NATIONAL RADIO NEWS

IN THIS ISSUE

How to Service Automatic Record Changers

The NRI Line of Radio Test Instruments

Alumni Association News

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COURTESY IS A SIGN OF STRENGTH

Courtesy is the oil which takes the friction out of your daily life. Friction means wear and tear. Friction creates heat and retards forward motion. You want to get where you are going with the least resistance.

Make full use at every opportunity of the magic oil of courtesy. A quiet word in the right place can accomplish more than a thousand impassioned ones. A simple, thoughtful deed of kindness will get you further than weeks of arduous striving.

Courtesy is a sign of strength. Big men are courteous. It is only underlings, irresponsible employees, and "small timers" who are habitually rude or thoughtless.

Practice courtesy in all your contacts, business as well as social. Be courteous to those with whom it may make little difference so that you will establish courtesy as one of your life habits. You will find that it pays even in trivial things. Just as you despise discourtesy in others and respond to courteous treatment so does every person who comes in contact with you react to you. The real man is as courteous to the newsboy as to the bank president. Courtesy will warm hearts, melt opposition, and allow you to transform resistance into forward motion.

J. E. SMITH, *President.*

Willard R. Moody

How to Service Automatic Record Changers

PART ONE

By Willard R. Moody,

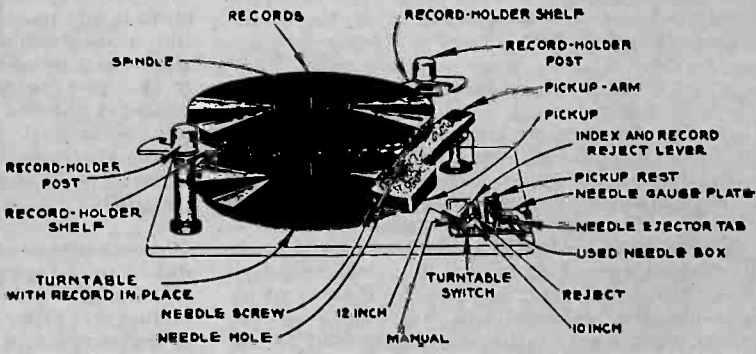
NRI Consultant

SERVICING an automatic record changer calls for a certain amount of mechanical skill on the part of the serviceman, coupled with patience. The job of servicing the equipment may be somewhat tedious and exasperating in some cases, while in others the work will be simple and relatively easy.

The purpose of this article is not to cover the servicing of every automatic record changer ever made, but to give some general hints and information on techniques that may be applied in servicing, and to illustrate how the work may be done with reference to a few specific modern automatic record changers.

The usual type of automatic record changer encountered by the average radio serviceman is one of the type which has the records arranged in a stack like a number of pancakes, one above the other. The first record to be played is on the turntable and the others are suspended above it.

The operation is simple and practically everyone having an acquaintance with radio has seen, at one time or other, an automatic record changer in operation. The motor is switched on, the turntable revolves and the needle of the tone arm is put in the first groove near the edge of the record. This begins the cycle of operation. Now the record is played and observing the tone arm we see that the needle gradually gets closer and closer to the center of the record. As it does this, the mechanism beneath the turntable is operating silently and getting ready to swing into operation at the proper moment. At last the tone arm needle has completed the last groove in the record and it now swings into an eccentric groove on the record. (This groove, often called a "run-out" groove, between the end of the recording grooves and the record's label, is placed on modern records to aid in automatic record changer operation.) This action trips a mechanical mechanism which swings the tone arm back out from the center of the record to a point beyond its edge. Now the next record is dropped down into place, the needle of the tone arm swings into the first groove and the cycle repeats itself. This continues until the



s is a typical, modern automatic ord changer, (RCA RP-139B). records to be played are ced on the record knives which ve as a shelf. One at a time, the proper order, the records dropped down to the turnle. The bottom record is sliced the pile while the tone arm is ung out of position and, after ing dropped into playing posin, the record is ready to receive tone arm needle which starts the outer groove near the record edge.

full stack of records is played. In one form of automatic record changer the last record is played continuously until the equipment is turned off manually. In another type, the completion of the last record in the stack results in throwing a switch which automatically turns off the power to the phonograph motor and rotation of the turntable ceases.

The method of dropping the records varies according to the design of the changer. In one type an off-set or bent spindle is used and an ejector or slip type mechanism allows one record to slip down and into playing position while the others are held back until playing time. In another (RCA), record separator knives which swing out and then back in, slicing a record from the stack, are used. Both types will be shown in this article.

Servicing Requirements

The first essential in servicing almost any kind of equipment, whether it's electrical or mechanical, is to secure a basic knowledge of its functioning. Knowing how the apparatus normally functions, it is easy to reason out causes of incorrect operation. Here, as in ordinary servicing of a radio, we apply the fundamental technique of effect to cause reasoning based on a knowledge of the equipment and observation of its operation.

In practice, this resolves itself into studying the service notes on a particular record changer and observing the cycle of operation before attempting repairs or adjustments, except perhaps in the case of breakage where parts are obviously damaged and must be replaced. A large collection of such service notes has been gathered together within the covers of a single volume entitled "Servicing Automatic Record Changers." This book is published by John F. Rider, Inc., 404 Fourth Avenue, New York 16, N. Y., and may be obtained from the publisher directly or through a regular radio distributor. The book is recommended to those who are doing or expect to do very much automatic record changer service work.

However, NRI students who require information on a specific record changer may write in to the Institute to obtain photostats, at cost, of the original technical data.

Basic Facts

All record changers are not alike by any means, but basic mechanical similarities do exist, not necessarily in the exact way in which a certain motion is attained but rather in the motion which is needed. For example, the manipulation of the tone arm must be the same in all cases because all modern record changers play the standard 10 or 12 inch diameter records. As the record dimensions are standardized, the needle of the pickup must start at the same point and end at a definite point irrespective of SLIGHT differences in mechanical design of various changers.

In completing this cycle, many motions are involved and while it is true that various means may be employed to secure the desired movements and actions, the basic fact remains that these actions must be accomplished.

One of the reasons servicemen have experienced complications in servicing record changers is that they try to observe too many actions at the same time. It is necessary to secure a definite breakdown of motions to avoid wasting time.

Due to its basic, functional importance, the tone arm may be selected as a key element for observation. When the pickup needle *starts* moving across the record, or is in the first record groove at the start of a record, most of the parts of the record changer mechanism are not moving. This setting of the changer is the best starting point for observation of the cycle.

Because the operation of automatic record changers involves a definite sequence of movement of the different parts, observation of the motion of the parts must be along definite lines. First, we find it necessary to observe parts which are moving as the result of the existing motion of definite elements. Secondly, observe the motion of those parts which are *getting set* to perform a certain function later. For example, when a record is being played there is no driving force actuating the travel of the tone arm other than the pickup needle tracking in the record groove. As the record rotates, the needle follows the groove and the tone arm swings with it. At the end of the needle travel, reaching the last groove of the record requires that the next operation be a lifting of the tone arm from the record. Some motion set off by the final position of the tone arm at the end of record playing must go into action.

As a result, we must picture a motion associated with the actual movement of the tone arm, in its swing across the record, which can gradually be accomplished so that a tripping action at the end of the record is obtained. In one type of record changer, the motion involved is the gradual shift in the position of a lever shaped something like a shepherd's crook. This lever is coupled to the tone arm swivel and as the tone arm swings it changes the position of the lever. When the record is finished, the lever is in a position to permit the hooked end to trip the mechanism. This raises the tone arm and carries it back to the starting point of a record to repeat the cycle automatically.

In another type of record changer (RCA), a lever linked to the tone arm swivel trips a pawl which is coupled to two mechanisms. One is a cable attachment which raises the tone arm and the other is a grooved arm arrangement which swings the

one arm back to the beginning of a record.

The end of a record means that soon afterwards a new record will be slipped into place. Various drop-down and ejector methods are used commercially and we'll examine typical changer mechanisms.

The important points of operation may be summarized:

1. Operation of tripping mechanism at the end of playing a record.
2. Method of carrying tone arm back to starting point.
3. Lowering of tone arm and return to starting point of record.
4. Operation of reject button mechanism.
5. Operation of record dropping mechanism (record shelves).
6. Operation of mechanism which determines operation for 12 inch records.

The Zenith S-11468

In the early part of this article, an effort is made to get across certain general, basic ideas useful in servicing. This is to be succeeded by a discussion of the basic functioning of a typical automatic record changer of modern design. This instrument is the Zenith S-11468 Automatic Record Changer.

A top view of the record changer is shown in Fig. 1. The operation, briefly, is as follows: The Record Changer will automatically play up to twelve 10 inch or ten 12 inch records at one loading. The Record Stack rests on the Spindle and the Record Shelf. The Selector Sprocket (shown in Fig. 2) drives the Ejector Plate (Record Ejector Cam shown in Fig. 1) which pushes the records off the Shelf and Spindle allowing them to drop on the Turntable. To load for automatic operation, set the Record Size Selector Knob to 10 or 12, raise the Pressure Bar (shown in Fig. 1). Press down lightly and turn the Spindle counter-clockwise to the load position; place the stack of records on the Spindle; lower the Pressure Bar until it rests on the Record Stack. Set the AUTO-MAN-OFF switch to AUTO and press the Record Change button. The Changer will play the entire selection of records and will repeat the last record until it is turned off.

For manual operation set the AUTO-MAN-OFF switch to MAN and play the records singly as on a non-automatic record player.

Cycle of Operation. Fig. 2 shows a bottom view of the changer. The motor drives an Idler Wheel whose rim drives the Turntable and the lower section of the clutch mechanism. *The spindle is fixed and does not turn with the turntable.* When the Record Change button on the receiver panel is pressed, an electric circuit is completed through the solenoid (the current being supplied by a winding on the motor) causing the solenoid armature to trip. (The solenoid circuit will be shown in Fig. 6.) This action engages the upper section of the clutch with the rotating lower section. (After the clutch is tripped a cut-out switch in the solenoid circuit is opened, breaking the current flow through it and eliminating chatter.) When the clutch is engaged, the Turntable turns the Drive Sprocket and the chain. The chain turns the Timing Sprocket which, due to its construction, pushes the Lift Pin up and raises the tone-arm off the record. The locating Bushing Pin on the Timing Sprocket then engages the Tone Arm Control Lever which swings the Tone Arm clear off the record. (The action of the Locating Pin and Bushing against the Tone Arm Control Lever governs the lateral swing of the Tone Arm.) For 12 inch records the small diameter Pin rides against the Tone Arm Control Lever and the Bushing drops to the lower end of the pin out of contact with the Tone Arm Control Lever. However, on 10 inch records the landing position of

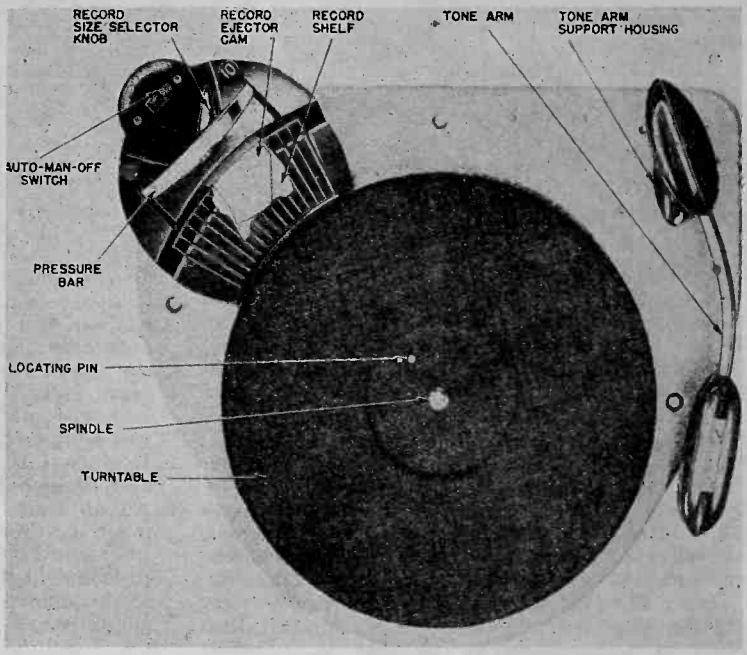


Fig. 1. Top view of Zenith Model S-11468 Record Changer.

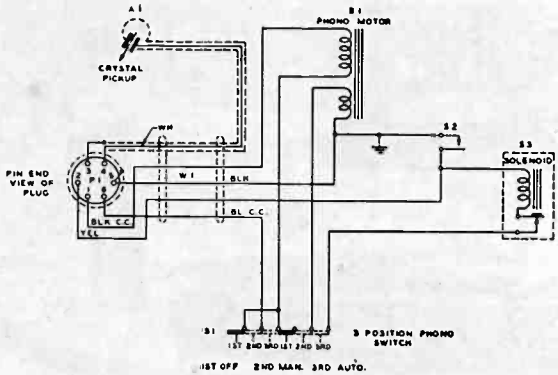


Fig. 6. Electrical Circuit for Zenith S-11468.

the individual cases may be observed.

It may be impossible to find an adjustment that will always trip the mechanism and never cut off with all type records, and in these special cases the record must be played manually.

Typical Service Trouble

A number of typical service troubles and remedies follow:

Motor Fails to Run Even When it is Entirely Disconnected From Changer and Voltage of Proper Value and Frequency is Applied Directly to the Two Input Leads of the Motor Winding

a. Open windings.
b. Damaged or frozen bearings.

Rumble And Microphonics During Reproduction

a. Changer not "floated" properly. Loosen mounting bolts.
b. Motor mounting Spring Clips rubbing on the idler wheel.
c. Motor leads pulled tight preventing motor from "floating" freely on its springs.

Needle Sets Down Properly On Record But Slides Over The Record Grooves

a. Cabinet tilted.
b. Badly worn needle.

Needle Fails To Clear Maximum Load Of Records On The Turntable

a. Check Tone Arm height adjustment, No. 2.

Changer Cycles With Auto-Man-Off Switch On Manual

a. Check Auto-Man-Off switch.
b. Chain too tight.

Tone Arm Falls Off Record

a. Check Tone Arm set down adjustment screw.
b. Check Tone Arm mounting screws.

Tone Arm Set-Down Position Varies

a. Loose Tone Arm set down adjustment lock screw.
b. Loose Tone Arm mounting screw.
c. Plastic Tone Arm housing broken.

Record Is Not Heard Although Changer Operates

a. See that the Phono-Radio switch is on Phono.
b. Check receiver audio amplifier by listening to radio.
c. Check Crystal Pickup Cartridge.

Tone Arm Sets Down Too Far In Or Out On Record

a. Check Tone Arm set down adjustment No. 1.

Changer Continues To Cycle

a. Check Cycling switch adjustment.
b. Check Record Change switch.
c. Clutch release mechanism sticks.
d. Tight drive chain.

Changer Will Not Cycle Upon Completion Of Record

a. See that the Auto-Man-Off switch is set to AUTO.
b. Make certain the record has an eccentric center groove.
c. Check Cycling switch.
d. Check Cut-out switch.
e. Check Clutch Release Arm for freedom of action.

Squeaks When Changer Is In Cycle

a. Friction between Lift Pin and Timing Sprocket. Apply a thin coat of Sta-Put.

Fails To Eject Records Accompanied By A Clicking Sound.

a. Clutch slips. A slight upward bend of the Clutch Release Arm will correct this condition.

Tone Arm Sticks Or Hangs Up During Cycle

a. Clutch Release Arm pressure on Timing Sprocket too great. Loosen the solenoid bracket and insert a very thin shim between it and the base plate. If the condition still prevails, increase the thickness of the shim.
b. Burrs in synchronizing notch or Clutch Release Arm Tip. Remove with a file.

The electrical section of the record changer is shown in Fig. 6. This concludes the Zenith data.

(To Be Continued)

In the December-January 1947-48 Issue of NATIONAL RADIO NEWS, *Mr. Moody will discuss the servicing of several other popular makes of record changers. Look for Part Two of this feature article.*

———*n r i*———

"That which is hardest acquired is that which is longest retained."

Some Information Regarding The NRI Line Of Radio Test Instruments

WE are pleased to announce that NRI now is able to accept orders and make deliveries on four of the five instruments we planned to produce. Those now in stock are the NRI Professional Radio Tube Tester, the NRI Professional Signal Tracer, the NRI Professional Volt-Ohm-Mil-Ammeter and the NRI Professional Resistor-Condenser tester.

A fifth instrument, the NRI Professional Signal Generator, is completely designed and is now being manufactured. Unless retarded by unexpected delays, the NRI Professional Signal Generator should be in stock by the end of October.

Hundreds of NRI students and graduates have already purchased one or more of the four types of instruments now in stock. These instruments are priced right and have given complete satisfaction in performance.

From time to time, during the past year, we have received requests from NRI men for information regarding testing instruments which NRI engineers were designing. In some cases the information was then not available. Under such circumstances we could not send a circular but promised to do so at a future date. We tried to keep these promises but may have failed to do so in some cases.

Immediate Deliveries Now

The following four pages give condensed information regarding the Tube Tester, Signal Tracer, Volt-Ohm-Mil-Ammeter and Resistor-Condenser Tester. If you have been waiting for an announcement that these instruments are in stock then now is your opportunity to place your order without further delay.

Circulars Sent Upon Request

If, on the other hand, you are not ready to place your order but wish more information we shall be glad to send a descriptive circular. In that case simply place a check mark in the box in the coupon at right indicating the instrument or instruments in which you are interested. Information will be sent to you by return mail. If you wish to place your order now then please use the proper coupon order blank which you will find on each of the following four pages.

Sold Only in United States and Canada

All instruments are sent by railway express. They are shipped express collect. They are not sent parcel post. It is requested that those who live outside of the United States or Canada please do not send orders for these instruments because we have no facilities for making deliveries without entailing serious risk of damage to the instrument.

Canadians understand, of course, their government will add customs duty and sales tax before delivery is made. This amounts to about 33% of the purchase price. We mention it only as a reminder to Canadians so they will be prepared to accept shipments promptly when notified by their Collector of Customs.

All remittances should be made by money order or bank draft. Personal checks are acceptable but should be certified to avoid delay of 10 to 15 days in shipment waiting for checks to clear.

We believe the information given in the following four pages regarding testing instruments will be of great interest to our students and graduates.

IF INTERESTED IN RECEIVING CIRCULARS, USE THIS COUPON

NATIONAL RADIO INSTITUTE 95
16th and You Streets, N. W.
Washington 9, D. C.

Send me circulars pertaining to the instruments I have checked.

- ☐ NRI Professional Radio Tube Tester
- ☐ NRI Professional Signal Tracer
- ☐ NRI Professional Volt-Ohm-Mil-Ammeter
- ☐ NRI Professional Resistor-Condenser Tester
- ☐ NRI Professional Signal Generator (when ready)

Name ..... Student No. .....

Address .....

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

The NRI Professional Radio Tube Tester

THE NRI Professional Radio Tube Tester is an ideal Tube Tester which we offer to you at a price you may feel assured is reasonable for a high grade, quality instrument of its kind.

In designing a portable Tube Tester which NRI felt would best serve its students and graduates we were primarily concerned with: 1, completeness of the test; 2, ease of operation; 3, long life (freedom from obsolescence); 4, appearance, and 5, cost.

The NRI Professional Radio Tube Tester is an emission tester, using the circuit type recommended by the Radio Manufacturers' Association, Tube Division.

It is a fact that after testing each tube for shorts or leakage between elements the value of a tube as far as its future use is involved is the ability of its cathode to emit electrons. Hence the NRI Tube Tester, like all emission testers, tests for shorts, leakage and then emission. Like all emission testers the circuit is so set that the meter tells you at once whether the tube is GOOD, BAD OR ? (questionable).

A Tube Tester is a basic need. If a serviceman can check tubes for shorts, leakage and emission quickly, he has eliminated tubes as a possible source of trouble, thus allowing him to concentrate on circuit defects. We decided on an emission type Tester because it can be made to test tubes rapidly and conclusively.

In the past, obsolescence (getting out of date due to the introduction of new tube types which could not be tested) was a very important factor to consider in purchasing a Tube Tester. In the NRI Tube Tester every effort has been made to avoid obsolescence.

This Tester is professional in appearance and impressive in action.

Specifications

1—Employs standardized R.M.A. emission test circuit.
2—Tests 4, 5, 6, 7, 7L, octal, loctal, bantam, miniature prong Radio tubes.
3—Tests electric eyes, pilot lamps, and gaseous rectifiers.
4—Filament taps provide voltages of 0.75, 1.2, 1.4, 1.5, 2, 2.5, 3.3, 5, 6.3, 7.5, 12.6, 25, 32, 50, 70, 85, 95, 100 and 110. With this range of voltages it is possible to test tubes requiring filament voltages of 0.75 to 117 volts.
5—Employs a three-inch square case red dot Triplett meter which is guaranteed for life against defective workmanship and material. Entire Tube Tester covered by the standard R.M.A. guarantee.
6—Test tubes for shorts and leakage between all elements while "hot," hence duplicating working conditions.
7—Reads directly BAD, ?, GOOD, and has a scale for fine comparison tests.
8—Has a manual line voltage regulator and uses voltmeter indicator.
9—Is provided with a booklet giving full directions and special tests.

10—Tests both diodes in a full wave rectifier, separate tube checks on multiple tubes using separate cathodes and the diodes in multifunction tubes.
11—Mounted in maroon hammerlin, baked enamel on steel carrying case, balanced for easy carrying. Measures 10 x 10 x 7¾ inches.
12—Actual weight 11½ pounds. Shipping weight 19 pounds.
13—AC operated 110-120 volts 50 to 60 cycles per second.
14—We reserve the right to alter the design of this Tube Tester, or to make any changes which we believe will improve its usefulness.

Canadians should read specifications, number 13, regarding power supply.

$47.50 Cash With Order

The price is $47.50 cash with the order. In every case the instrument is sent express charges collect. Please use order blank below.

USE THIS BLANK TO ORDER YOUR TUBE TESTER

NATIONAL RADIO INSTITUTE 91
16th and You Streets, N. W.
Washington 9, D. C.

I enclose $47.50 (certified check, money order, or bank draft) for which send me, express collect, one NRI Professional Radio Tube Tester.

Name ..... Student No. .....

Address .....

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

Express Office .....

The NRI Professional Volt-Ohm-Mil-Ammeter

NRI is proud to offer this fine instrument to its students and graduates. The NRI Professional Volt-Ohm-Mil-Ammeter, Model 44, has been carefully engineered to give you maximum service and quality at a price you may feel assured is reasonable for a high grade, professional instrument of this kind. Simplicity of operation is an important feature. Easy-to-follow instructions are included with each instrument.

What This Instrument Will Do

Enables you to make all necessary A.C. and D.C. voltage measurements. NRI design engineers have given careful consideration to selection of the voltmeter ranges incorporated in this instrument. A sensitivity of 10,000 ohms-per-volt was selected for the D.C. Voltmeter ranges, since this makes possible D.C. voltage measurements in A.V.C. and other high resistance circuits found in A.M., F.M., and Television Receivers. We have selected a sensitivity of 2000 ohms-per-volt for the A.C. Voltmeter ranges to give accurate readings for audio frequencies with minimum disturbance to the circuit under test.

Plus These Features

Wide Range of Resistance Measurements
Valuable in F.M. Alignment
Three Milliampere Ranges
A 12 Ampere D.C. Current Range
Output Meter Useful in Alignment
Detachable Cover Included — Completely Portable

The NRI Professional Volt-Ohm-Mil-Ammeter, Model 44, is shipped complete with a removable, hinged cover; black leather carrying strap; 50 inch rubber-covered test leads; detachable alligator clips; and instructions for operating the instrument.

Specifications

VOLTS D.C. (At 10,000 ohms per volt)	VOLTS A.C. (At 2000 ohms per volt)	OUTPUT
0-3	0-3	0-3
0-12	0-12	0-12
0-30	0-30	0-30
0-300	0-300	0-300
0-1200	0-1200	0-1200

AMPERES	MILLIAMPERES D.C.	MICRO-AMPERES
0-12	0-1.2	0-120
	0-12	
	0-120	

OHMS
0-2000 (10 ohms center scale)
0-20,000 (1000 ohms center scale)

MEGOHMS
0-2 Meg. (10,000 ohms center scale)
0-100 Meg. (500,000 ohms center scale)

BATTERIES: One size "D" and One 67½ v. Mini-Max Furnished.

Attractive Maroon Hammerline Finish—Nickel Plated Hardware Case—7⅞" high, 6⅝" wide, 5¼" deep.

Actual weight 6 lbs. Shipping weight 13 lbs.

Operating Instructions Included

$39.95 in Full With Order

An excellent instrument—one you will be proud to own. The price is $39.95, cash with order. In every case the instrument is sent express charges collect. Please use order blank below.

USE THIS BLANK TO ORDER YOUR VOLT-OHM-MIL-AMMETER

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16th and You Streets, N. W.
Washington 9, D. C.

I enclose $39.95 (certified check, money order, or bank draft) for which send me, express collect, one model 44 NRI Professional Volt-Ohm-Mil-Ammeter.

Name ..... Student No. .....

Address .....

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

Express Office .....

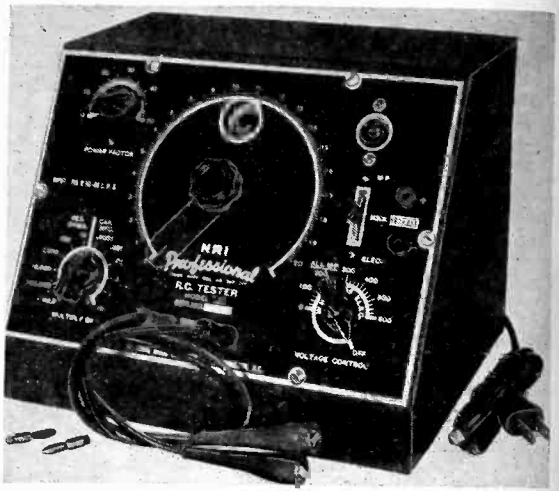
The NRI Professional Resistor-Condenser Tester

CONSIDER THESE FEATURES

1. Measures power factor of electrolytic condensers.
2. Measures capacity of all types of condensers.
3. Checks condensers for breakdown.
4. Measures resistor values in ohms and megohms.
5. Valuable in giving estimates on repair jobs.
6. A fundamental tester—does not become obsolete.
7. Enclosed in a sturdy self-shielding steel case.
8. Attractive maroon colored crackle finish.
9. Black panel with high-lighted, easy-to-read lettering.
10. Manufactured for NRI by a quality instrument maker, Industrial Instruments, Inc.
11. Easy to operate.
12. Step by step instructions supplied.
13. Price only $34.25 in full with order.

Specifications

1. Capacity ranges: .0001 mfd. to 200 mfd. in six ranges.
2. Resistance ranges: 10 ohms to 20 megohms, in six ranges.
3. By following simple instructions, capacity as low as 10 micro-microfarads and resistance as low as 1 ohm may be measured. This extremely low resistance range makes it easy to identify r.f. coil windings.
4. An ingenious bridge type circuit gives a linear calibrated main scale, with uniform sensitivity, unique in capacity testers.
5. D.C. voltage up to 600 volts available for condenser leakage and breakdown tests.
6. Uses four tubes: type 1-V and 6Y6G rectifiers; type 6SL7 dual triode in bridge circuit amplifier; and a type 6E5 tuning eye. Tubes furnished with instrument.
7. Extra heavy rubber covered test leads. Also two special test plugs for use in measuring very small capacity and very high resistance.
8. A.C. operated, 110-120 volts, 50 to 60 cycles per second. (Canadian Students and Graduates: Some localities in Canada do not have 110-120 volts, 50 to 60 cycles per second A.C. electricity, which is standard in the United States. This instrument cannot be operated on any other type power supply.
9. Maroon colored, crackle finish cabinet. Deep etched black panel with attractive "high-lighted" lettering.
10. Measures 10 x 8 x 7½ inches.
11. Actual weight, 11 pounds. Shipping weight, 13 lbs.
12. Complete instruction Manual for operating shipped with instrument.



Canadians Note

Canadians should read specifications, number 8 regarding power supply.

$34.25 in Full With Order

This is another NRI service. We offer our students and graduates this high quality instrument at the moderate price of $34.25, with order. In every case the instrument is shipped express collect. Please use order blank below.

USE THIS BLANK TO ORDER YOUR R-C TESTER

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16th and You Streets, N. W.
Washington 9, D. C.

I enclose $34.25 (certified check, money order, or bank draft) for which send me, express collect, one Model 112 NRI Professional Resistor-Condenser Tester.

Name ..... Student No. .....

Address .....

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

Express Office .....

The NRI Professional Signal Tracer

WHAT THIS INSTRUMENT WILL DO

1. Traces signal from antenna to loudspeaker.
2. Quickly localizes trouble in dead receivers.
3. Locates source of hum, noise or distortion.
4. Speeds tracing down intermittent trouble.
5. Enables accurate alignment without Signal Generator.
6. Also traces signals in F.M. Receivers.
7. Measures gain per stage.
8. Isolates oscillation in R.F. or I.F. stages.
9. Selects only that signal to which instrument is tuned.
10. Practically foolproof—you can't misuse it.

Specifications

ower Requirements—50-60 cycle, 110-120 volts .C. required. (Cannot be operated on D.C. or 5 cycle A.C.)

Vacuum Tubes Included: 2-6SK7; 1-6SQ7; 6K6-G; 1-6E5; and 1-5Y3-G.

requency Coverage—170 Kc. to 11.3 Mc.

Band A: 170 kc. to 490 kc.
Band B: 490 kc. to 1470 kc.
Band C: 1.47 mc. to 3.9 mc.
Band D: 3.8 mc. to 11.3 mc.

ermeability-tuned R.F. Transformers—insure tter tracking, more gain.

lanetary drive tuning condenser—eliminates ck-lash, ratio 3:1.

Electro-Dynamic Loudspeaker—insures plenty audio output.

alibrated R.F. and A.F. Attenuators—necessary stage gain measurement.

ctual Weight, 15 pounds. Shipping Weight, 20 unds.

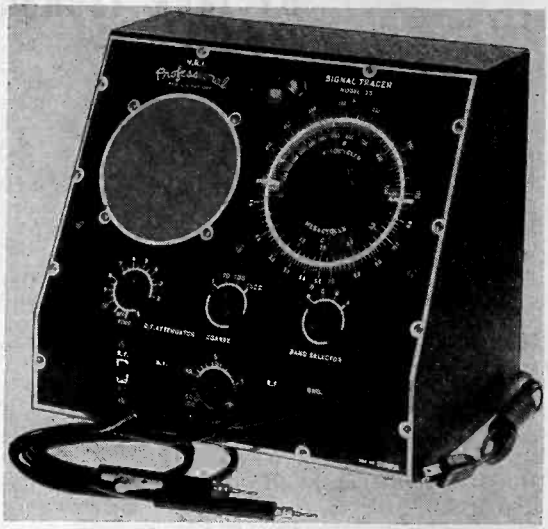
urdy Maroon Crackle Finish Case—Size 12" × 4" × 10¼", handsomely etched aluminum nel.

put Capacity of R.F. Probe—2 uuf.

ipped Complete with Detailed Instruction anual.

Canadians Note

nadians should read specifications, first line, garding power supply. Shipments to Canada quire purchaser to pay customs duty and sales x amounting to about 33% of purchase price.



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Dealer Service Builds Volume

By Jack Tannehill, NRI Graduate

Reprinted through Courtesy of "Radio-Craft" Magazine

IF you have been a little discouraged with a small volume of part-time radio repair work, or if you feel ambitious and want to expand your present part-time shop, here is a plan which was worked out and is being put to practical use by the writer. Besides bringing in a large volume of repair work, it offers many money-saving and time-saving ideas that have proven their worth in making a part-time radio repair shop a profitable business.

Many spare-time radio repair benches are barren countless days of the year and they often become little more than a hobby for the radio enthusiast. But if a radioman has the necessary experience and technical background to back up this plan, he can keep busy at the bench for as much of his spare time as he desires.

Personal experience has shown which are best of many possible ways of getting a steady flow of repair work. The neighborhood sign in front of the home, while it is important in identifying oneself, at best will attract people only in the immediate vicinity and probably will not bring in more than a dozen receivers a month. Exceptions of course are the shops that have been established for a long time and are well known, or those which are located on a street where a great deal of traffic passes.

Door to door leg work will bring some results, but too much time must be devoted to this method. Direct-mail advertising, while inexpensive and easy, in the author's experience was not an effective means of getting repair business. Local newspaper advertising may be a good medium, depending on the community served. To be worth while, it must be continuous; and it soon becomes an expensive item.

Dealer Servicing

But the best method yet developed, and one which is guaranteed to bring in plenty of work, is wholesaling! Wholesaling radio repair work on a large scale is not new, but it is *not often* encountered in a *spare-time* business. Perhaps the part-time devotee does not feel up to the responsibilities wholesaling might entail, or he feels his profit margin will be small. Wholesaling will cut slightly into the profit per job, but the much greater volume it brings will more than offset that; and it can very easily be the method of making your repair business worthwhile and profitable.

Believing that this is an advisable plan to follow, how can one establish himself as a part-time wholesale radio repairman? Taking for granted that you are capable as well as desirous of expanding a part-time business, your first step is to make contacts with several reputable retail outlets that feature radio and appliance sales in your community. Try to interest the proprietors in a radio repair service setup in which you will do the repair work for them on a wholesale basis, the service to be advertised under their name as their own service. Choose one, or even two, of these who appear sympathetic with your idea. Naturally you will choose firms with established reputations, that are aggressive in their appliance sales, and that have a full line of new radios to sell.

Your approach in selling this idea to a merchant should be to show him the advantages in having a service department of his own. Stress the fact that the service will bring additional traffic into the store, that it will be a great help to him in selling new radios, that it will lead to closer cooperation with distributors who naturally favor service-dealers over dealers without a service department. Mention the fact that he will have someone available to service any new radios sold by the store which come back for repair, thus eliminating the wait on replacements and adjustments by distributors. Last, but not least, is the income the merchant will derive from his commissions or markups on the repair jobs. This is a substantial item and more than pays for his time in handling the incoming repair jobs, collecting, etc.

Agreement and Records

No written agreement or contract is in effect between the service shop and the retail store; it might be a good thing to have, but a merchant usually does not want to be burdened with such detail. Repair tickets have been printed, and one is kept at all times with each radio brought in. The dealer in this case happens to be very co-operative and, if he can, he

Jack Tannehill, at his modest, but well-equipped Radio Service bench.

arns the complaints of the customers and notes ese on the reverse of the repair ticket together ith any wishes of the customers, special work quired, etc. Arrangments are made to pick radios to be repaired at the closing time of e store each day. They are returned to the ore the next morning if possible. A local de- very service has been found useful in making e pickups and returns, for a very small fee ch week. This is a great help since the repair- an is not always able to get to the store in time pick up the repair jobs before closing time. his delivery service is also used to pick up large dios at customers' homes, and thus helps to t down on home service calls.

loser and more elaborate bookkeeping is neces- ry in these associations than might be needed a repairman working independently. An in- oice is issued to the store for each repair job, overing the wholesale charges to the store, and entry is made in a ledger for each invoice. his same entry includes the date, the customer's me, radio model number, and work performed. he work performed need not appear on the in- oice but can be shown on the repair ticket kept ith the radio. A notation is made beside each entry in the ledger when the invoices are paid by the store. Collections can be made from the store monthly or weekly and each invoice that is paid is marked and initialed for the store's records. Repair tickets, invoices, and statements with your name printed on them can be bought from several tube and part manufacturers at small cost.

The wholesale price on repair jobs can be figured by deducting from a fair, regular retail charge (approximately 20% on small jobs to about 10% on large, expensive ones). The merchant can charge a retail price suggested by the service- man or he may choose to make his own markups. After each month's collections have been made, a statement is given the store showing any out- standing invoices that may not have been paid.

There are advantages to the serviceman as well in an association of this kind. If radio tubes are stocked and sold by the retail store, as in this instance, it is not necessary for the service- man to carry a stock of tubes in his shop. A fair plan is for the serviceman to buy all his tubes from the retail store at the "one-to-five" whole- sale price; the store will buy them in large

quantities and take advantage of the larger discounts and will still make a little profit from the tubes sold to the serviceman. The advantage in this is the eliminating of the large overhead a tube stock entails. One or two tubes of popular types can be kept at the service bench and others procured as needed.

Special Arrangements

A setup has been worked out by the writer with one store in which he does all the repair work and service calls without charge to the merchant on radios sold by the store. The store in turn pays for the ads run each week in the local newspaper. Other similar trades can be worked out.

The store used as an example is a tire and supply company which has arrangements for servicing cars for tires and accessories. This works out very nicely for taking care of car radios. The store makes its own charge for taking out and installing car radios, and the serviceman is presented with car radio work without the usual encumbrances. This store also sells and installs car aerials and the proprietor is capable of minor trouble-shooting on bad aerials, loose connections, blown fuses, poor lead-ins, and the headaches of static suppressors and condensers. This eliminates a lot of wasted time and leaves more of that precious part time for the more profitable bench work.

Under this plan the service shop in the home can be small since there need not be the usual clutter of uncalled-for radios and the normal accumulation of "junkers" lying around.

Since wholesaling narrows the margin a little on each repair job, careful thought must be given to overhead, buying, and stocking of parts and the investment in test equipment; only small stocks should be carried. Small orders for parts, placed as needed, will eliminate large expense items. By using this method the volume of repair work each month will control the outlay for parts and will stay in line even during a slow period. If you are in an outlying territory, some such setup as described above with a tube dealer will assist in keeping your stock to a minimum. Although cutting the overhead to the bone is being stressed, common sense will keep you from being handicapped by not having an ample stock of common items.

Test equipment and tools need not be elaborate but must be adequate. A vacuum-tube volt-ohm-milliammeter, or a good a.c.-d.c. multimeter, a signal generator, and a tube tester are the necessary basic items. An inexpensive signal tracer is very valuable. Another tool, and one that can be made by the serviceman, is a handy shunt box. This box should contain electrolytic condensers, or combinations of condensers, to make all the values commonly encountered in receivers, a complete range of paper condensers from about 0.5 uf to 0.001 uf and a potentiometer of about 1 megohm resistance. These can be arranged by switching or by plugging in test leads. This test box is a great help and will save much time in service work. Several circuits have appeared in RADIO-CRAFT in recent months covering the construction of these shunt boxes.

With only the above basic pieces of equipment, and by following the plan outlined, the writer has been very successful in part-time radio servicing.

RCA Tube Dept. Issues Valuable Folder for Hams

Harrison, N. J.—A new technical reference folder, designed especially for the nearly 100,000 radio hams in this country and containing a roundup of tube information, some of it never before published, has just been issued by the RCA Tube Department.

Titled "Headliners For Hams," the new folder is a combination technical bulletin, price list, catalogue, and sales brochure. It contains valuable design information, and covers a selected group of RCA's most popular amateur tubes.

Information in the colorful three-page folder includes new ratings on the RCA 807, 808, 810, 813 and 829-B; new operating conditions for frequency doublers, and new data on modulators.

The new folder is available free from RCA tube distributors or the Commercial Engineering Section of the RCA Tube Department, Harrison, N.J. Please direct requests for this free booklet only to the above address, and not to NRI.

How to Build And Use Wave Traps

BY LOUIS E. GARNER, JR.

NRI Consultant

Louis E. Garner, Jr.

A MEDICAL doctor prescribes a certain medicine and treatment for specific ills. The treatment is based partly upon the sickness and partly upon the condition of the patient. Similarly, a "radio doctor" must treat certain radio ills with specific treatments—the exact treatment depending upon the fault to be corrected and the condition of the set.

A wave trap is a type of treatment—one that can be used for certain specific "radio ills." It is not a "cure-all."

Wave traps are used to reduce interference from specific stations. That is, the interference must occur on a specific frequency for the wave trap to be effective—the reason is simple—the wave trap is actually a tuned circuit.

Basically, there are two types of wave traps, just as there are two types of resonant circuits. One type of wave trap is that made up of a parallel resonant circuit, which is usually placed in series with the circuit in which it is being used. The other type is the series resonant circuit, which is usually shunted across the circuit in which it is used.

The parallel resonant circuit type of wave trap is used to offer a very high impedence to a signal at its resonant frequency. This type of trap is used primarily where the circuit being protected is of the low impedance type. It effectively acts with the circuit being protected to form a voltage divider—the greater portion of the signal (at that frequency) being dropped across the wave trap and the smaller portion of the signal (sufficiently smaller, in some cases, as to be negligible) appearing across the circuit being protected.

The series resonant circuit wave trap is usually shunted across the circuit being protected—this circuit being of the high impedance type. By doing this, we are effectively shunting the circuit with a low impedance path (at the resonant frequency). In other words, at the resonant frequency, the series resonant circuit acts as a short to ground across the particular circuit being protected.

Fig. 1 illustrates a parallel resonant wave trap used in series with the circuit being protected. Fig. 2 illustrates the series resonant type of wave

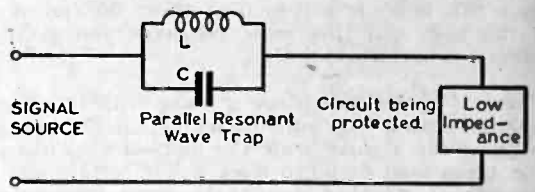

Fig. 1

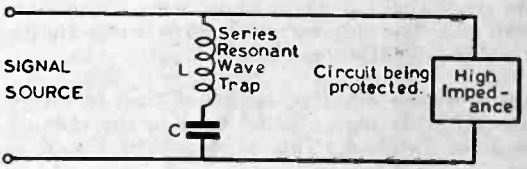

Fig. 2

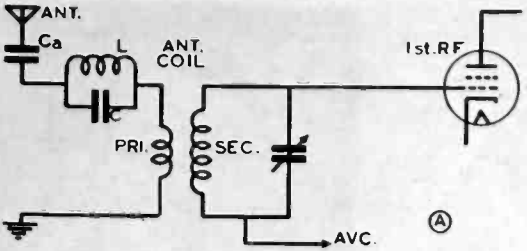

Fig. 3A

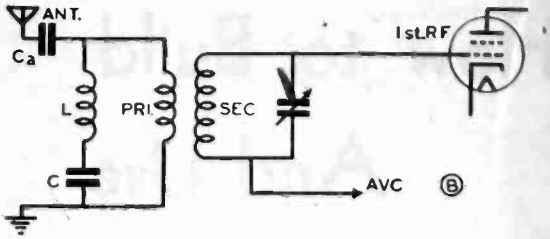

Fig. 3B

trap used in parallel with the circuit being protected.

Usually, the wave trap is used in the in-put circuit of a receiver—on the antenna side. This is illustrated in Fig. 3. Fig. 3A shows the use of a parallel resonant wave trap and Fig. 3B shows the use of a series resonant wave trap.

The illustrations shown in Figs. 3A and 3B a e for a comparatively simple antenna circuit—that is, the antenna consists only of a long wire attached to one side of the antenna coil and the other side of the antenna coil primary is grounded. If there is a series condenser in the antenna circuit (shown as Ca in the diagram), it makes little difference in the installation and operation of the wave trap.

When the antenna consists of a loop or a doublet, slightly different techniques should be used. Many commercial sets using loop antennas have a wave trap in series with the loop. Normally, the service man should not attempt the installation of such a wave trap unless he is working on a set specifically designed for that type of trap and he has the specific trap recommended by the manufacturer available. You can see the reason for this quite easily—at other than the resonant frequency, the wave trap will act as a reactance. Since this is so, it will tend to affect the tuning of the loop and this must be taken into consideration in the loop design.

Where it is desired to use a wave trap in conjunction with a loop antenna which has not been designed for a wave trap, the method shown in Fig. 4 has been found to work under certain circumstances. In this circuit, the wave trap has been placed in series with the grid of the first r.f. tube. A parallel resonant wave trap is used.

This system will work in some cases—in others, it will not. The only way to be sure is to actually try out the installation.

Such a system (that is, the wave trap in series with the grid) may also be used in the case of a doublet antenna. This is shown in Fig. 5.

Also, in the case of a doublet antenna, the wave trap may be inserted in one leg of the antenna as shown in Fig. 6. A certain amount of attenuation is given when the wave trap is used in one leg of the doublet. However, if the doublet antenna is of the "balanced" type—that is, the center tap of the antenna coil primary is grounded, it would be desirable to use a wave trap in each leg of the doublet so as to maintain balance. This is shown by L^1 and C^1 in Fig. 6.

Variations in Wave Traps

In specific installations, different types of selectivity may be desired in a wave trap. For example, one may desire a very sharp response so that a particular station will be attenuated greatly while adjacent stations will not be affected too much. On the other hand, one may desire attenuation over a band—that is, a broad response.

There are a number of ways of broadening the response curve of a tuned circuit. The Q of the circuit will affect the response curve. If the coil to be used is of low Q and a sharply selective trap is desired, there is not much that can be done. However, if the coil to be used has high Q and a broad response is desired, then a resistor may be added to the circuit. You may use a loading resistor in parallel with the wave trap as shown in Fig. 7(A). You may also use a resistor in series with the series type wave trap, as shown in Fig. 7(B).

If a series resistor is used, its value will be quite small compared to a parallel resistor. For example, one may use a series resistor of from 10 to several hundred ohms. On the other hand, a parallel resistor will probably be in the tens or hundreds of thousands of ohms.

It is also possible to vary the selectivity curve by changing the L to C ratio. In a series resonant circuit, a high L to C ratio is used for sharp response—that is, a large inductance and a small capacity.

In a parallel resonant circuit, a small L to C ratio is used for greatest selectivity. That is, a small inductance and a large capacity.

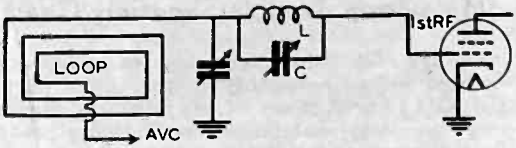

Fig. 4

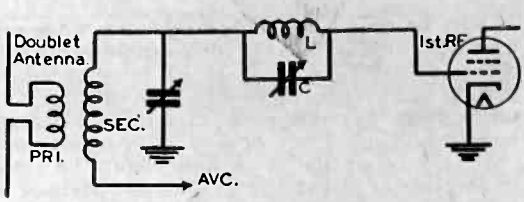

Fig. 5

From a practical viewpoint, however, the service man has little to choose about the L to C ratio. The reason for this is simple—the service man usually buys a commercially wound coil and, in some cases, a complete commercially built wave trap. Since this is the case, he has little to say about the L to C ratio or the coil Q.

Once the wave trap is installed, if the Q is found to be too high, then the series resistance or parallel resistance might be used.

However, in general, the service man will simply detune the wave trap slightly.

Construction and Installation of Wave Traps

The practical radio service man will purchase a coil and condenser combination which will tune to resonance at the frequency he desires to reject. Ordinary antenna coils may be used. For the short wave band, an oscillator coil may be used. In some cases, a small 2.5 millihenry choke might be used.

The actual installation will vary with the type of set and the antenna system. The various types of antenna systems and methods of installation have been mentioned.

However, it will sometimes be found desirable to mount the wave trap in a small shielded can. Some service men find it desirable to wind their own coils for wave traps. However, this is not the most economical thing to do. In the first place, a commercially wound coil is usually smaller than a hand wound coil and if the time of winding is figured at a normal hourly rate, the commercially purchased coil is cheaper. Since this is the case, the service man should hand wind the inductance only as a last resort.

One may wind a coil to use in the broadcast band by placing 75 turns of number 22 d.c.c. wire on a 2½-inch diameter bakelite tube. This coil would be used with a 350 mmf. condenser.

Of course, there are commercially built wave traps available. Since this is the case, the service man may find it desirable to simply purchase a commercially built wave trap rather than to attempt building one. The price of a commercially built wave trap is usually comparable to the cost of small coils. The actual cost is often less than the cost of an i.f. transformer. When a commercially built wave trap is purchased—full instructions are usually furnished with it for installation and adjustment.

Adjustment of Wave Traps

One may wire the wave trap into the receiver circuit using any of the methods that have been discussed. In some cases, it will be found that one method will not work as well as another and a certain amount of experimentation may prove desirable.

When wiring the wave trap into a circuit, certain simple precautions should be observed. First, one should disturb the set wiring as little as possible. This is especially true where the wave trap is being installed in the grid circuit as shown in Figs. 4 and 5. When a wave trap is installed in this manner, it may be necessary to touch up the alignment of the set somewhat. Also, it may be necessary to experiment with the placement of the wave trap if it is inserted in the grid circuit—otherwise, feedback may occur.

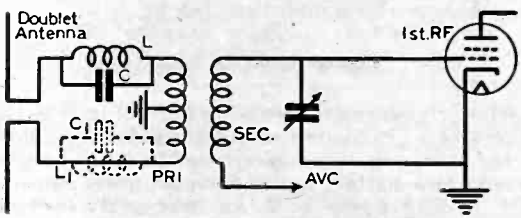

Fig. 6

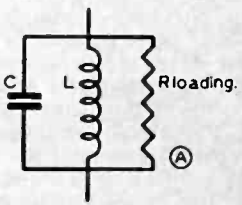

Fig. 7A

Fig. 7B

It may be found desirable to try the wave trap first without a shield. If undesirable results are obtained—such as feedback or poor operation, then a shield may be used. The shield can be made from a small tin can, an old i.f. transformer shield, or out of any scrap sheet metal that may be available. A hole should be placed in the side of the shield so that the trimmer adjustment can be made with the shield in place.

Once the wave trap has been installed, you may adjust it to reject the undesired station quite easily by varying the capacity of the trimmer. When you do this, it is preferable that you use the insulated type of aligning tool.

As far as the actual installation is concerned—the first move is to decide on the frequency to be rejected. If an i.f. frequency is to be rejected, you can probably make the wave trap out of a discarded i.f. transformer. If a station in the broadcast band is to be rejected, you can use the wave trap described above, or make the wave trap out of a conventional r.f. or antenna coil. If stations in the police band are to be rejected, you may make the wave trap out of a superhet oscillator coil. A trimmer or padder condenser is chosen that will tune the coil to the station to be rejected.

The wave trap is then installed as has been discussed. The experimentation with shielding and with placement is carried out. And, finally, the trimmer is adjusted to suit the customer's requirements.

Of course, the wave trap should be installed in the customer's home, using the customer's antenna and the final adjustment should be made to suit the customer's preference.

Summary

In general, the wave trap is used for one purpose only—to reject or attenuate a particular interfering signal. Therefore, before a wave trap is tried, one should decide exactly what is causing the interference and whether the wave trap might reduce it.

———*n r i*———

Handwriting As An Aid to Memory

In studying lessons, many students find it is very helpful to write out portions of the lesson in longhand, fixing, in that way, definite principles in the mind. Studying which is not planned is ineffective. Lay out the work that you want to do mentally before tackling it, then go to it. When you find a section of the lesson is unusually difficult, write out the portion you can't understand and in that way not only make learning easier but also use the writing as an aid to memory. Experience proves the wisdom of these words.

Television Trouble-Shooting Chart

Although television servicing techniques are covered quite thoroughly in the latter part of the NRI Course, many of our advanced students meet an occasional television servicing problem in their spare or full-time service work.

In answer to their many requests, there follows on pages 21, 22, and 23, a television trouble-shooting guide or chart which will prove of interest to all television minded students or graduates.

This chart is intended primarily for our advanced students who have need of this specialized information. If you are still studying the more elementary part of your Course, you will undoubtedly find this information just a little too "deep" for now.

How to Use This Chart

An improperly-operating television receiver is literally a sign-post pointing out probable locations of the trouble. Special test patterns which are transmitted by television stations from time to time, particularly at the beginning of a telecast, assist the Teletrician in diagnosing the nature of the defect.

In using the chart on the following pages, the nature of the observed effect on the television screen is described in the left-hand column of the chart. Probable causes for this effect are listed in the middle column. Remedies are given in the right-hand column.

Unless otherwise indicated, you may assume that the sound section of the television receiver is performing satisfactorily and that all picture characteristics except those mentioned in the left-hand column are essentially normal.

It would clearly be impossible to give directions for finding and correcting all of the possible troubles which could occur in the various models of modern television receivers. However, most of the common troubles and their remedies are covered in the following tabulation. You will notice that many of the troubles are quite simple, and their remedies appear equally simple. Do not let this mislead you, for simple defects are often times most difficult to locate.

General Servicing Procedures

The procedures for locating defects in television receivers are fundamentally the same as employed for servicing sound receivers. In both cases, we have two distinct types of complaints to consider: 1. A dead receiver; 2. An improperly operating receiver. See chart on following three pages.

OBSERVED EFFECT	PROBABLE CAUSES	REMEDIES
1. No image, pattern or spot on t.c.r. tube even when brilliancy control is fully advanced.	1. Failure of high-voltage power pack. Excessively high negative bias on t.c.r. tube grid. Image or pattern is entirely off the screen. Defective t.c.r. tube.	1. Check high-voltage power pack. Check t.c.r. tube bias. Check settings of beam-centering controls. Try another t.c.r. tube.
2. No image. Raster is present. Back traces are visible when brilliancy control is advanced, and are stationary.	2. Defect in video amplifier or its power supply connections. (Stationary raster indicates synchronizing impulses are controlling sweep circuits.)	2. Check tubes, parts and leads in the v.f. amplifier between the clipper connection and the t.c.r. tube.
3. No image. Raster is present. Back traces are visible when brilliancy control is advanced, but are moving.	3. Defect in video i.f. amplifier, video detector, video amplifier stages ahead of clipper input connection.	3. Check tubes, parts and leads in signal and supply circuits of suspected stages. (Moving raster indicates synchronizing impulses are not controlling vertical blocking oscillator.)
4. No image. *No sound*. Raster is present. Back traces are visible when brilliancy control is advanced, but are moving. Telecaster is known to be on air.	4. Defect in receiving antenna, preselector, oscillator or mixer-first detector. (Moving raster and absence of sound indicates that no signals are getting through the mixer-first detector output circuit.)	4. Check tubes, parts and leads in signal and supply circuits in and ahead of mixer-first detector. Check the low-voltage power supply serving these stages. Check the antenna system.
5. Only a spot on t.c.r. tube screen. (No saw-tooth voltage on horizontal and vertical deflecting plates.)	5. Failure of power pack which serves sweep system. Defect in any voltage supply lead or part which is common to both horizontal and vertical sweep channels.	5. Check power pack serving sweep system, particularly the rectifier tube and filter condensers. Check common voltage supply connections to both sweep channels.
6. Horizontal line only. (No saw-tooth voltage on vertical deflecting plates.)	6. Failure of the vertical sweep channel, due to a defect in the vertical blocking oscillator stage or between this stage and the vertical deflecting plates.	6. Check tubes, parts, leads and supply voltages, working from vertical blocking oscillator to vertical deflecting plates.
7. Vertical line only. (No saw-tooth voltage on horizontal deflecting plates.)	7. Failure of horizontal sweep channel, due to a defect in the horizontal blocking oscillator stage or somewhere between this stage and the horizontal deflecting plates.	7. Check tubes, parts, leads and supply voltages, working from horizontal blocking oscillator to horizontal deflecting plates.
8. Insufficient picture width. (Horizontal sweep voltage too low.)	8. Improper setting of horizontal size control. Defective tube, defective part or improper supply voltages in horizontal saw-tooth sweep oscillator stage or horizontal sweep output stage.	8. Adjust horizontal size control. If picture is still too narrow, check tubes, parts and supply voltages in horizontal output stages.
9. Insufficient picture height. (Vertical sweep voltage too low.)	9. Improper setting of vertical size control. Defective tube, defective part or improper supply voltages in vertical saw-tooth sweep oscillator stage or in vertical sweep output stage.	9. Adjust vertical size control. If picture is still too short, check tubes, parts and supply voltages in vertical saw-tooth sweep oscillator stage and vertical output stage.
10. Picture not centered with respect to mask. (Shifted to one side, to top or to bottom.)	10. Improper setting of vertical or horizontal beam centering control, giving improper bias on deflecting plates. Electromagnetic deflecting coils improperly positioned.	10. Adjust beam-centering controls. Adjust positions of electromagnetic deflecting coils; always turn off power when working on deflecting coils.
11. Picture is tilted with respect to mask.	11. Magnetic deflecting coils are not properly oriented. Electrostatic deflection type t.c.r. tube is not properly oriented.	11. Rotate electromagnetic deflecting yoke or entire t.c.r. tube until the tilt is eliminated. Turn off power when making adjustments.
12. Two narrow, full-height pictures side by side, separated by a black vertical bar.	12. Horizontal sweep circuit is operating at one-half normal frequency due to improper setting of horizontal hold control.	12. Increase frequency of horizontal blocking oscillator by adjusting horizontal hold control.
13. Two short, full-width pictures one above the other, separated by a black horizontal bar.	13. Vertical sweep circuit is operating at one-half normal frequency due to improper setting of vertical hold control.	13. Increase frequency of vertical blocking oscillator by adjusting vertical hold control.
14. Right-hand half of picture superimposed on left-hand half.	14. Horizontal sweep circuit is operating at twice normal frequency due to improper setting of horizontal hold control.	14. Decrease frequency of horizontal blocking oscillator by adjusting horizontal hold control.
15. Bottom half of picture superimposed on top half.	15. Vertical sweep circuit is operating at twice normal frequency due to improper setting of vertical hold control.	15. Decrease frequency of vertical blocking oscillator by adjusting vertical hold control.

OBSERVED EFFECT	PROBABLE CAUSES	REMEDIES
16. Entire picture slips or moves up or down. Picture is clear, with normal contrast and no abnormal interference patterns.	16. Vertical sweep channel is not "holding on to" vertical synchronizing impulses. Pulses at the input of the saw-tooth sweep generator may be too weak.	16. Check for defective parts or tubes in the vertical sweep channel, the frequency separator, the clipper and any synchronizing impulse amplifier stages if adjustment of the vertical hold control does not clear up the trouble.
16A. Same as above but with interference patterns.	16A. Excessively strong static or man-made interference pulses may be taking over control of the vertical sweep channel, or video signals may be getting through the clipper and affecting the vertical sweep generator.	16A. Listen to the vertical sweep output with headphones (high voltage off); video signals in this sweep channel may give a raspy tone instead of the usual steady tone (some sweep generator circuits will not pass video signals, so this test is not conclusive.) Adjust the hold controls.
17. Entire picture slips or moves up or down. Picture is dim, with poor contrast and interference patterns.	17. The v.f. signal at the input to the clipper is too weak, indicating trouble somewhere ahead of the clipper, a poor antenna system, or too low signal strength at the receiver location.	17. Check all tubes and parts for defects which could cause low gain in stages between the clipper input and the antenna. Check the antenna system for signal pickup and interference pickup. Readjust vertical hold control.
18. Part of the picture (usually at the top) is highly distorted and shifted in a horizontal direction. Rest of picture is clear, with normal contrast and no abnormal interference patterns. No vertical movement.	18. Horizontal sweep channel is not "holding on to" horizontal synchronizing impulses, with result that picture "tears." Pulses may be too weak at the input of the saw-tooth generator. Video signals may be getting through the clipper and affecting the horizontal sweep generator.	18. Check for defective parts or tubes in the horizontal sweep channel, the frequency separator, the clipper and any synchronizing impulse amplifier stages if adjustment of the horizontal hold control does not clear up the trouble.
19. Part of the picture is highly distorted and shifted in a horizontal direction. Picture is dim, with poor contrast and interference patterns.	19. The v.f. signal at the input to the clipper is too weak, indicating trouble somewhere ahead of the clipper, a poor antenna system, or too low signal strength at the receiver location.	19. Check all tubes and parts for defects which could cause low gain in stages between the clipper input and the antenna. Check the antenna system for signal pickup. Readjust horizontal hold control.
20. All parts of picture are fuzzy—not clearly defined—and fine details are blurred.	20. Electron beam may not be properly focused on t.c.r. tube screen, due to improper focusing electrode (first anode) voltage.	20. Adjust focus control for maximum clearness of sharply defined lines in picture. If this does not help, check the focus control and associated parts in the voltage divider of the t.c.r. tube power pack.
21. Only the fine details in the picture are blurred or absent. Particularly noticeable on distant scenes or long studio shots.	21. Loss of higher video frequency components, due to attenuation of these components somewhere in the receiver. Consider whether it is due to original limitations in receiver performance.	21. Check alignment of video i.f. coupling units. Look for defects in the coils, condensers, resistors, and leads of coupling and equalizing circuits in the video i.f. amplifier, video detector and v.f. amplifier.
22. Picture is smeared, with white or black shadows at the right of each object.	22. Loss of lower video frequency components, accompanied by excessive phase shift at low frequencies.	22. Look for a shorted low-frequency compensating resistor in a v.f. amplifier load circuit, or an open plate or screen grid by-pass condenser in the v.f. amplifier. Look for defect in the coils, condensers, resistors and leads of video i.f. and v.f. coupling units and in low-frequency compensating circuits.
23. Vertical retraces are visible in picture.	23. Brightness and contrast controls are not properly set, or signal intensity at t.c.r. tube input is inadequate.	23. Lower the setting of the brightness control and advance the contrast (gain) control. If normal brilliancy cannot be secured without having retraces visible, check all video signal circuits for a defective part. Check antenna pickup and television signal strength at antenna location.
24. Insufficient contrast between light and dark portions of the picture.	24. Inadequate signal strength at input of t.c.r. tube. Sound i.f. carrier may be beating with video i.f. carrier in video detector to give a strong 4.5 mc. signal which brightens entire picture. Defective t.c.r. tube or d.c. restorer.	24. Advance the contrast (gain) control and readjust the brightness control. Check sound i.f. rejector circuit in video channel. Look for defect in d.c. restorer circuit. Try a new t.c.r. tube.

OBSERVED EFFECT	PROBABLE CAUSES	REMEDIES
25. Excessive contrast between light and dark portions of the picture.	25. Excessive signal strength at input of t.c.r. tube, due to contrast (gain) control being advanced too far, excessive signal input to receiver.	25. Lower the contrast control setting. Lower any sensitivity controls which are present in receiver.
26. Objects at left and right sides of image or at center appear wider or narrower than normal.	26. Non-linear horizontal sweep.	26. Adjust bias on horizontal sweep output tube until trouble is eliminated. Check horizontal saw-tooth sweep generator and horizontal linearity control circuit.
27. Bright vertical band along left side of picture.	27. Horizontal flyback time is too long. Picture signal is modulating electron beam as it approaches the left side of the picture during a slow horizontal retrace.	27. Look for a defective part in the horizontal saw-tooth sweep generator, particularly the parts which govern flyback time. Check for excessive capacity between horizontal deflecting plate leads and chassis. In a gaseous triode sweep generator, the current-limiting resistor may be too large.
28. One or two wide dark horizontal bands on picture. If receiver and telecaster are on different power line systems, these bars may move slowly up or down.	28. Excessive power line a.c. hum or ripple in video amplifier.	28. Check filter condensers in video and t.c.r. tube power packs for opens and loss of capacity. Check plate and screen-grid by-pass condensers in v.f. amplifier. Check v.f. tubes for cathode to heater shorts.
29. Many irregularly-positioned horizontal black and white bars or geometric patterns on picture.	29. Sound signals are getting into the video channel and causing "cross talk."	29. Readjust the vernier tuning control. Check the sound i.f. rejector circuit at the video i.f. input. Look for open by-pass condensers if a common power supply serves both sound and video sections.
30. A pattern of fine lines or short diagonal bars appears on the picture at irregular intervals, and may or may not move.	30. Excessive diathermy interference. Carrier of police, amateur or aircraft station beating with video carrier. Intermittent high-frequency oscillation in video channel of receiver.	30. Trouble is external interference if it disappears when a television signal gencrator is connected in place of the antenna. Try new antenna position, or use a directive antenna oriented for minimum interference.
31. Moving white and black splotches or spots on picture and momentary loss of either vertical or horizontal synchronization.	31. Ignition interference due to automobile or other equipment employing a spark coil for ignition.	31. Move antenna farther away from street, and rotate for a maximum signal-to-noise ratio. Use a directive antenna.
32. Snowstorm effect on entire picture.	32. Signal strength at receiver input is too low; to get a picture, gain must be advanced so far that normal atmospheric interference and tube hiss affects picture.	32. If reception was normal at one time and television transmitter has not been changed, check antenna system. Check tubes, parts and voltages in preselector stage and mixer-first detector stage.
33. Dark brown or black spot in center of picture.	33. Bombardment of center of t.c.r. tube screen by ions which come from the electron gun but are not controlled by the deflecting systems, destroying the fluorescent material in this region.	33. Replace t.c.r. tube.
34. Ghosts images in picture.	34. Signals are arriving at the receiving antenna over two or more different paths from the telecaster. Signals are being reflected back and forth in the transmission line due to improper match.	34. Change the position of the receiving antenna, or use a directive antenna so as to pick up signals over only one path. Match the receiver input to the transmission line.
35. Picture appears momentarily, then disappears. Sound is unchanged.	35. Loose connection in a video signal circuit.	35. Look for loose connections, particularly in leads to t.c.r. tube socket.
36. Picture scrambles for a while without changing in average brightness, then returns to normal.	36. Loose connection or defective tube in the scanning system.	36. Look for loose connections in clipper or frequency separator if scrambling occurs.
37. Picture is trapezium-shaped (not rectangular).	37. Deflecting system is out of balance.	37. In a balanced electrostatic deflecting system, check the output tubes in each sweep channel. In an electromagnetic deflecting system, look for shorts between turns in a deflecting coil.

Our Cover Photograph

We are extremely proud to show in this photograph Graduate T. L. Kidd, who now holds the excellent position of Chief Engineer of Radio Station KSFA, located in Nacogdoches, Texas. KSFA is one of East Texas' newest and most modern Radio Stations. Graduate Kidd had the pleasure of supervising the entire construction and lay-out of Station KSFA. He has every right to be very proud of the final result.

A word about Alumnus Kidd. He is exceptionally well qualified to hold his present position. His earlier broadcast experience resulted from positions as Radio Engineer at Station KCGI, San Antonio, Texas and Station KSTA, San Antonio, Texas; and Chief Engineer of Station KHMC, Harlingen, Texas. He is a member of the Institute of Radio Engineers.

Kidd's Radio experience has also consisted of running his own radio repair and public address business; installation and repair work on Aircraft receivers and transmitters; a fine position as lead inspector for Northrop Aircraft Company; and during the past war an extremely interesting position as Supervisor in charge of Radio and electrical equipment, Hindustan Aircraft Corporation, Bangalore, India.

Our cover photograph shows Mr. Kidd making some adjustments on Station KSFA's equipment in the transmitter building, located two miles east of Nacogdoches. This main room houses the Gates Model BC-1E 1000 watt transmitter and emergency stand-by program equipment.

The emergency stand-by transcription equipment consists of a Presto Model 62-a turn-table. A Gates Studioette Console Model 51-CS is mounted on the engineer's desk.

The equipment rack at the left of the transmitter consists of the following: The top panel holds three meters and the master push-button switch. The second unit from the top is a Gates Model 2639 modulation monitor. In case of overmodulation, a relay flashes a warning light. Below the patch panel, a Gates Model MO2696 amplifier is mounted, and kept in reserve for emergency use. Below this amplifier is the Gates Model 28CO limiting amplifier. This prevents overloading of the transmitter. Other equipment in this rack include the Model CW-3 Wilcox Communications Receiver, and a Cinema Model 4031-B program equalizer.

We feel Chief Engineer Kidd deserves to be congratulated on his fine station. He is building a great reputation for himself.

How to Convert A Battery Receiver For AC-DC Operation

By Sherman L. O'Guinn
NRI Graduate, Trumann, Arkansas

Editor's Note: NRI Graduate O'Guinn recently mailed us an interesting procedure for converting battery receivers to a.c.-d.c. operation. We feel, and we think that you will too, that this is quite an interesting article and contains information of value to radio men in rural areas where electrification is in process.

A typical battery operated set is the Sentinal 289-T, shown in Fig. 1. To convert this set for a.c.-d.c. operation, it is necessary to do several things—the filaments must be wired so that a.c.-d.c. type tubes can be used, a rectifier and filament power supply must be built, and a few changes in the circuit (such as providing bias voltage) must be made.

Graduate O'Guinn found that the following method could be used to make the conversion in the least possible time:

First, of course, make sure that the set is playing properly on batteries. Otherwise, if the set doesn't play when you have finished the conversion, you cannot be sure whether or not you have made some mistake in the conversion.

Now, you should check the wiring of your receiver very carefully. If you find that some tube socket lugs have been used as "tie points" (terminal lugs), then the connections to these lugs are removed and attached to insulated terminal lugs. It is common practice for manufacturers to employ tube socket lugs on unused tube pins as common "tie points."

If the tube filaments are connected in parallel (as the set shown in Fig. 1), then you must start with the first stage and wire all the filaments in series. The same tube sequence should be used as is shown in Fig. 2. *Don't* change any part of the oscillator circuit (1A7GT stage), but place a 150 ohm, ½ watt, resistor and a .05, 400 volt condenser between tube prong 8 and ground. This provides bias for the oscillator stage.

Now connect pins 5 and 8 of the 1N5GT i.f. amplifier stage together and connect another 150 ohm, ½ watt resistor and .05, 400 volt condenser between these pins and ground. If you find that the set squeals when you try to align it, ground the number 1 pin of the stage.

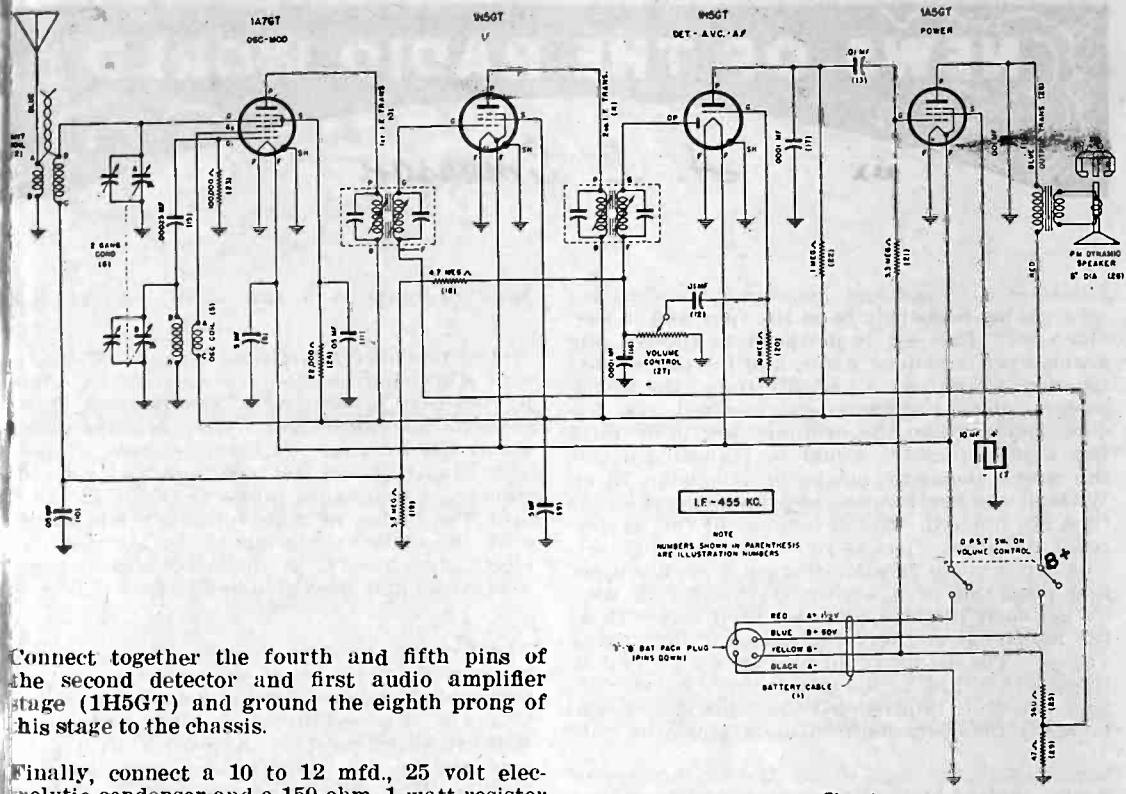

Fig. 1

Connect together the fourth and fifth pins of the second detector and first audio amplifier stage (1H5GT) and ground the eighth prong of this stage to the chassis.

Finally, connect a 10 to 12 mfd., 25 volt electrolytic condenser and a 150 ohm, 1 watt resistor between pin 8 of the output stage (1A5GT) and ground. The positive side of the condenser would connect to the tube cathode, pin 8.

It is now necessary to build a small power supply. This is built and connected as shown in the circuit of Fig. 2. If a 35Z5 is not desirable or available, then the circuit using a selenium rectifier shown in Fig. 3 may be used. The receiver's original "on-off" switch should be wired into the power supply circuit.

Either of these power supplies may be built on a small chassis or on a "breadboard" (small wood block on which parts are mounted and wired). The power supply can then be mounted in the battery compartment of the receiver.

Once you have completed the conversion, built the power supply, and connected it, to the receiver chassis and to B+, the set is ready for operation. The various new tubes used in place of the battery tubes follows—for 1A7, use 12A8; for 1N5, use 12K7; for 1H5, use 12Q7; and for 1A5, use 50L6.

When you connect the converted receiver for operation, there is one point to remember as in a conventional A.C.-D.C. set—*don't use an external ground.*

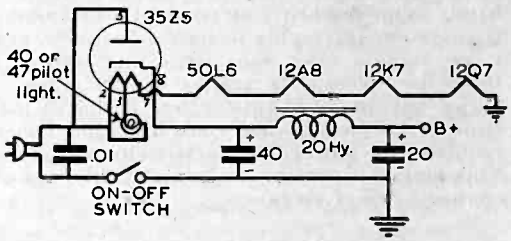

Fig. 2

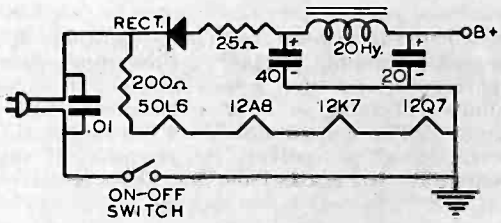

Fig. 3

NEWS OF THE RADIO WORLD

BY *H. L. Emerson*

Latest idea for putting Television broadcasting on a paying basis may be in the "pay as you see" video set. This set is designed to receive programs over telephone wires, and for the service, listeners would pay a monthly fee to the broadcaster. Most programs are received via frequencies just like the ordinary set, however, a few key frequencies would be transmitted into the user's home by means of telephone wires. Without the key frequencies, the pictures on the tube are blurred. The developers of this system point out that "pay-as-you-see" television sets would put video broadcasting on a paying basis, and programs of a higher type could be seen. To get clear pictures, the user need only pick up his telephone and ask the operator for "phone vision." The setup would provide for an end-of-the-month billing by the broadcasters for services performed. It is predicted that this system will be ready for operation in about six months.

A new type of power-line communication system —that provides voice transmission better than that of many telephone circuits—recently has been delivered by Westinghouse to the Pacific Power and Light Company. Called a single-sideband, suppressed-carrier power line communication system, the highly technical device transmits voice signals over the power-line wires from Pasco to Spokane, a matter of 149 miles. The major advantage of this system is that it uses a band of frequencies less than half that formerly required by power-line carrier-current systems. This makes it possible to increase the number of channels in a given range.

The smallest radio tube in the world has been recently constructed in Sylvania's Advanced Development Laboratories. It is only ⅞ inch long and slightly more than ⅛ inch in diameter.

The Federal Trade Commission considers it improper to include rectifiers in the tube count in representations "that a set contains a designated number of tubes or is of a designated tube capacity." The commission does not object to description of a receiver, for example, if represented as "An Eight Tube Set—This Receiver in addition contains a full wave rectifier tube.

Midget-Can electrolytics in higher voltage ratings. The handy midget-can electrolytics offered by Aerovox Corporation, of New Bedford, Massachusetts, heretofore available in voltage ratings up to 450 volts d.c. working, are now available also in ratings of 500, 600, and 700 volts d.c. working. Capacitance values are 8, 10, 12, and 16 mfd. The higher working voltages are in keeping with the higher potentials of certain radio and electronic circuits, particularly cathode-ray-oscilloscopes and television receivers.

The General Electric Company has a one-way micro-wave radio relay circuit ready for commercial television operation between New York City and Schenectady, New York. This system will extend to Syracuse, New York, if plans are approved by the Federal Communications Commission. The new relay operates in the 2000 megacycle region. Extremely directional, the micro-waves are beamed from a transmitter atop the GE Building in New York City, to a relay station on Beacon Mountain fifty-five miles north. From there they travel fifty-five miles to Round Top Mountain, where another relay tower transmits them twenty-nine miles to the Helderberg Mountains. Picked up by a third relay tower there, the signals are sent fourteen miles to Schenectady.

Regular consumer use of Dick Tracy's "Wrist radio" may not be too far in the future. The Citizens Radio Service will provide an opportunity for adapting short-range radio communication equipment, including pocket-size sets now under development, to varied personal needs. The possibilities for size utilizing this type of radio are unlimited with the use of printed circuits and subminiature tubes. In some of these unique circuits, coils, resistors, and condensers are actually printed on the glass envelope of the sub-miniature tube. This makes it possible for a transmitter, exclusive of microphone and batteries, to be built into a lipstick container. Range of these small transmitters, under experimental conditions, is reported to be approximately two miles.

N.R.I. ALUMNI NEWS

Frank Zimmer ..... President
Ernest W. Gosnell ..... Vice-Pres.
Harry R. Stephens ..... Vice-Pres.
Chas. J. Fehn ..... Vice-Pres.
Harry Andresen ..... Vice-Pres.
Earl Merryman ..... Secretary
Louis L. Menne ..... Executive Secretary

Gosnell of Baltimore and Andresen of Chicago Are Candidates for Alumni President

THE final tally of the ballots for nomination of officers to serve the NRI Alumni Association during 1948 show Ernest W. Gosnell of Baltimore and Harry Andresen of Chicago the nominees.

Both Mr. Gosnell and Mr. Andresen have served several terms as Vice President of the NRI Alumni Association. Likewise, both served several terms as Chairman of their local chapters after having first served in other capacities. They are very loyal Alumni members and, although only one can be elected, it is a real compliment to both these gentlemen to be nominated for this honor.

In the field for Vice Presidents we have some interesting results. Mr. H. J. Rathbun, who has served Baltimore Chapter as Chairman for several consecutive years, ran very strong. He is easily nominated. Harvey Morris of Philadelphia, who likewise has served several terms as Chairman of his local, also showed much strength and is nominated.

James J. Newbeck of New York and William Peterson, also of New York, were nominated. Both are very active in New York Chapter.

That grand warrior, Harry R. Stephens of Detroit, who can always be depended upon for more than his share of work, was again nominated for Vice President. Charles J. Fehn of Philadelphia, another man who can be depended upon through thick and thin is again nominated for Vice President.

All of the candidates so far mentioned have chapter affiliations. It will be noted that we have two candidates for Vice President both of whom are connected with New York Chapter. It is presumed that New York Chapter members will throw their support to one or the other of these candidates so as not to deprive candidates from other sections an opportunity to serve. The same situation holds true in Philadelphia.

It is always gratifying to have candidates from sections where we have no local chapters. Such candidates deserve special mention because they have no chapter support. Elmer E. Hartzell, who has been a candidate for office on previous occasions, is again a candidate for Vice President. Harold Bailey, Peoria, Illinois, also was a candidate several years ago and again is back with considerable strength.

Thirty-five candidates received votes for President. One hundred and thirteen members received votes for Vice President.

All NRI Alumni Association Members are requested to vote. Please turn to Page 29 of this issue where you will find a convenient ballot for you to mark. Kindly mark the ballot and mail it promptly. Polls close at midnight October 25, 1947.

All elected officers shall serve a term of one year beginning January 1, 1948. Results of the election will be announced in the December-January issue of NR News.

Mail your ballot to C. Alexander, Bookkeeper, in care of National Radio Institute, Sixteenth and Yon Streets, N.W., Washington 9, D. C. Mr. Alexander will head a committee of Tellers to count the votes.

Chapter Chatter

Secretary Lou Kunert of New York Chapter reports they tried something new over there. They organized a public speaker's class . . . The idea being to encourage members to get up on their feet and speak. Of course the subject is always Radio . . . Then at the close of the season they held a speaker's contest in which the winners were Philip Spampinato, Harry Wittenstein and Armand Legenshine . . . the winners received prizes, three of Rider's Manuals . . . Jimmy Newbeck gave a good talk on the action of a condenser . . . Newbeck has been working nights and may miss a few meetings but will be back before long . . . Pete Peterson sold his Radio shop to take a new Radio job with splendid possibilities. Pete has something big up his sleeve but it must be kept a secret until it is all consummated . . . Lou Kunert writes that his report was delayed because of an accident in his home. He does not say what happened but indicates it was not serious . . . We hope nothing happened to Cookie . . . that's Kunert's good wife . . . Others who took part in recent programs were Alex Remer, Pete Peterson, Frank Zimmer, William Fox, Phillip Spampinato . . . The last named gentleman was one of the winners in the speaker's contest, you remember . . . William Fox, by the way, always injects a great deal of humor in his talks . . . had the fellows in stitches about his Television set . . . Eric Chelton, a fine member who was always willing to help, has left us for the West Coast . . . we are sorry to lose him . . . Thank goodness the hot weather is over . . . some talk about suspending meetings during June, July and August next year . . . Speaking of suspending meetings it has been the practice of Detroit Chapter to suspend meetings during July and August . . . meetings were resumed in Detroit on September 12th but this issue went to the printer September 1—too early for a Detroit report . . . they have a great program planned far in advance . . . Let's hop over to Chicago now . . . a good Secretary, that man Louis Brodhage . . . and a fine Chairman too in Steve Bognar . . . been meeting at 2759 South Pulaski Road . . . not the best place in the world but good enough until they find something better . . . Harry Andresen gave a talk on F.M. . . . the boys are whooping it up for Harry for President . . . Lloyd Immel won the door prize . . . a book on Radio Engineering donated by Radolek Company . . . a swell outfit which certainly has given fine support to our Chapter . . . other speakers were Bob Warner and William Grommes. They talked on the Solar Capacitor Analyzer and Signal Tracing . . . Secretary Brodhage would like to see attendance pick up a bit . . . over a hundred members on the list who get notices for each meeting . . . if you are not on the list write Louis Brodhage, 4820 N. Kedzie Avenue, Chicago, Illinois . . . no Chicago picnic this year . . . too busy . . . lots of fun but maybe next year . . . meeting place is being remodeled and should be improved a great deal when we meet in October . . . Over to Philadelphia now . . . Harvey Morris has been knocking around in various Radio servicing jobs for about twenty years and has finally saved his first million . . . established himself in his own business . . . doing very well too . . . that man knows his Radio . . . and Secretary Clifford Hill also has gone into Radio servicing business on his own at 1262 N. Alden Street, in Philadelphia . . . best wishes fellows . . . after a long absence Frank Armstrong showed up at a meeting and the entire group of about fifty stood to cheer him . . . a hard worker for the Chapter whom we are very glad to have back . . . at each meeting now we hold a drawing for a door prize . . . creates a lot of interest and is good fun . . . have a big social party planned for this fall . . . will be something . . . committees at work . . . details later . . . plenty of talks by Harvey Morris, Charlie Fehn and other members of our Chapter . . . things are going great . . . Now let's get on to Baltimore and see what they are doing . . . Secretary Marsh reports plenty of discussion about the new Maryland Sales Tax and how it applies to the servicing work of our members . . . a very interesting discussion on a most important subject . . . good talks by Chairman Rathbun . . . one on F.M. . . . another on Discriminator Circuits . . . Larry Arthur, Vice Chairman and a great utility man who fills in for any officer not present . . . this Chapter also is planning a get-together soon . . . a semi-annual affair . . . one of our meetings was unusual. Our member Thomas H. Clark sent post cards to all of our members whose addresses he had inviting them to a Television showing at his home. We had a very enjoyable evening . . . about two and a half hours of Television . . . during the course of the evening we were well provided with lemonade and refreshments by Mrs. Clark, an excellent hostess . . . Clifford M. Whitt has offered to give a fifteen minute talk on Television at each meeting . . . he is an expert on the subject . . . recently completed quite a tour of Television stations . . . two visitors, Milton Feldman and Victor J. Furst, Jr. . . . glad to have them . . . the fellows are beating the tom-toms for Gosnell for President and Rathbun for Vice President . . . as previously mentioned that goes for Chicago where the fellows are backing Harry Andresen . . . and in Philadelphia where Harvey Morris and Charlie Fehn are candidates for Vice President . . . in Detroit where Harry R. Stephens, also a candidate for Vice President, enjoys great popularity . . . in New York where two hard workers, William Peterson and James Newbeck are candidates for Vice President . . . may the best men win and let us hope we do not get lopsided in any one Chapter . . . only the votes will determine that, so let her go . . . polls close October 25 . . . be sure to vote if you are a member of the NRI Alumni Association . . . by the way how do you like this manner of reporting Chapter activities . . . it is an attempt to pep things up by doing something different . . . best wishes to every member of the NRI Alumni Association.

Alumni President Frank Zimmer Visits National Headquarters

Accompanied by his very pleasant wife, Frank Zimmer spent two days in Washington. The first day was given to a discussion of Alumni affairs with Executive Secretary Menne. The second day, however, was devoted to sight-seeing and relaxation.

In the capable hands of Chief Instructor J. A. Dowie, who acted as guide and chauffeur, Mr. and Mrs. Zimmer visited many of the places of interest in Washington, including the White House, the Nation's Capitol, Arlington Cemetery, the tomb of the Unknown Soldier, and the Washington Monument. Other places visited were the Lincoln Memorial, Jefferson Memorial, the Senate Chambers, and to top it all off, a visit to the beautiful grounds at Mount Vernon, the home of George Washington.

Mrs. Zimmer could hardly wait to see the White House. In fact she didn't wait. While Frank was busy at NRI, Mrs. Zimmer walked from the hotel to the White House and was thrilled beyond words. Later, in the company of Mr. Dowie, the group made a second visit to the White House —a treat the Zimmers say they will always remember.

We know Mr. and Mrs. Frank Zimmer enjoyed every minute of their stay in Washington. They are fine folks and we, too, enjoyed their company.

Election Ballot

All NRI Alumni members are urged to fill in this ballot carefully, following instructions given on page 27. Mail your ballot to National Headquarters immediately.

FOR PRESIDENT (Vote for one man)

- ☐ Ernest W. Gosnell, Baltimore, Md.
- ☐ Harry Andresen, Chicago, Ill.

FOR VICE PRESIDENT (Vote for four men)

- ☐ Harvey Morris, Philadelphia, Pa.
- ☐ H. J. Rathbun, Baltimore, Md.
- ☐ Elmer E. Hartzell, Allentown, Pa.
- ☐ Harry R. Stephens, Detroit, Mich.
- ☐ Harold Bailey, Peoria, Ill.
- ☐ Wm. Peterson, Jamaica, N. Y.
- ☐ James Newbeck, New York, N. Y.
- ☐ Chas. J. Fehn, Philadelphia, Pa.

SIGN HERE:

Your Name .....

Your Address .....

City ..... State .....

Polls close October 25, 1947. Mail Your Completed Ballot to:

C. ALEXANDER, BOOKKEEPER
NATIONAL RADIO INSTITUTE
16th and U Streets, N. W.
WASHINGTON 9, D. C.

Former Alumni President George B. Thompson Is Dead

It is with deep regret we inform our members that Doctor George B. Thompson passed away several months ago. This delayed information came to us through an Alumnus who called upon Mrs. Thompson in Los Angeles.

Doctor Thompson lived to celebrate his fiftieth wedding anniversary. He was eighty-one years of age when he died.

In 1940 Doctor Thompson was elected a Vice-President of the NRI Alumni Association. In 1941 he was elevated to President of our Alumni and again in 1944 he was elected a Vice-President.

Doctor Thompson was a great advocate of home-study training. In his lifetime he took about a dozen correspondence courses of various kinds. He was tremendously interested in young people and always went out of his way to extend a helping hand to an ambitious young man.

The NRI Alumni Association has lost a very loyal and helpful member.

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Difficulties

A would-be aviator made a poor landing as he came down from his third solo flight. Dejectedly he went to the head instructor and said, "I'm sorry sir, but I'm quitting. Flying is too tough and I'll never be a good pilot."

With an understanding smile, the instructor replied, "Son, you've just learned one of the most important lessons in aviation. Flying is tough, and the sooner a student realizes what he's up against, the better chance he's got of coming through the course successfully—and in one piece."

Like the ambitious airman, we must first learn to know "what we're up against"—before we can hope to master an art or a job. Life would lose a lot of its flavor, a lot of its richness and compensations, were there not handicaps to transcend, obstacles to be surmounted, victories to be won. And the man who suddenly becomes aware of the difficulties in his path is taking the first step towards success. The next step is to plan to *overcome* the difficulties and win through to accomplishment.

—*Reprinted from "Ediphone Voice Writing."*

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Politeness costs nothing, and gains everything.
Lady Montagu.

Local Chapter Meetings and Officers

NEW YORK—Meet at 8:15 P.M. on 1st and 3rd Thursday of each month at St. Mark's Community Center, 12 St. Mark's Place—between 2nd & 3rd Ave., New York City.

Chairman, Bert Wappler, 27 W. 24th St., New York City.

Secretary, Louis J. Kunert, 145-20 Ferndale Ave., Jamaica 4, N. Y.

PHILADELPHIA—Meet at 8:15 P.M. on 2nd and 4th Monday of each month at 4510 Frankford Ave.

Chairman, Harvey Morris, 6216 Charles St., Phila.

Secretary, Clifford Hill, 1317 N. Alden St., Phila.

BALTIMORE—Meet at 8:15 P.M. on 2nd and 4th Tuesday of each month at 745 West Baltimore St.

Chairman, H. J. Rathbun, 506 East 26th St., Baltimore.

Secretary, P. E. Marsh, Box 2556, Arlington Station, Baltimore.

DETROIT—Meet at 8:15 P.M. on 2nd and 4th Friday of each month at Electronics Institute, 21 Henry St., corner Woodward (fourth floor).

Chairman, F. Earl Oliver, 3999 Bedford, Detroit.

Secretary, Harry R. Stephens, 5910 Grayton Rd., Detroit.

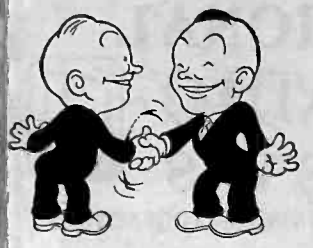
CHICAGO—Meet at 8:15 P.M. on 2nd Wednesday of each month at 2759 So. Pulaski Road.

Chairman, Steve Bognar, 4443 Cortez St., Chicago.

Secretary, Louis Brodhage, 4820 N. Kedzie Ave., Chicago.

Raymond B. Fouke, 220 West Road, Trenton, Mich., in his shop. Ray is one of the shining lights in Detroit Chapter! Note that King Size cash register!

Here And There Among Alumni Members



We were very pleased with the number of N R I Alumni who were able to visit the National Radio Institute during the past S u m m e r months. Among our visitors was John H. Bailey, who is Chief Engineer of Station WJZM, Clarksville, Tennessee.

nri

We enjoyed the visit of R. Cooper Bailey of Richmond, Virginia, formerly a Lieutenant Commander, USNR. Bailey recently had the honor of being appointed a member of a Commission to study public utility conditions in Japan, but was forced to turn down the appointment due to the travel involved.

nri

On his way to California to visit a newly arrived grandchild, Newton M. Usher, of Bermuda, stopped and got acquainted with us here at NRI.

nri

Our last letter from Ralph F. Saba, who graduated from NRI only in March of this year, tells us he has accepted a position with International Harvester, Evansville, Illinois. His work is in Electronic maintenance.

nri

We are very proud of Graduate Martin Prager. He received a one year scholarship at the RCA Institute, in New York City, and has just completed this training. He has his first-class Radio-Telephone license, and has just become an associate member of IRE.

nri

William A. Mueller, NRI Grad of St. Johns, Michigan, now has his second-class 'Phone ticket, and is with the Michigan State Police as a radio operator. This must be exciting at times!

nri

We were happy to receive the announcement of the marriage of Miss Ruth Andresen to R. F. Knoerr. The former Miss Andresen is the daughter of Vice-President Harry G. Andresen, very active member of Chicago NRIAA Local Chapter.

nri

Congratulations to Alumnus A. J. English, who now owns "Professional Electronics," Parkersburg, West Virginia. English has one of West Virginia's finest Radio servicing laboratories.

nri

While vacationing in Washington, Mr. and Mrs. Frederick Mulroney, of Greenfield, Massachusetts, spent a short while at the Institute. We were glad to meet them and show them around.

nri

Parker Ingram and Clifford M. Whitt, of Baltimore Local Chapter, were here for a short visit and chat with L. L. Menne, Executive Secretary.

nri

Thank you, Graduate Vance A. Good, of Mishawaka, Indiana, for the fine photograph you sent to NRI. We like the very good looking test panel you have at your service bench.

nri

L. C. Cadieux, Long Beach, California, now has his first-class 'Phone ticket, and is anxious to locate in a broadcast station.

nri

Other visitors while on vacation were Mr. Benjamin Rose, of Cumberland, Maryland, who has a fine spare-time Radio servicing business; Mr. Henry L. Julian, of Muskogee, Oklahoma, also in part-time service work; Mr. John Zelasko, of Harrison, New Jersey, who took several NRI Professional test instruments home with him; and Mr. Henry F. Munsch, of Pittsburgh, Pennsylvania. We enjoyed meeting all of our NRI graduates from here and there.

nri

Good luck to Alumnus Otho W. Morris, of Hot Springs, Arkansas, who is now opening his own Radio and appliance store. Morris graduated from NRI in September, 1946.

nri

L. J. Goulet is now happily settled with Station WWSR, St. Albans, Vermont, with duties as a broadcast engineer.

nri

Proud daddy! George Deroko, reports the birth of a new 6 lb., 12 oz. son. The name is "Richard." We were also glad to hear that Deroko's spare-time Radio service business is doing well in Central Village, Connecticut.

nri

Owner of a fine full-time Radio service business, Albert E. Hubbard, Hopkinton, Massachusetts, tells us that he is now using every available spare moment in constructing a new home.

nri

New York Alumni Chapter member Franklin Slay visited the Institute and talked with Chief Instructor J. A. Dowie and Executive Secretary L. L. Menne. We hope you enjoyed your visit, Frank.

nri

Good and bad luck is reported from Pittsburgh, Pennsylvania. F. P. Skolnik has just located a new commercial basement for his full-time servicing business. He is now in a very satisfactory location and business is increasing. On the other hand, it was only a short while ago that Skolnik's shop was burglarized and valuable equipment and technical manuals stolen. The loss included his NRI texts and carefully preserved copies of "National Radio News."

Dear Mr. Smith

I am a very enthusiastic booster and attribute what success I may have achieved to NRI.

For the past fifteen years my experience has been entirely in the radio field. I have served as radio operator, monitoring officer, radar field engineer and seismic observer, plus some spare-time servicing. I hold Radiotelephone First and Radiotelegraph Second Class Licenses.

The Electronics-Radio field today includes many specialized branches, each based on the fundamental principles of radio which the NRI Course covers so thoroughly. At present, I am engaged in a very interesting phase of the industry—ionospheric research in relation to radio wave propagation.

The National Bureau of Standards, in conjunction with other scientific organizations, has radio propagation field stations scattered throughout the world. Data from these stations is forwarded to Washington where it is correlated and predictions as to the best frequencies to be used for various distances and times are furnished to interested parties engaged in communications work.

I am at the Adak, Alaska field station where we make measurements every hour of the virtual height and penetration frequency of the different ionosphere layers. The method used is very similar to radar. We radiate pulses of r.f. energy and record their reflections from the ionosphere on an oscilloscope with horizontal sweep calibrated in kilometers.

I wish to thank you for the splendid cooperation you have given me, both as a student and graduate.

Very truly yours,

John W. Pritting

Adak, Alaska

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