Kemp, 618 Sunset Avenue, Hagerstown, Maryland. The Secretary is Leonard B. Thomas, 300 Bryan Place, Hagerstown.

Springfield, Mass. Chapter members voted to hold meetings during the summer, once a month, rather than suspend them entirely. However, the two meetings a month will be resumed beginning in October. Coffee and doughnuts are served after each meeting. L. Lyman Brown conducts the interesting Question and Answer period.

Chairman Howard B. Smith arranged for several educational films, a cartoon and a scenic film as well, which were shown at a recent meeting. They were well received by the members.

The address of Chairman Howard B. Smith is 53 Bangor Street. The address of Secretary A. L.

Brosseau is 56 Gardner Street, both in Springfield.

Chicago Chapter members report they are knee-deep in work on TV rebuilding and servicing. Members are invited to bring in receivers that offer problems for the members to solve.

The Chairman has even arranged for help to carry the receivers to the meeting room. Walter Nicely has volunteered his services as instructor and the Chicago members have a real treat in store for them.

Chairman Charles C. Mead can be reached at 666 Lake Shore Drive, Room 228. His telephone number is Superior 7-4100.

Meetings are held on the second and fourth Wednesday of each month on the thirty-third floor, Tower Space, in the American Furniture Mart Building, 666 Lake Shore Drive. Entrance through the West door.

Pittsburgh Chapter reports an attendance of about forty at each meeting. Some twenty-five members have never missed a meeting since the chapter was organized. The chapter now has a membership of about sixty. The officers are very anxious to have all members attend meetings regularly so as to bring up the average attendance.

Meetings were held right through the summer months. The members voted to continue without interruption. The records show that attendance did not drop off appreciably during last summer which speaks well for the type of meetings that are being arranged. A picnic is being planned. This is an annual event.

At a recent meeting we had a 16-inch Olympic TV to trouble-shoot and repair. This was followed by an open discussion of repair jobs that were "stumpers." The chapter is purchasing testing equipment. The members were canvassed as to the type of testing instruments they feel the chapter should buy and these will be purchased in order of preferred choice by the members.

Howard Tate, our Treasurer, gave an interesting talk on DX'ing. William Elter, Vice Chairman, gave a talk on Service Tips. Tom Schnader, a member of our Executive Committee, spoke on Trouble-shooting Receivers, and Bert Bregenzer, our honorary member, spoke on the Trends of the Industry. Automation was also discussed.



Mr. George J. Methlie, District Plant Wire Chief, assisted by Mr. Roy Dewees, Chief Switchman at one of the exchanges of the Bell Telephone Co., giving a talk on the transistor before Phila-Camden chapter.

Meetings are held on the first Thursday of each month at 134 Market Place in Pittsburgh. Students and graduates who have never attended a meeting of Pittsburgh Chapter and who live in this area will find this a delightful place to spend an evening. The Chairman is Frank P. Skolnik, 932 Spring Garden Avenue. The Secretary is William L. Roberts, 2521 Wenzell Avenue, both of Pittsburgh.

Philadelphia-Camden Chapter is going great as always. Photographs of recent events are shown in this issue.

Mr. George J. Methlie, District Plant Wire Chief, and Mr. Roy Dewees, Chief Switchman at one of the Exchanges, gave us a very interesting talk and demonstration on the Transistor. In fact, Mr. Methlie, gave us a very good talk on the Bell Telephone with interesting statistics and a preview into the vast program the telephone company has laid out to serve the public. He also gave information on the way coaxial cable came



Members of Phila-Camden chapter at Henry Whelan's establishment, 4745 Penn St., just before movies were shown. Mr. Whelan did a fine job of entertaining our members.

into existence. This was a fine talk.

The chapter held one of its periodic socials at which all business is dispensed with. The fellows simply have a good time with plenty to drink and eat.

One of our new members, Richard J. O'Donnell, is with the Philadelphia Police Department as Radio Dispatcher. He has promised to make arrangements for the chapter members to tour the Radio Department at the City Hall to see how the

Police Department handles its work and how calls go through. This should be an interesting tour. Another new member is Carlton A. Ward of Upper Darby, Pennsylvania.

Secretary Jules Cohen may be reached at 7124 Souder Street in Philadelphia, Penna. The chapter meets on the second and fourth Monday of each month at the Knights of Columbus Hall, Tulip and Tyson Streets in Philadelphia.

New Orleans Chapter members continue to follow the program laid out by the Chairman, which is a course in TV Servicing. This is a planned study and is giving a great deal of information to those attending meetings regularly.

Meetings are held in the recreation room in the home of Chairman Louis E. Grossman, 2229 Napoleon Avenue. Those NRI men in the New Orleans area who would like to attend meetings are invited to get in touch with Mr. Grossman or Secretary Anthony H. Buckley, 305 Serpas Drive, Arabi, La.

Baltimore Chapter regrets to report the death of Charter Member John B. Gough who seldom missed a meeting although eighty years of age. He was a fine gentlemen and is mourned by his many friends in the chapter.

The members all recognize the fact that substantial progress is constantly being made in the field of Industrial Electronics and that no Radio-TV serviceman can consider himself completely informed without keeping abreast of new changes as they occur. The opportunity to hear speakers at chapter meetings is a privilege much appreciated by the members.



Henry Whelan, NRI graduate, prominent TV service shop owner, member of Phila-Camden chapter, here shown receiving a message from his automatic recording secretary.

Mr. H. J. Rathbun gave a comprehensive talk on FM receivers. Another feature of our chapter activities is what is called "Swap Talk." The members gather in groups and in an informal exchange of information post members on interesting experiments or situations and the results of tests that brought about the desired effect.

As this issue goes to press, a dinner party is being planned. Meetings are held on the second Tuesday of each month at 100 North Paca Street in Baltimore. The Chairman is Joseph B. Dolivka, 717 No. Montford Avenue.

New York Chapter members, as is customary, suspend meetings during July and August. Highlights of chapter activities reported by the secretary are as follows.

David Spitzer spoke on a picture tube checker. At other meetings, Mr. Spitzer spoke on TV Trouble Shooting and gave demonstrations.

Onte Crowe spoke on a Sweep Generator. Chairman Thomas Hull spoke on Radio Alignment. Alex Remer gave a TV tube demonstration, Phil Spampinato, Radio service notes, Albert Rose, TV experiences, Sam Antman, Record Players, Alex Remer, TV Tube Rejuvenation and again Phil Spampinato, Ohms Law demonstration. There were also interesting talks by Frank Zimmer, Cres Gomez, Willy Fox and other members of the chapter.

Meetings will be resumed in September on the first and third Thursday and will continue on those dates each month. Meeting place is St. Marks Community Center, 12 St. Marks Place, Between 2nd and 3rd Avenues in New York City. The Chairman is Thomas Hull, 119-18 223rd St.

Cambria Heights, New York and the Secretary is E. E. Paul, 6 Gateway, Bethpage, New York.

Detroit Chapter brought a very successful season to a close with the customary stag party which is held each year at the Chry-Moto Club. in Windsor, Ontario, Canada. Social affairs are a delightful change of pace and are usually well attended. Another is being planned for October.

For one of our meetings the chapter members met at the Davis Tube Company in Highland Park, Michigan, where picture tubes are re-processed. We are indebted to Mr. Al Schuman who took our chapter members through the factory and demonstrated how picture tubes are rebuilt. Mr. Schuman went into great detail and gave an excellent demonstration of how tubes are dis-assembled, etc.

At another meeting Milton Oliver gave a demonstration on the use of an Oscilloscope. Unfortunately a picture taken at this meeting did not develop sufficiently to be reproduced. The program committee has already prepared interesting meetings for the Fall Season. The Chairman is Stanley Szafran, 2660 Holmes, Hamtramck 12. Michigan. The Secretary is Jack Shupak, 4075 Tuxedo, Detroit and the Assistant Recording Secretary is Ellsworth Umbreit, 12523 Racine Avenue, Detroit, whose telephone number is VEnice 9-9718.

We are all pleased to have our former Secretary, Mr. Ken Kacel back on the day shift which enables him to attend our meetings. He was immediately appointed a member of the Program Committee.

We had a demonstration on Transistors at one meeting, and at another we had trouble shooting on "dogs" which some of our members brought in. Of course we always have our Open Forum which is a regular feature.

One of our members, Mr. William R. Albury, donated a TV set to use as we see fit for demonstrations, trouble shooting, TV circuitry demonstrations, etc. Mr. Earl Oliver donated a small generator which was promptly auctioned off at our last meeting.

Milwaukee Chapter is going along very nicely with regular meetings at the Radio and TV Store and Shop, owned and operated by Mr. S. J. Petrich, 5901 W. Vleit Street. Mr. Petrich was our first chairman.

Chairman Philip J. Rinke may be reached at Route #3, Box 356, Pewaukee, Wisconsin. Students and graduates in the Milwaukee area are cordially invited to attend meetings. They will be placed on the mailing list to receive notices if they will communicate with Chairman Rinke.

NATIONAL RADIO-TV NEWS

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