

National TECHNICIAN

A Publication Devoted to the Radio Service Industry and Its Problems

VOLUME 1

JANUARY 1936

NUMBER 4

AF-RF
Oscillator
by John Rider

•
Technical
News

•
Association
News



Official Organ of the National Radio Service Association

15c the Copy

\$3.00 per Year

Radio Repairing

NATIONAL RADIO SERVICE ASSOCIATION

The members of this organization have proven their honesty and ability to render the service that they have to sell.



"WHERE TO BUY IT"

- RADIO SERVICE CO., 213 Maryland.....1780
- ACME RADIO SERVICE, 976 Michigan.....9345
- JONES RADIO SHOP.....4697

Do you want to see your shop listed under the above heading in the classified section of your local telephone directory?



Do you want to be a partner of an advertising campaign that will bring you results in the form of more radio calls that will develop into greater success for your business?



Would you like to have the radio stations in your locality constantly telling the radio public where they can find you, and that you are a competent and reliable radio man?



And just think—the profit on the sale of a carbon one-watt resistor will pay for two days of this advertising!



We have used the testing equipment of sound advertising to prove the pulling power of this National Service for you.



Wire or write at once for complete details telling how to put this plan to work for you. No obligations or cost incurred.



NATIONAL RADIO SERVICE ASSN.

714 Anico Building ♦ GALVESTON, TEXAS

Do You Know..

That the "NATIONAL TECHNICIAN" is owned and operated entirely by the NATIONAL RADIO SERVICE ASSOCIATION.

And that every officer of the National Radio Service Association and its affiliated associations are bonifide Radio Servicemen.

That if you are a SERVICEMAN or a member of some association, not affiliated with the NATIONAL Association you are eligible to subscribe to the "National Technician."

That if you are a radio DEALER—JOBBER — MANUFACTURER — manufacturer representative or factory man you are eligible to subscribe to the "National Technician."

And that no one outside of the trade is solicited for subscriptions to the "National Technician."

THAT THE "NATIONAL TECHNICIAN" IS THE RADIO SERVICE INDUSTRY'S ONLY NATIONAL MAGAZINE, OWNED, CONTROLLED, EDITED AND DISTRIBUTED SOLELY BY AND FOR THE RADIO SERVICEMAN.

If you are a member of the RADIO INDUSTRY you should subscribe—News of vital importance to you and your business appears monthly in the "National Technician." You owe it to yourself to subscribe NOW.

Use the convenient coupon below—pin your dollar to it and mail at once—we can not guarantee back copies. Our suggestion is subscribe NOW and keep a complete file.

FILL THIS OUT NOW AND MAIL IT

P. F. METZLER,
714 ANICO BLDG.,
GALVESTON, TEXAS.

Please enter my subscription for the NATIONAL TECHNICIAN for one year, for which I enclose One Dollar. I am a.....
Serviceman—Jobber—Dealer—Mfg., etc.

NAME.....

ADDRESS.....

CITY.....STATE.....

I am a member of the following Radio Organizations:

.....
.....

National TECHNICIAN

Official Publication of the National Radio Service Association

E. H. OLSEN, Managing Editor
W. H. WARMINGTON, President J. SIERCOVICH, Associate Editor
P. F. METZLER, Circulation Manager

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Volume I

JANUARY 1936

Number 4

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Published monthly by the NATIONAL RADIO SERVICE ASSOCIATION at 714 Anico Building, Galveston, Texas. Application for second class matter is pending. We retain the privilege of refusing advertising that is considered contrary to the policies of the NATIONAL RADIO SERVICE ASSOCIATION.

TO SUBSCRIBERS: Instructions for change of address should reach us before the 20th of the month to assure delivery of the forthcoming issue. Please give both old and new addresses. TO CONTRIBUTORS: We are always glad to receive manuscripts, drawings, etc. We will use due care with material in our hands, but cannot be responsible for damages.

AMERICAN PRINTING CO.  GALVESTON, TEXAS



DURING THE past three years, things have happened to this business of servicing radios—things that have never happened before. Believe it or not, we actually have an organization! And it is a national organization at that. For the first time in our history, we have a voice to command respectful consideration. We have, in *The National Technician*, an instrument of that voice. It has proven itself in a skirmish or two—proven that it is capable of much greater things—things against which we have been futilely struggling individually for years.

We have come a long way during these past three years. We have laid a foundation upon which can be built a better future. The most hazardous part of the work has been done. Unremitting, ceaseless, all enduring effort, have seen to that. But the men who have made this possible, the men who have worked that this organization might be, need help. Unless each man in it really belongs to this organization, really gives an unflinching devotion to it, he cannot expect it to produce results.

So-called radio servicemen's organizations have come and gone silently in years past. They have existed beautifully in the abstract theory. Evidently, it was believed that through the miraculous power of the mere conception of an organization, the evils of the profession were to be obliterated. An organization was viewed by many as being a peculiarly endowed machine, operating of itself and requiring no external energy or attention.

Unfortunately, this is not the best of all possible worlds, and such things do not exist. Unless every man puts into this organization everything he has, and does everything in his power to build and mold it into a sound institution, all the work and labor of the past three years shall have been absolutely worthless. It is not a task for one man or for any group of men. It will require the individual effort of every member to make it a success. With proper application, it cannot fail. This is not difficult. Let us attend our meetings, pay our dues, support our organization and its magazine, and prove that we can mold ourselves into a more perfect union.

Let us not adopt the attitude that in doing these things we are doing someone else a favor. The benefits derived from the success of the organization will be the same for everyone. Let us see this association, not as merely another organization, but as **the organization**. The ideals and the principles upon which it is founded are sound. It can fail only through indolence and disinterestedness.

Sound

Convention Notes and News

Every Serviceman Should Attend a Convention this Year.

THE NATIONAL Radio Service Association will only sponsor several district conventions this year in widely separated areas in which the National Advertiser and Manufacturer will be asked to participate, they will be offered display space at these convention sites, which in each case will be district affairs, they will not, however, be asked to subscribe to advertising in the convention program booklets, all such advertising of a national nature will be handled through the official organ, "The National Technician," which has national circulation. During the months of convention activities of the groups affiliated with the National the circulation of the "National Technician" will be increased to almost double its present circulation. Programs, pictures and convention activities of the sponsored groups or associations will be contained for several months in the National Technician.

A brief outline of convention activities as it regards the affiliated organizations of the National Radio Service Association, may not be amiss here, for the guidance of the servicemen and the manufacturer.

In the past it has been the practice of each association either local, state or district to work independently, in getting up their conventions and program booklets or display spaces, this has worked a great hardship on the National advertisers and Manufacturers. This condition since the formation of the National Association has been rectified.

Most state activities this year and in the future, as it regards advertising or support for their state conventions will be confined to their state borders, there should be no efforts to publish large program booklets, that will be mailed outside of their own states. Nor will the national advertisers or manufacturers be asked to take advertising space in their program booklets.

The national office located at 714 Anico Bldg., Galveston, Texas, will be glad to furnish further information or confirm sponsored groups, this information is available to the advertisers and the manufacturers.

DISTRICT

Official dates and announcements for district conventions sponsored by the National Radio Service Association, at present are:

Northwest District, April 5th, 6th, and 7th, Official headquarters, the West Hotel, Minneapolis, Minn.

The Southern convention, May 24th, 25th, 26th, 1936. Official convention headquarters, the Buccaneer Hotel, Galveston, Texas.

For information regarding the above named conventions address the national office or the chairmen at convention headquarters.

Listed is the information as recorded in this office. It will be published in every issue and as further information is obtained it will be added to this list. If any of this data is incorrect, please communicate with this office, giving corrected data.

NORTHWEST.

Held at the West Hotel, Minneapolis, Minn., April 5th, 6th and 7th.

Delegates to the Northwest will be as follows:

	State	Dist.
Minnesota	41	8 1/5
Wisconsin	49	9 4/5
Iowa	39	7 4/5
South Dakota	9	1 4/5
North Dakota	8	1 3/5
Nebraska	24	4 4/5

SOUTHERN

Held at the Buccaneer Hotel, Galveston, Texas, May 24th, 25th, and 26th.

Delegates to the Southern will be as follows:

	State	Dist.
Texas	52	5 2/5
Oklahoma	19	3 4/5
Louisiana	15	3
Florida	16	3 1/5
Alabama	15	3
Georgia	16	3 1/5
Tennessee	21	4 1/5
South Carolina	7	1 2/5
North Carolina	16	3 1/5
Arkansas	8	1 3/5
Mississippi	6	1 1/5

State secretaries are requested to forward district secretaries the list of their state delegates and alternates. Each delegate or alternate will have to present his credentials before being recognized at the convention.



NATIONAL RADIO SERVICEMEN'S WEEK

The National Radio Service Association voted to set aside the fourth week in May of every year as "Radio Servicemen's Week."

This plan is being carried out with the thought of better acquainting the public with the virtues of all radio men and all radio men's associations.

During this week attention will be directed upon the service man and the important part he today plays in the every day life of John Public.

All radio servicemen and all branches of the radio industry are urged to participate in making this a success.

Additional information as to how every branch of the radio industry may participate and derive benefits of this plan will be released each month.

Those desiring additional information may write to the National Radio Service Association, 714 Anico Bldg., Galveston, Texas.

A Versatile AF-RF Oscillator

By John F. Rider

The Description and Pictures of this Multi-Range Oscillator appeared in the September issue of Successful Servicing.

THIS PROVED TO BE the simplest and least expensive of several available circuits tried by the writer, that was consistent with an output of good wave form.

The circuit, which is shown in Fig. 1, may not be familiar, since it is comparatively new, having been an-

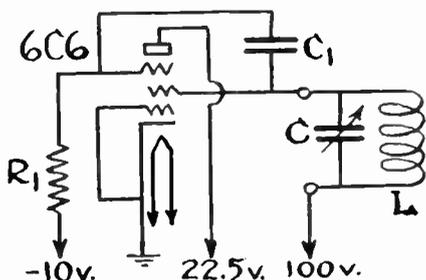


Fig. 1.

nounced a short time ago by RCA. It employs the negative resistance characteristic obtained by operating the elements of the 6C6 tube at suitable voltages and coupling the screen grid to the suppressor grid through a condenser. Without going into an elaborate explanation as to why this circuit oscillates, we can point out that an increase in voltage on the screen is accompanied by a decrease in screen current, because the voltage on the suppressor grid is simultaneously increased (through condenser C1) and in this way the net result is the appearance of a negative resistance at the screen. By the term negative resistance we mean that an increase in voltage results in a decrease in current. If a tuned circuit is inserted at the screen the circuit oscillates at the resonant frequency of the circuit. Like the closely related dynatron oscillator, we have found this 6C6 oscillator to provide a signal of excellent stability and wave form with a minimum of adjustment.

Fig. 2 shows the complete schematic of the AF oscillator and AC-DC power supply. While an amplifier stage is not at all essential to the operation of the oscillator we have included one to facilitate coupling to the oscillator. Furthermore, in some cases, especially testing Class B amplifiers, it is convenient to have an oscillator capable of delivering a fair amount of power. The use of an amplifier also permits working the oscillator at a low level, thus insuring excellent wave form. In this connection we should

state that the potentiometer R2 has been introduced into the circuit to permit the control of the oscillation amplitude. The operation of this control, which varies the amount of negative resistance generated, is not at all critical; in fact, we have found that if reasonable values are used for the LC ratio, excellent waveform is obtained even with the control set to deliver zero bias. In general, increasing the control grid bias will reduce the amplitude of the oscillations and the potentiometer should be adjusted so that no distortion appears in the signal. Again we say that this control is not critical; we have included it because its use results in the generation of a pure sine wave even with high LC ratios. The output control, of the audio taper type, is located in the input circuit of the 76 amplifier tube and requires no further comment. The output transformer may be the universal type, providing a high impedance winding, and a low impedance winding for feeding directly into a 200, or 500--ohm line. The use of a poorly-designed transformer will introduce distortion which is not present in the signal generated by the oscillator, especially at low frequencies.

You may have observed that the diagram shows just a single tuned circuit in the screen circuit of the 6C6 oscillator. We have omitted showing any one definite arrangement, because we feel that you will want to vary the number of frequencies to be made available to suit your own individual needs. Excellent results have been obtained with the arrangement shown in Fig. 3, using two values of inductance and a number of condensers to provide a frequency range from 50 cycles to well above 10,000 cycles.

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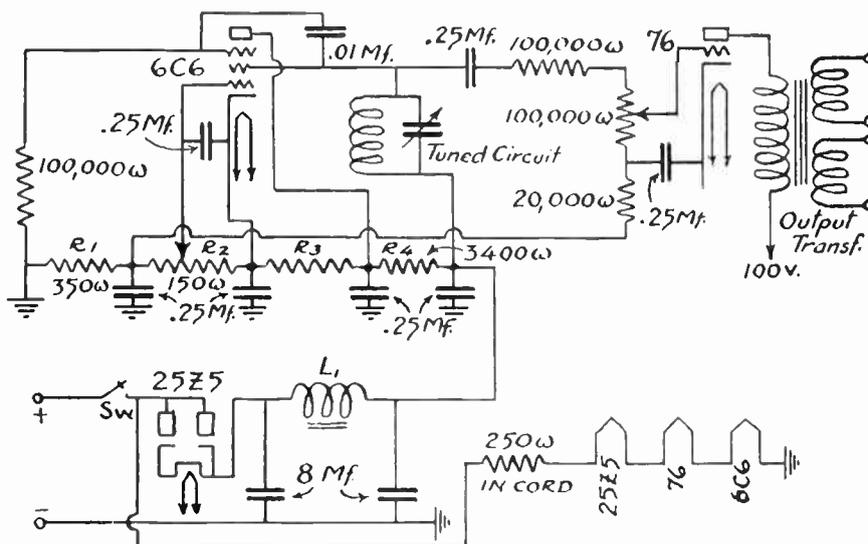


Fig. 2. Schematic diagram of the ac-dc. operated a-f. oscillator. For range of values of tuned circuit see Fig. 3. The 76 cathode connects to the junction of R2 and R3. R3 has a value of 1100 ohms.

A VERSATILE AF-RF OSCILLATOR

(Continued From Page 52)

The capacity values necessary to cover this range, from about .005 to 2 mfd. The primary of a line-to-line coupling transformer can be used to serve as the 5 henry inductance, while the 250 henry choke is readily obtainable at your local jobber.

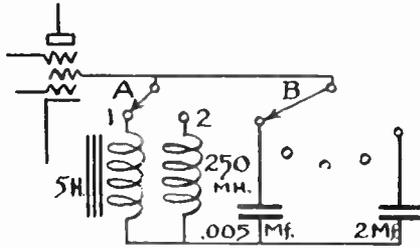
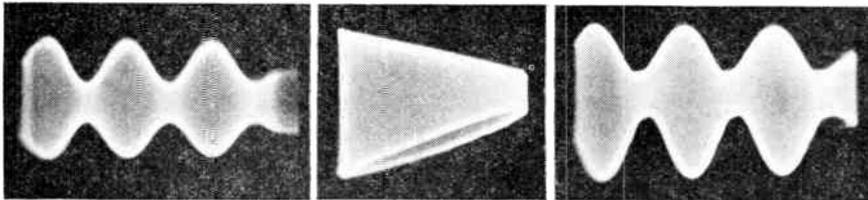


Fig. 3. Detail of the tuned circuit (see Fig. 2) showing the range of values.

We have not felt it necessary to give exact values of capacity since ordinary paper condensers can be used and the exact frequency is not of great importance for most work. Furthermore, since it is intended that this oscillator be used in conjunction with the oscillograph, calibration can be effected using the 60 cycle line or some other frequency as the standard. It is useful to remember that the frequency varies inversely as the square of the capacity; e. g., four times the capacity cuts the frequency in half.



Figs. 5, 6, and 7, from left to right. When a-f. is in the output of the modulated amplifier the patterns of Figs. 8 and 9 result. Fig. 10 results from improper adjustment of the bias on the 6D6.

The stability and excellent waveform, which the 6C6 showed as an audio oscillator, was found to be present to no less an extent when it was used as an RF oscillator. We have long felt the need for a modulated test oscillator which possessed linear modulation by an undistorted audio wave. It occurred to us that the simple two terminal oscillator just described could be used to advantage to serve both as an audio and RF oscillator. For three reasons we decided that a modulated amplifier should be incorporated in the instrument. First, it is highly desirable to isolate the oscillator from the load circuit. Secondly, linear modulation is more easily effected in the amplifier and is independent of the oscillator frequency. In the third place, the incorporation of an amplifier simplifies the problem of attenuating the signal.

The complete schematic of the modulated oscillator is shown in Fig. 4. The RF oscillator is shown in the upper left corner and the circuit follows the same layout as the audio oscillator just described. The circuit will oscillate

readily as high as 15 megacycles; the values of capacity and inductance in the tuned circuit are conventional and will depend upon the frequency range to be covered. To keep the minimum signal low, it is advisable to shield all circuits carrying RF and to arrange the layout to make all RF leads as short as possible. A three step attenuator is provided at the input to the modulated amplifier. This provides a range of signal strength 1,000 to 1. In addition, continuous control of the signal level is provided by the potentiometer in the output circuit of the amplifier.

The audio oscillator employs exactly the same circuit as has been previously described and can be designed to work at any frequency. To obviate the need for an iron core choke, we suggest the use of a 250 mh choke in parallel with a 1mfd condenser; this combination will generate approximately a 1,000 cycle note. Provision is made for external modulation if desired. While the audio oscillator described above can be used to effect the modulation,

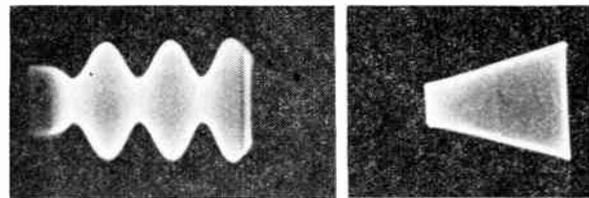


Fig. 8, left. Fig. 9, right. The modulated output of the oscillator of Fig. 4, the modulation being 50%. Note the linearity of the modulation in the corresponding trapezoidal pattern of Fig. 9.

from the standpoint of convenience and ease of operation it is suggested than an audio oscillator working at one frequency be incorporated as shown in the diagram of Fig. 4.

Lack of space prevents us from showing the power supply for this unit. However, it follows along the same lines as that shown in Fig. 2. The voltages required are indicated directly on the diagram. It is important that all voltage taps in the power supply be by-passed to prevent hum, and interaction of circuits.

The modulated oscillator described will find its chief utility in checking for distortion in IF amplifiers and in the broadcast band. The performance of the unit is indicated by the unretouched oscillograms Figs. 5 to 9.

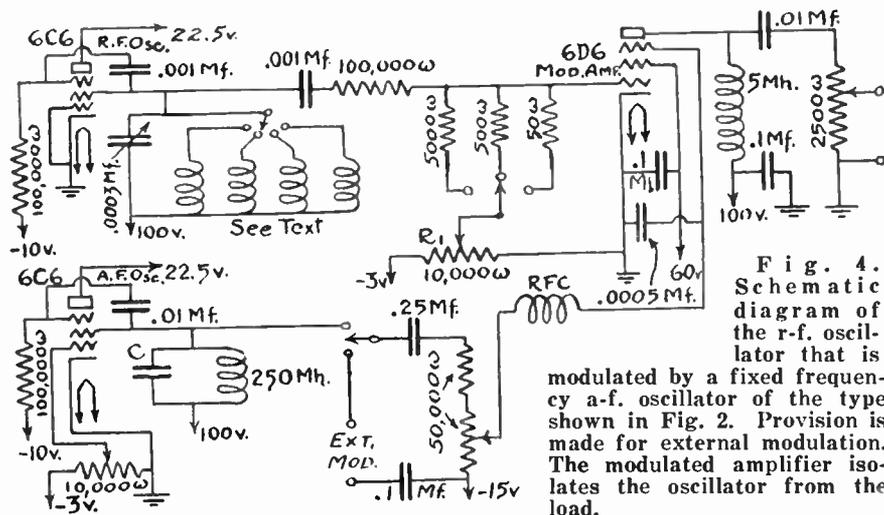


Fig. 4. Schematic diagram of the r-f. oscillator that is modulated by a fixed frequency a-f. oscillator of the type shown in Fig. 2. Provision is made for external modulation. The modulated amplifier isolates the oscillator from the load.

The Month's NEWS

*Brief of Men and Events Associated with the Radio Industry are Published Here
Items Should Reach Us by the Tenth of the Month*

NATIONAL

January found the main offices of the National Radio Service Association running at full speed. This has been the busiest month experienced.

From the letters that have been pouring in one is led to believe that perhaps there were a number of resolutions made and are being carried out. Well, that is what makes the wheels go-round.

Among the letters were some very fine ones from Maryland, Pennsylvania, and the Rochester and Buffalo area of New York. ,

Aside from grinding out about a sack of mail a day, the national secretary's office has been filling out and mailing the 1936 registration cards. The secretary reports that all cards will be completed and in the mail by the end of January.

Organization's thoughts and activities are now turning toward the coming conventions, trade shows, and state universities' short courses, which will be conducted throughout the United States. Last year's attendance at these were greater than anyone anticipated. This year will be the largest yet experienced, every radioman in the country is planning on attending at least one of the above mentioned activities and many are looking forward to attending all.

Anyone wishing information concerning either the Radio Short Course or convention nearest to them can write to this magazine.



TEXAS

Well, the old gun-toting, oil-producing, steer-grazing State of Texas started the new year with a bang. Most of the local organizations had their yearly election of officers.

Ray Samberson of San Angelo sends word that their local had one of those good old-time meetings—the kind that about turns the chairman into a referee. But it seems that they had to have one in order to get their business ironed out, which they did to the complete satisfaction of all. Once in a while a meeting of that sort acts as a tonic or stimulant to the local, and peps up when activities grow lax.

The San Antonio chapter is on the home stretch for the advertising of 1936. Their advertising will consist of listing the members under the national emblem in the telephone directory and programs over two of their local radio stations. This will be in full swing by February.

The district meeting held in Houston on January 3rd was a success PLUS. A summary of the National's activities were outlined for this year, and samples of advertising material that will soon be available to the members was shown. This district will start their radio advertising about the first of February. Plans at the present call for three programs a week for four months.

A few of the old guards of the Houston Craftsmen were present and bemoaned the fact that their organization was dead. That was funny, because after all, the members are the organization and if they claim the organization is dead, that must mean they are dead. However, promises were made that they would be back in their old stride within

two weeks and prove that one of the oldest radio organizations can again step out and lead in local associations. Well, Houston, we are watching you. What will be the report in next month's National Technician? We hope it will be good.

The Sabine District, composing of Beaumont, Port Arthur and the surrounding territory, held a meeting on January 10th. This was the first district meeting these boys held this season. Last season it was a monthly affair and proved very successful. Although Beaumont has never gone in for a lot of inter-organization publicity, the records show that they have been for the past two and one-half years the most completely organized city in the country, and all indications show that they will remain in that position for a while longer. They have also been the most prompt in attending to state, district, and national matters, and have always been the first in sending in their dues. A lot of credit can be given to their secretary, Mr. Mabry, and the state director from that district, Mr. Aubey.



LOUISIANA

The Louisiana Radio Service Association has been slowly growing to what will soon be a very healthy organization. They were not prepared last year to send a delegation to the Southern convention, but plan to be well represented this year.

Radio servicemen in Louisiana wishing further information concerning their state association should communicate with Mr. Herbert Edelen, 936 Louisiana Ave., Shreveport, La.

Mr. Metzler on his trip to Galveston reported that the McKee Radio Service, of West Monroe, Louisiana, was the cleanest, neatest, and finest appearing radio that he had ever seen.

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Radio Service Co., Fayetteville, North Carolina.

NEW MERCHANDISE

RCA HELPS SERVICEMAN WITH THREE-POINT PLAN

A three-point service system, which is designed to help the radio serviceman get more business, facilitate his handling of it and organize his methods and accounting so as to insure the most profitable operation, was announced by the RCA Parts Division, at Camden, New Jersey.

First of the three elements in the new RCA parts plan is a radio service "tip" file consisting, initially, of a collection of 200 labor and time-saving ready-reference answers to difficult service problems as they are likely to be encountered in actual practice. All of these tips have been culled from among a large collection of such solutions contributed by servicemen from first-hand experience in the field. They are housed in a handy metal file cabinet, which will accommodate 1200 similar three-inch by five-inch cards for additional information. The RCA Parts Division will add to this "tip" collection from time to time.

Second, is a volume entitled "101 Service Sales Ideas," in which have been gathered the business-getting ideas which have been most successfully tried and proven in a wide field of application. They are grouped under such classifications as New Sources of Income; Organization; Personality; Goodwill; New Business, Publicity and Financial Hints.

The third, is a carefully written book on service business methods, by John F. Rider, widely known radio service expert, in collaboration with J. Van Newenhizen, radio auditor and accountant. In it, such pungent topics as What to Charge; How Much for Rent; Advertising; A Profit on Your Investment; Simplified, but Informative Record keeping, are discussed by men whose practical experience in this phase of radio work extends over a long period of years. Primarily, it should help the radio service engineer, unfamiliar with bookkeeping, to maintain an orderly accounting system which will keep him informed of his financial progress with a minimum expenditure of time and effort.

Servicemen may obtain the RCA Three-Point Service System from their RCA parts wholesalers in accordance with the following plan. A serviceman ordering RCA parts (not including test instruments) totalling five dol-

lars, automatically become eligible to receive the Three-Point Service System for \$1.50, plus a deposit of a like sum which is later refunded. He immediately gets possession of the steel file containing 200 service tip cards. He also gets the "101 Sales Ideas" book. For every additional ten dollar purchase he receives another packet of 20 service tip cards. The Rider-Newenhizen book of Service Business Methods will be off the presses early in March. When the total purchases reach \$60.00 the small deposit is returned and he will have acquired the complete Three-Point Service System for \$1.50, or less than the cost of the file cabinet alone.



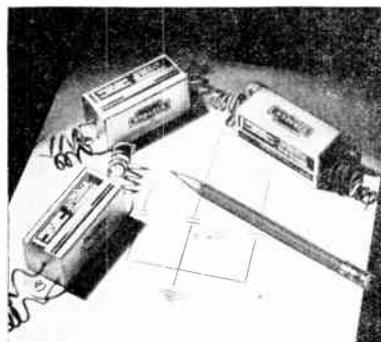
LINE VOLTAGE DROPPING RESISTOR TUBE

Resistance elements for use in series with tubes and pilot lamps operated on 110-volt circuits, are offered in a convenient unit developed by Clorostat Manufacturing Co., Inc., 285 N. 6th St., Brooklyn, N. Y. The unit has a perforated metal housing similar to the 5Z4 metal tube, and fits in the new octal socket.



SPRAGUE "TINY-MIKE" ANNOUNCED

An unusually small dry electrolytic condenser of full capacity and 450-v working voltage has just been perfected and placed upon the market by Sprague Products Company, North



Adams, Massachusetts. The condenser is called the Sprague "Tiny-Mike," Type TM.

Basing their size comparisons upon their own standard types, the makers of "Tiny-Mike" assert that this little fellow actually fits into one-half the space occupied by standard condensers of equal capacity. This makes an ex-

ceptionally compact unit—although one that is large enough and so constructed as not to overheat. Like other Sprague Condensers, the TM units are guaranteed unconditionally when used on any voltage up to their rated capacity.

"Tiny-Mike" condensers are an ideal low cost replacement for any of the electrolytic condensers used in modern radio sets, wet or dry. Where economy is a factor, "Tiny-Mikes" may be used to replace any cell in multiple units, and where exceptionally high capacity is wanted two or more TM units may be combined in parallel.

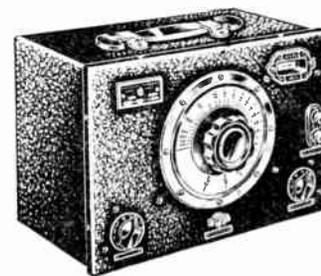
"Tiny-Mike" condenser is fully described in the Sprague 1936 Catalog which will be sent upon request.



CLOUGH-BREngle INTRODUCES NEW LOW PRICE AUDIO OSCILLATOR

An instrument entirely new to the radio and public address field is introduced by the Clough-Brengle Co., in their Model 79 Beat-Note Audio Oscillator.

This instrument generates a pure sine-wave audio voltage, variable from zero to 10,000 cycles per second, for the checking of gain and wave shape



distortion in the audio systems of radio sets, public address amplifiers, and radiophone transmitters.

In radio receiver servicing, it is used to modulate test oscillators over the entire audio spectrum and thus completely checks a radio set at all frequencies—instead of checking it at the 400-cycle audio frequency only. This test is useful in determining the relative frequency gain or reproduction curve of any receiver, and is absolutely essential in checking the true performance of a high fidelity set.

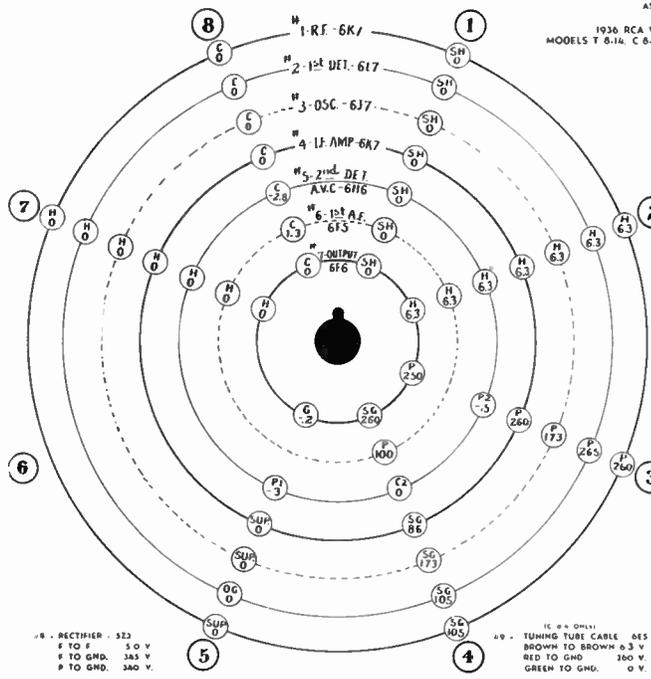
The output is 27 volts at 5000ohms, and is uniform within 2 decibels over

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BULL'S-EYE SOCKET - VOLTAGE CHARTS FOR NEW "OCTAL" METAL TUBE SOCKETS

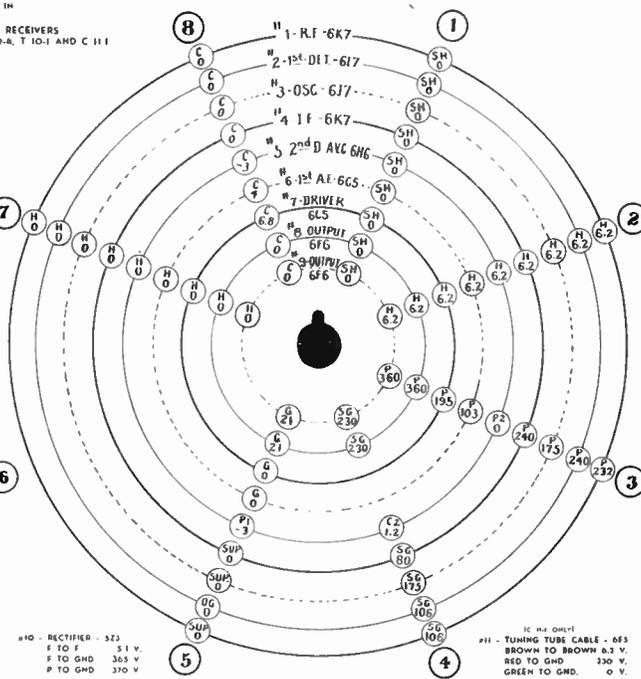
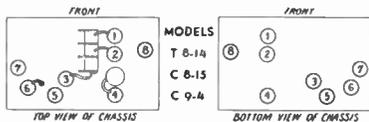
AS USED IN

1936 RCA VICTOR RECEIVERS
MODELS T 8-14, C 8-15, C 9-4, T 10-1 AND C 11-1



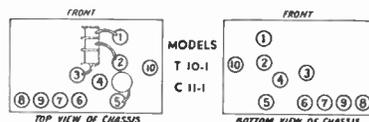
#8 - RECTIFIER - 5Z3
F TO F 5.0 V
F TO GND. 365 V
P TO GND. 360 V.

#9 - TUNING TUBE CABLE - 6ES
BROWN TO BROWN 0.3 V
RED TO GND. 160 V.
GREEN TO GND. 0 V.



#10 - RECTIFIER - 5Z3
F TO F 5.1 V
F TO GND. 365 V
P TO GND. 370 V.

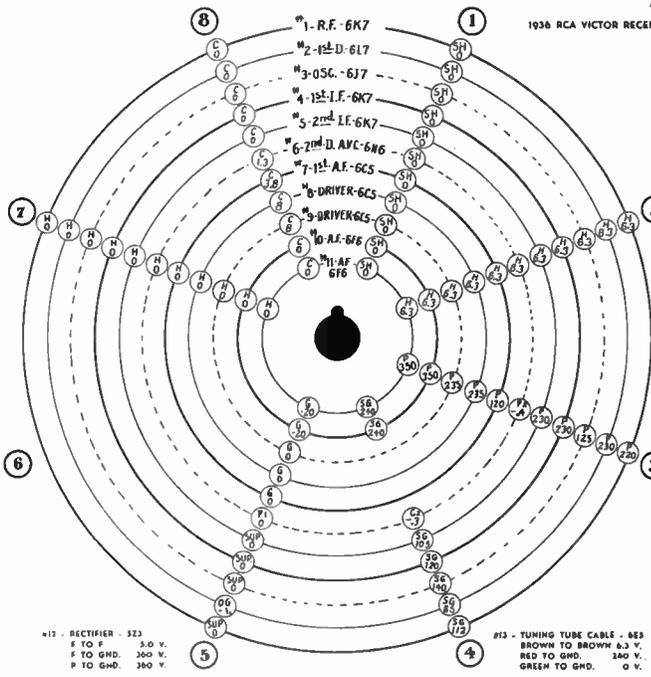
#11 - TUNING TUBE CABLE - 6ES
BROWN TO BROWN 0.3 V
RED TO GND. 160 V.
GREEN TO GND. 0 V.



BULL'S-EYE SOCKET - VOLTAGE CHARTS FOR NEW "OCTAL" METAL TUBE SOCKETS

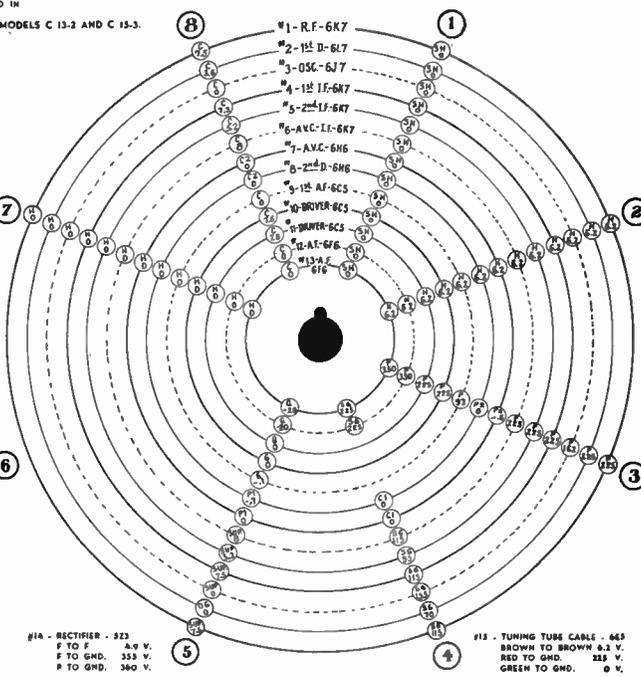
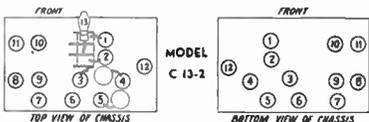
AS USED IN

1936 RCA VICTOR RECEIVERS, MODELS C 13-2 AND C 15-3.



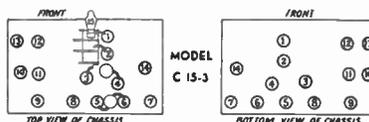
#12 - RECTIFIER - 5Z3
F TO F 5.0 V
F TO GND. 360 V.
P TO GND. 360 V.

#13 - TUNING TUBE CABLE - 6ES
BROWN TO BROWN 0.3 V
RED TO GND. 160 V.
GREEN TO GND. 0 V.



#14 - RECTIFIER - 5Z3
F TO F 4.9 V
F TO GND. 355 V
P TO GND. 360 V.

#15 - TUNING TUBE CABLE - 6ES
BROWN TO BROWN 0.3 V
RED TO GND. 160 V.
GREEN TO GND. 0 V.



INSTRUCTIONS: Each bull's-eye represents the under-chassis socket terminals for the receiver models indicated. Each large circle represents the particular socket-pin layout for which it is labeled. The small outer circles indicate the pin numbers. The upper and lower designations in each small circle, on the large circles, indicate respectively; PIN CONNECTION and PIN VOLTAGE TO GROUND. All heater voltages and plate-to-ground rectifier voltages are a-c; all other voltages are d-c. At the lower left are voltages for the rectifier tube; at the lower right, voltages for the tuning-tube cable.

THE MONTH'S NEWS
(Continued From Page 54)

MINNESOTA

Due to the great amount of work on the coming Northwest convention, Minnesota failed to get a release in this month.

However, from the letters they have been writing one can see that their convention this year will be a WOW!

The manufacturers' representatives in that territory have meetings once a month, and from all indications are doing all they can to assist the Northwest District.

President W. H. Warmington continues promising himself and all concerned that he is going to write an article for the National Technician. This has only been going on for four months now, so perhaps the next issue will find a masterpiece of his in it.

TENNESSEE

Memphis and Knoxville are sick in bed with a bad case of inorganization-itis. A couple of months ago they were very healthy and going at top speed, but the common old ailment overtook them.

The cases have not been completely analyzed as yet, but the very fine Doctors, Mr. Baker of Memphis and Mr. Carter of Knoxville, have the case well in hand and as soon as they have finished with their analysis they shall prescribe and administer the necessary medicine.

SOUTH DAKOTA

Robert A. Haines.

After the organization of the South Dakota Radio Service Association No. 739 and electing the state Board of Directors of 15 men (based on an estimated total number of 300 radio servicemen in the state) at a statewide convention at Yankton just before the first of November, 1935, the immediate concern of the Board officers was that of getting active local chapters set up and functioning. While yet at Yankton, the Board officially recognized the local group which had previously been an independent non-affiliated unit, as Yankton Chapter No. 7391; in addition there was set up a South Dakota Chapter-at-Large No. 7392. The latter was created to act as a flexible "holding association" for the men who were desirous of immediately joining the organization and yet who were too remotely located to associate with any local chapter operating at the time of such individual affiliation. It is anticipated that as chapters are later added that these men will transfer affiliation to one of these located at some point near them.

As a result of severally carefully arranged meetings at which formation plans were considered and worked out, the Sioux City Chapter No. 7393 became existent and active on the 25th of November. This Chapter embraces the city of Sioux Falls and its surrounding trade zone. Several very worthwhile meetings have since been held and the group is forging ahead to do a real job of handling the existent local service problems.

With the passing of the holidays and the natural resultant lull in activities, a program is now being mapped out for further organization of chapters throughout the state. It is expected that the next chapter to be formed will be one in the rich Black Hills area with headquarters in Rapid City. Interest is running high in this zone and chances are excellent that before long the Black Hills group may be one of the outstanding state units. Other chapters are planned for Aberdeen, and a combined unit for Huron and Mitchell.

By the time of the big Northwest District Convention in Minneapolis to be held at the West Hotel April 5th, 6th, and 7th, South Dakota expects to be able to present an enthusiastic report of a unified state-wide organization

which will proudly reflect the interest and activity of the many men now engaged in forwarding this movement dedicated to better radio service business.

Since its official inception on November 25th, 1935, the Sioux Valley Chapter No. 7393 has been striving to make each of its meetings interesting and worthwhile to all the members. The membership includes servicemen living as far as forty-five miles from the city of Sioux Falls where all meetings are held, and it is the aim of the officers to make the meetings particularly attractive to those who must drive considerable distances for each meeting. To this end, all business is planned by the Chapter Board of Directors before each meeting and concisely presented to the membership with limited overall time allotted for discussion.

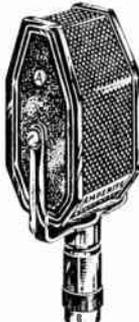
At the conclusion of each business session, one of the members who has been notified in advance by the Chapter President, presents a technical talk, usually with demonstrations. At the December 2nd meeting, "The Theory and Application of the 6E5 'Magic Eye' tube" was presented by Bob Haines, while Louis Warren spoke and demonstrated very effectively with the aid of the Cathode Ray Oscillograph the "Operation of 6-Volt Vibrators" on December 16th. It was decided to postpone the next meeting until after the holidays, and January 6th was selected as the date. At this meeting, the topics of "The Application of the RCA Piezo-Electric Calibrator" and "Triple-tuned IF Transformers as Applied by Crosley" will be given by Charles Cushman, with accompanying demonstrations. Future subjects are under consideration by the President for assignment to other members.

(Turn to Page 58)

AMPERITE HIGH LEVEL VELOCITY

Operates WITHOUT PRE-AMP
HIGH IMPEDANCE—2000 OHMS
THIS MICROPHONE IS HIGH ENOUGH IN IMPEDANCE TO OPERATE DIRECTLY INTO GRID . . . BUT NOT HIGH ENOUGH (ONLY 2000 OHMS) TO INTRODUCE SERIOUS LOSSES IN LINE UP TO 200 FEET.
Requires no pre-amp when used with regular high gain amplifier (100 DB)
Replaces condenser and crystal microphones NO CHANGES or additions necessary **ELIMINATES INPUT TRANSFORMER** and its losses Therefore requires 12 db. less overall amplification **ELIMINATES INDUCTIVE HUM! ELIMINATES FEEDBACK!**
Lifelike brilliance! Excellent on close talking

ELIMINATES HUM TROUBLE



MODEL RB-H. for speech and music. LIST \$42.00 with coupling. MODEL RB-H. for speech, but can also be used for music. LIST \$32.00 with coupling.

New! POSITIVE-AND-SMOOTH-ACTION STANDS

Positive, NON-SLIDING ball-bearing clutch! Will never wear out . . . never require adjustment. WILL NOT "CREEP." Tightens with only one-eighth turn of clutch.

MICROPHONE can be ROTATED WITHOUT LOOSENING CLUTCH. Smooth, PNEUMATIC-LIKE ACTION up and down.

A model for every purpose . . . studio, P. A., desk, banquet, and portable. SCIENTIFICALLY DESIGNED AND STYLED. See one at your distributor.

WRITE FOR ILLUSTRATED BULLETIN S.

WRITE FOR BULLETIN H.

FEATURING NEW PATENTED CONSTRUCTION



MIKE ROTATES WITHOUT LOOSENING CLUTCH

CLUTCH TIGHTENS WITH 1/8 TURN

PAT. PEND.

AMPERITE Company 561 BROADWAY NEW YORK

AMPERITE HIGH LEVEL VELOCITY MICROPHONE

THE MONTH'S NEWS
(Continued From Page 57)

The Chapter is planning a comprehensive campaign against noise throughout the territory covered by the members, and a committee has been formed to consider the problem and outline the basis for bringing the need of Noise Elimination to the general public attention.

SSSS
MARYLAND

The local organizations throughout this entire section have their eyes turned toward the Bedford Conference. This conference which is to be held at the Hotel Pennsylvania on January 25th, has many weighty problems to consider.

The conference will get under way at 4 P. M. There will be an hour's recess at 6 P. M., reconvening at 7 P. M. and staying in session until all business is transacted.

Our sympathies are extended to Mr. Weipert who is just recovering from what threatened to become pneumonia.

SSSS
OKLAHOMA

Secretary L. G. Dearing reports intense activity in the the Oklahoma State Association.

Their state convention will be held some time during the month of April. The definite date has not been set.

Mr. E. M. Arnold is the newly elected secretary-treasurer of the Stillwater Chapter.

Oklahoma's delegation to the Southern convention this year will be one of the largest Oklahoma has ever sent.

SSSS
It is necessary that the local organizations send in news of their activities if they wish to see their organization represented in these columns. Appoint one man to take care of that job. It will only take about thirty minutes of his time each month.

ST. PAUL, MINN.

At the regular business meeting of the St. Paul Chapter No. 7212 held January 9th at the Hall Electric Co., the following men were elected for the coming year:

Mr. F. F. Polsky, president; Mr. Paul Davis, vice-president; Mr. Noel J. Granger, secretary-treasurer. The new trustees are: Mr. Ralph Pringle, Mr. Willius Bisenius, Mr. John J. Reider.

A resolution was presented instructing the association to send a letter and a copy of the National Technician to every radio serviceman in the city, as a start in an intensive membership campaign for the St. Paul Chapter. This resolution received unanimous approval.

Cut prices came in for quite a discussion and ways and means were debated as to how to combat this evil. A Philco All-Wave Aerial Kit was awarded as a door prize.

SSSS
MASSACHUSETTS

Words of encouragement and activity continue to pour in from the state of Massachusetts, and the radio servicemen of that section take the business of organization seriously. Everything they do receives considerable thought and study before they go ahead, their plans are well thought out and laid and they are building a solid foundation on which to assure future successful operation of their organization. Their progressiveness is shown in part by being able to publish their own monthly organ known as the R. T. G. News, which is a very attractive and newsy little publication, and they are to be commended on the fine work in getting up this booklet. The editorials should command the attention of all servicemen, they are very interesting and instructive. A reprint of one of these editorials will be found on page 63.

SSSS
WASHINGTON

A letter from Spokane, Wash., announces that the matter of affiliation with the National Radio Service Association had been discussed and considered by that organization, and that at their next meeting date, January 20th, 1936, in the regular order of business the matter of affiliation will come up for further discussion and a vote. The Washington organization is a very active and progressive group of radio servicemen, their activities and progressiveness drew national attention last year, and when their rights were encroached upon, they had the courage to back up their convictions against heavy odds. The Independent Radio Servicemen's Association all over the country, that now compose a large part of the National Radio Service Association, came to the aid of these boys in their hour of need. The leaders of the various groups

(Turn to Next Page)



WUXTRA!
DOC MANUAL
WITH
UNCLE SAM'S ASSISTANCE
Wants to Bring You
Successful Servicing

RIDER'S FREE Monthly House Organ
This is a service for you owners of
RIDER'S MANUALS

It will keep you constantly informed of manufacturers' changes in chassis already published . . . An article every month on an up-to-the-minute subject.

MAIL THE COUPON TODAY

Doc Manual, c/o John F. Rider, 1440 Broadway, New York City.
Please send me your **FREE SUCCESSFUL SERVICING**

Name _____
Address _____



NEW LOW PRICE
on
AMPERITE
CURRENT AND VOLTAGE
REGULATORS

Amperite replacements for AC-DC sets now LIST \$1.25. Amperite 3-40 can replace AC-DC set regulators 50x3, 300, and 5B. Also new low price on replacements for 2-Volt Battery Sets, List \$1.60

Write for CHART CV.

AMPERITE Co. 561 BROADWAY N. Y.

at once realized the need of a national organization, and set the necessary machinery in motion toward that end. Now the independent servicemen have their eyes on Washington, to see what the decision of the Washington group will be. Boys, we're counting on you.

LAST MINUTE FLASH!

Just as this issue goes to press the good news comes from Washington, in the form of a telegram, which reads in part as follows: "The Radio Association of Spokane as assembled go on record as approving affiliation with National Radio Service Association."

MICHIGAN

A letter received from the Kalamazoo, Michigan, Association indicates that the boys in that city are becoming very active in helping to rid the city of man-made static. They are to be highly commended for such activities and, no doubt, will win the support of the radio owners of Kalamazoo. There is already on the law books of that city an ordinance that outlaws man-made interference. The matter of interference is becoming an ever increasing problem in all cities, and many a sale is lost due to interference. The Kalamazoo boys request all possible information on this matter, and the national office joins in that appeal by asking that all servicemen, engineers or manufacturers that have had any experience, or have information or manufacture equipment that will assist in interference elimination, to kindly get in touch with the national office, so that it may be passed on to various interested associations and servicemen.

BOY! OH BOY!

TYPE J-EH

THE RIGHT CONDENSER!

For AC-DC Midget Servicing

COMPACT 1 1/4" square by 3" long, the type J-EH C-D electrolytic will squeeze into the smallest corner of any midget receiver.

DEPENDABLE Type J-EH electrolytic "Stays put." No kicks or profitless return calls. Build your "rep" and add "steady" customers by using Type J-EH, the condenser designed for

General catalog 128 and replacement catalog 129 available upon request.

The leading jobbers in the country carry "the world's most complete condenser line."



servicing AC-DC midget receivers.

CONVENIENT Don't turn away midget service calls because you can't obtain the right replacement. Type J-EH supplied with separate terminal leads will "pinch-hit" for the meanest condenser combination.

Also a complete line of mica, paper, electrolytic and oil condensers available.

CORNELL-DUBILIER CORPORATION

4375 BRONX BOULEVARD NEW YORK

ATWATER KENT MODEL 165 (And Those Using 2A6 Tube.)

Audio howl apparent only when tone control is turned to high position, is very frequently traced to a defective volume control. The action of the control may be smooth and, apparently all right, but when checked with an ohm-meter, it may be found to have a resistance of as high as one megohm instead of its rated 500,000 ohms. The two megohm grid resistor in the same tube circuit may have changed its value also.



417

things every

SERVICE MAN must KNOW!

Yes, believe it or not, a serviceman today must have at his instant command 417 different kinds of data in order to do his work successfully and hold his own against competition. How many of these things do you really know? Be honest with yourself—just take out a pencil and put down on paper a list of all the different things you are confident you've mastered. A few of them are listed below. The rest of the 417 are tabulated on a check-sheet which we'll be glad to send you free. Just ask for it by mailing the coupon. It'll help you check up on your present store of radio information—the equipment most essential in your business.

Here are just a few of the 417—

TEST INSTRUMENTS
All about the latest commercial models of all kinds . . . See pages 5 to 425 in MODERN RADIO SERVICING, which will also tell you how to build your own if you wish to. This section could make a complete book in itself.

LATEST TEST METHODS
Test procedures that have proved most successful with the best servicing organizations in the country . . . In MODERN RADIO SERVICING there are 121 pages, illustrated, that give you all of them.

LATEST REPAIR METHODS
Real time-saving methods for making every kind of radio repair . . . They're all explained and illustrated in MODERN RADIO SERVICING.

ALIGNING SUPERHETS—THE CATHODE-RAY OSCILLOSCOPE
You can't afford to let any T-R-F or superhet alignment job haffle you. . . . You can crack the hardest cases when you apply the dope in MODERN RADIO SERVICING, which also tells you all about how to use the Cathode Ray Oscilloscope in your work.

NOISE AND INTERFERENCE
One of the biggest bugabos of all servicemen. You can't know too much these days about how to track down and eliminate all kinds of noise and interference . . . MODERN RADIO SERVICING gives you 120 pages full of hard facts.

How well do you know these? How many more do you know?
SEND FOR THE CHECK-LIST OF 417 THINGS YOU MUST KNOW

You'll find complete information on all these and many others in—

MODERN RADIO SERVICING

By Alfred A. Ghirardi
1300 pages. 706 illustrations. 723 Review Questions.

TOGETHER WITH 240-PAGE RADIO FIELD SERVICE DATA Supplement \$5.00

RADIO & TECHNICAL PUBLISHING COMPANY
45 Astor Place, N. Y. C. Dept. NT-1.

Please send your Introductory Combination Offer of both books at \$5.

Please send FREE CHECK-LIST of 417 Things Every Service Man Should Know.

Please send free descriptive literature.

ADDRESS _____

NAME _____

OCCUPATION _____

FREE CIRCULARS

MAIL TODAY

NEW MERCHANDISE

(Continued From Page 55)

the range of 50 to 10,000 cycles. The wave shape is a true sine and is free from harmonic distortion.



NEW YAXLEY REPLACEMENT MANUAL AND SERVICE GUIDE

The Yaxley Manufacturing Division of P. R. Mallory & Co., Inc., Indianapolis, Indiana, have recently released for distribution to radio servicemen and technicians, the 1936 edition of the Yaxley Replacement Volume Control Manual and Service Guide. Company executives report that twenty-four months were devoted to the preparation of the material in this new manual. Five radio service engineers, especially trained for the task, compiled, checked and rechecked the tremendous amount of data it contains.

The first edition of the Yaxley Replacement Volume Control Manual, issued in 1934, was recognized as the most complete and comprehensive of its kind ever published. The new edition is even better. It lists over five thousand set models. It provides more factual data and contains a complete

catalog of Yaxley approved radio products.

Any authorized radio serviceman can obtain a copy of this new manual, containing 159 pages of valuable data and information, by addressing the Yaxley Division of P. R. Mallory & Co., Inc., Indianapolis, Indiana.



NATIONAL UNION ANNOUNCES APPOINTMENT OF TWO MANAGERS

Mr. F. J. Wessner, general sales manager of National Union Radio Corporation, announced the appointment of Mr. Ross Turner as district manager in charge of N. U. sales in the states of Texas and Louisiana, with headquarters at 512 Medical Arts Bldg., Fort Worth, Texas, and Mr. Lloyd Marsh as regional manager in complete charge of the Washington, Montana, and Idaho territory.

Mr. Marsh, a veteran in the radio industry, is well known throughout the Northwest and has established a brilliant record for National Union tubes as district manager since 1933.



417 THINGS EVERY SERVICE-MAN SHOULD KNOW

RADIO AUTHORITY SAYS SERVICE-MAN MAY BECOME "WALKING ENCYCLOPEDIA"

Alfred A. Ghirardi, author of the world-famous Radio Physics Course, has discovered, in gathering material for his recently published Modern Radio Servicing, that the up-and-coming radio serviceman of today uses 417 different kinds of specialized information in his work, and that he has to have all this mass of information available at a moment's notice.

"Competition has brought about a

state of affairs," says Mr. Ghirardi, "where a serviceman's success today may be directly measured by his supply of information. Unless this information were available in one quickly accessible source, a serviceman would have to change himself into a walking encyclopedia."

Among the 417 things every serviceman should know about, Mr. Ghirardi lists test instruments, latest test methods, latest repair methods, AVC and QAVC circuits, intermittent reception, hum, distortion, aligning receivers, the Cathode-Ray Oscilloscope, auto-radio, all-wave receivers, noise, interference, high-fidelity receivers, sales and advertising methods, intermediate frequencies, "case histories," and auto-reference data.

The entire list of 417 is available without charge from the publishers of Modern Radio Servicing, Radio & Technical Publishing Co., 45-Q Astor Place, New York City.



G. W. DAVIS APPOINTED CHICAGO REPRESENTATIVE FOR THE P. R. MALLORY & CO.

Mr. G. W. Davis, formerly assistant manager, wholesale division of the P. R. Mallory & Co., was recently appointed as their representative for the Chicago division.

Mr. Davis will call on jobbers in Illinois, Iowa, Wisconsin, and Northern Indiana.



NEW P. A. ANALYZER.

The Supreme Instruments Corporation of Greenwood, Miss., announces their model 491 theater, P. A. and radio analyzer which supersedes their model 391. The 491 is a newly developed instrument built primarily to take care of the needs of theater projectionists and P. A. engineers.

Rotary switches—completely internal resistance measuring power supply—both point-to-point and selective analysis (socket) testing methods—multiple-range meter (including 6 D. B. ranges)—all combine in making the supreme model 491 a most unique test instrument.



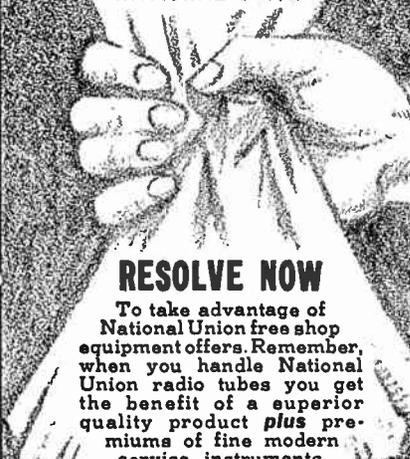
RCA SERVICE MEETINGS

The following dates and locations are the schedules of the first of the spring series of service meetings, sponsored by the RCA Manufacturing Co., Inc., Service Division, Camden, New Jersey, in the Southwest. For other dates and locations, refer to any RCA distributor.

- New Orleans, La. February 3rd
- Houston, Texas February 5th
- San Antonio, Texas February 7th
- Fort Worth, Texas February 11th
- Dallas, Texas February 13th

GRASP IT—SERVICE DEALERS!

1936 OPPORTUNITY TO OWN FINE SHOP EQUIPMENT FREE OFFERED BY NATIONAL UNION



RESOLVE NOW

To take advantage of National Union free shop equipment offers. Remember, when you handle National Union radio tubes you get the benefit of a superior quality product plus premiums of fine modern service instruments.

NATIONAL UNION RADIO CORP. OF NEW YORK 570 LEXINGTON AVENUE, NEW YORK, N. Y.

What is your 1st special equipment opportunity for 1936?

Name.....
 Street.....
 City..... State.....

The New MALLORY Condenser Service and Replacement Manual IS READY!



Have you received your copy? If you have not write us—

P. R. MALLORY & CO., Inc., Indianapolis, Ind.
 CABLE ADDRESS—PELMALLO

U. S. YEARLY RADIO BILL 700 MILLIONS

Listeners Spent 590 Millions on Their Radio Sets in 1935; Broadcasters Put 110 Millions Into Air Shows.

Nearly three-quarter billion dollars was the cost of entertaining America by radio during the 12 months just closed, according to figures given before the Radio Club of America at Mavemeyer Hall, Columbia University, New York, last night, (Thursday, Jan. 16) by Dr. Orestes H. Caldwell, editor of "Radio Today" and former Federal Radio Commissioner.

Five and three-quarter million radio sets and 73,000,000 tubes purchased during 1935, cost the public \$367,000,000. To operate the nation's 28,500,000 radio sets now in use, listeners paid \$150,000,000 for electricity, batteries, etc. And they called in service repairmen to the tune of \$68,000,000.

Meanwhile \$86,000,000 of "time on the air" was sold by the nation's 630 broadcasting stations, and talent for these programs cost the sponsors \$25,000,000 additional.

Already there are far more "homes with radio" than homes with either telephones, automobiles, or electric light, Dr. Caldwell revealed, from figures to appear in "Radio Today." Homes with radio sets now total 22,500,000. Of these 3,000,000 have "second sets," not counting the 3,000,000 automobile sets now on private cars, bringing the grand total of radio sets now in use to 28,500,000. These sets represent a past investment of over two billion dollars on the part of the listening audience.

First industry to recover from the depression, radio is now making tremendous demands on the nation's steel, copper and lumber production. During 1935, there went

into radio receiving sets more than 1500 carloads of steel and 3500 carloads of lumber. Curiously, also, Dr. Caldwell remarked, makers of radio—sometimes called "wireless,"—purchased a million miles of copper wire for use in sets manufactured during 1935,—enough wire to reach four times to the moon.

500 500 500

Philco Model 118

Distortion on low volume and improper action of the shadow tuning meter in this model is usually the result of a very high resistance leak in the plate coupling condenser between the 78 plate and the 6A7 grid. This is the small .00018 mfd mica unit located within the oscillator coil. This trouble is quite frequently intermittent and does not show up until the set has been turned on for half an hour or so.

**YOU TOO CAN OWN
A TRIPLET**

MASTER UNIT TEST SET



Model No. 1205-A
COMPLETE, only \$71.33
DEALER NET

One compact portable case contains the four units necessary for expert radio service work. Each unit is a professional instrument. Each instrument has exclusive Triplet features.

Each unit as well as the carrying case can be purchased separately—Model 1205-A contains the following:

Model 1200—Volt - Ohm - Millimeter, Dealer Net Price \$21.67

Model 1210-A—Tube Tester, Dealer Net Price \$20.00

Model 1220-A—Free Point Tester, Dealer Net Price \$8.33

Model 1230—All-Wave Signal Generator, Dealer Net Price \$15.33

Model 1204—Leatherette Covered Carrying Case, Dealer Net Price \$6.00

Direct reading all-wave signal generators No. 1231 d. c. and No. 1231 a. c. are also available in these units at \$26.67 each.

Write for complete catalogue. See them at your jobbers.

TRIPLET MANUFACTURERS
A complete line of electrical measuring instruments for radio, electrical and general industrial purposes both standard and custom built. See them at your jobbers. If you have an electrical instrument problem write to TRIPLET.

MAIL THIS COUPON

Triplet Electrical Instrument Co.
261 Harmon Drive, Bluffton, Ohio.

Please send me information

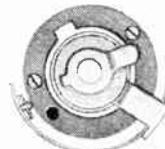
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Address _____

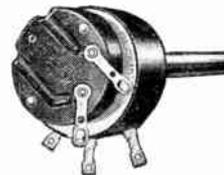
City _____

State _____

The Direct-Contact, Carbon Volume Control with ONLY ONE MOVING UNIT



Complete mechanism of the control, showing straight-path travel of contact shoe on resistance element.



Complete control, showing new-type power switch interchangeable with standard end cover.

SIMPLICITY is the keynote of Electrad design—simplicity which performs efficiently without waste motions.

Direct floating contact on the carbon resistance element, with only one moving unit in the entire assembly, means freedom from mechanical complications, longer life and more positive, finer variation of current regulation.

The resistance element is permanently fused to the flat outer rim of a warp-and-wobble-proof Bakelite ring. The special-alloy contact is self-cleaning—polishes the carbon to icy smoothness—keeps it clear of dust. No skipping, leaping or stuttering to make noise.

Electrad individually tests each volume control for noise before it leaves the factory, and unqualifiedly guarantees trouble-free performance. Use an Electrad in your next service job.

Write
Dept. NT-1
For
New
Catalog

New 100-Page VOLUME CONTROL GUIDE

FREE, if you send us the carton from any new-type Electrad Carbon Volume Control carton, together with your business letterhead or card.



6 1/4" x 9 1/4"



RESISTOR SPECIALISTS

Featuring
Quiet Carbon Volume Controls
Vitrous Resistors
Truvolt Resistors
Power Rheostats

"YOUR NEW BOOK HAS PUT MONEY IN MY POCKET!"



FREE!
Send for Your
Copy Today

Servicemen write us that Sylvania's new volume of Service Hints can't be beat. Send for your FREE copy today.

Sylvania's new book, Service Hints, contains practical servicing tips that have been gathered from successful servicemen all over the country.

You get the benefit of their years of experience when you tackle tough problems. It gives you the easiest solution to everyday problems.

These and hundreds of other up-to-the-minute service tips are contained in Sylvania's new book, Service Hints. Send for this valuable book today, and put yourself in line for more and better service jobs with bigger profits.

Get the inside dope on receiver troubles. Iron out your problems. Right now . . . fill out this coupon and send it to the Hygrade Sylvania Corporation. The New Volume of Service Hints will be sent you within a few days.

Hygrade Sylvania Corporation. Makers of Sylvania Radio Tubes and Hygrade Lamps. Factories at Emporium, Pa., Salem, Mass., and St. Mary's, Pa.

SYLVANIA

THE SET-TESTED RADIO TUBE

Hygrade Sylvania Corporation, Emporium, Pa. NT-1
Please send me free, without obligation, Volume 2 of Sylvania's "Service Hints."
 Experimenter Amateur Call _____
 Serviceman Employed by dealer Independent
 Member Service Organization _____

NAME _____
 ADDRESS _____
 CITY _____ STATE _____
 NAME OF JOBBER _____
 ADDRESS _____

YOUR INVENTION

By Elmore B. Lyford.

Radio Technical Publishing Company, New York, 1935.

210 Pages — Price \$1.50.

The number of people to whom this book will appeal will be limited. But to those who have an idea, or think they have an idea worth patenting or have written something they consider worth protecting from infringement, this book will be invaluable.

It is not merely a book of patent law written for an attorney, but is one for the average layman written clearly and concisely, and to the point. It carries the patentable idea from its conception to its ultimate capitalization. The mode of applying for a patent, the correct procedure while the patent is pending, and what to do with the patent after it is obtained, are explained in detail.

The related subjects of trade marks and copyrights are given the same penetrating analysis. If you have an idea, do not attempt to do anything with it until you have read this book.

*** **

Volume VI, "Rider's Perpetual Troubleshooters' Manual"

Published by John F. Rider.

Rider's Manuals are so well known and appreciated that lengthy comment is hardly necessary for this latest volume of the series. It has 1240 pages of diagrams and notes, and in arrangement, carries out the plan of the other preceding volumes. In order to simplify some of the more intricate and detailed diagrams, a number of large double-spread schematics are included. It is up to the minute and includes many of the now current receivers. If you have the others, you will not want to be without this one.

NEW LINE Supreme Instruments Approved for FHA Loans

Let Uncle Sam equip YOUR shop NOW with the New Supreme Laboratory models you need, at no more cost than your telephone.

No Down Payment. As long as 18 months to pay. Present FHA Act expires in April. See your jobber NOW.



SUPREME
385
Automatic
Laboratory
Model
\$77.95

Supreme 89 DeLuxe Tube Tester Laboratory Model \$45.95
 Supreme 339 DeLuxe Analyzer Laboratory Model \$39.95
 Supreme 189 Signal Generator Laboratory Model \$36.95

Supreme Instruments Corp.
 Supreme Building :: Greenwood, Miss.

ACTION!

The Radio Service Industry of late has given rise to various articles in different publications regarding the necessities, advantages and disadvantages, that the serviceman reading the varied opinions is at a loss as to the best method of conducting his business.

The whole thing boils down to the fact that 90 per cent of the service work is conducted by independent stations with their own methods of doing business. Of course these methods are more or less controlled by local competition.

We all know that Monday starts a new week and accompanied with the thought "What can be done to pep up business?" This of course giving rise to an advertisement in the local paper, a newly designed flyer or going the rounds with the telephone announcing a special checkup that will knock your eye out at a bargain price.

To get into the home under the disguise of some bargain offer so as to extract a few dollars from Mr. Consumer is a sheer abuse to science and a let down of the profession.

Many servicemen have resorted to door to door service campaign with the result that he has done damage when allowed to enter and check up, especially when the receiver has been in tough shape and ready to fall apart as soon as it was touched. The words that are not music to this type of serviceman are: "Well, it was all right until you monkeyed with it." What a let down.

Thank God some men are above this type of business solicitation and advertise their existence and await calls. He may well hold his head above the other fellow because he has got the best sales talk when he is called in to service a receiver.

Positively the public is skeptical of the professed

radio serviceman and do need some guidance regarding the employment of such men. It is too bad that this condition exists, but the only way out is a recognized service organization of trained, technical and trustworthy men who can and will give the public a thorough service issue.

The Radio Technical Guild recognizes this fact and have started to advertise its members to the public. A slow and effective measure is now under way being conducted from a centrally located office in Boston. Thousands of set owners have expressed their application of this "on the level service." The Guild has dedicated its emblem to the "SIGN OF SERVICE" and application for membership has exceeded all expectations with the result that we have found honest to goodness servicemen who have waited for such protection to enable them to keep their good business ethics, which in turn creates a better standard of living.

Naturally the public knows that no man can live on his losses, so when the free checkup man sends out his circular people know that he is coming to find trouble.

—November Editorial R. T. G. News.

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ATWATER KENT MODEL 555

Audio howl in this set has been found to result from an open 4 mfd. plate filter condenser in the a. f. circuit. A misleading factor in diagnosing the trouble is that the open condenser does not cause any appreciable increase in hum. (It is listed as "C14" in the A. K. Schematic.)

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MYSTERY

The great Twin City mystery? Where did Hank Dahl get that soprano duck calling radio set? It is hard to get anything out of Hank on the subject. We might suggest though that those attending the Northwest Convention remove the wax from their ears. The mystery deepens.



WHAT ARE YOUR ANSWERS TO THESE QUESTIONS



What do you think of the "NATIONAL TECHNICIAN"?

What subjects would you have us cover in the NATIONAL TECHNICIAN?

What are your ideas for improving it?

Should we accept advertising from catalogue houses, who do not restrict the mailings of their catalogues to the trade?

That publish list prices? Publish net prices? In 1937 the NATIONAL RADIO SERVICE ASSOCIATION will sponsor about eight District Conventions. What city would you suggest for your District?

Will your Association and the Chamber of Commerce lend support? Any guarantees?

Have your Association and the Chamber of Commerce write the National Executive Secretary, giving full details if interested.

About how many radio servicemen in your city? State Are you willing to help support the

NATIONAL RADIO SERVICE ASSOCIATION by your membership or by subscription or by advertising in the NATIONAL TECHNICIAN? What type of organization advertising would you suggest: Magazines

Broadcasting, Newspapers, Local, National. Are you interested in starting an association in your city under the National Radio Service Association? Have you any other comments to make?

This page is perforated so that you can tear it out, and we urge that you fill in your answers to the above questions together with any other suggestions or comments you may wish to make and mail to the National Executive Secretary, 714 Anico Bldg., Galveston, Texas. If you wish to make application for membership fill in the blank on the opposite side of this page.

Name I am a Serviceman—Dealer—Jobber—Manufacturer—Etc.

Address City and State

(Names will be held strictly confidential)
If you wish to subscribe to the National Technician check here () and enclose a dollar bill.

(FILL IN APPLICATION ON REVERSE SIDE OF THIS QUESTION BLANK)

TEAR OUT, FILL IN AND MAIL

"Let's Get Organized"

You should support your organization in every way—as member you can receive, at a small cost, a very attractive emblem for store and car display. Buy one and make use of it. You can have your letterheads, envelopes and business cards carry the N. R. S. A. emblem, and possibly buy them for a lower price than you now pay. Order these items today! Support the N. R. S. A.

- ★ ★ **TRANSFERS** Reversible N. R. S. A. EMBLEMS Blue and Gold
for Auto Window or Doors . . . 35c each; 3 for \$1.00
(Size 6 ins. by 8 ins.)
- ★ ★ **PLAQUES** N. R. S. A. EMBLEM Blue and Gold
Excellent for shop, counter and wall display . . . 40c each
Die Cut . . . Size 6 ins. by 8 ins.
- ★ **LETTERHEADS** 5-inch N. R. S. A. EMBLEM watermarked in each sheet
NAME AND ADDRESS . . . (Emblem in Gold Watermark)
250 sheets, \$3.20 . . 500 sheets, \$3.85 . . 1,000 sheets, \$5.75
2,000 sheets, \$9.35 . . 5,000 sheets, \$20.00
- ★ ★ **ENVELOPES** 10-inch ENVELOPES to match above—
250, \$3.90 . . 500, \$4.65 . . 1,000, \$6.15
2,000, \$10.15 . . 5,000, \$20.50
- ★ ★ **BUSINESS CARDS** TWO COLORS and EMBLEM—
500, \$2.75 1,000, \$4.00

For Details Write
NATIONAL RADIO SERVICEMEN'S ASS'N.
 ANICO BUILDING
 GALVESTON, TEXAS.

Application For Membership National Radio Service Association

P. F. METZLER, Nat'l Exec. Sec'y, 714 Anico Building, Galveston, Texas.

Gentlemen:

Kindly accept this, my application for membership in the nearest local chapter or chapter-at-large in the state of _____ (whichever is most practical, or conforms with rules and regulations). It is my sincere desire to become a member and adhere to your principles of fair competition and ethics.

Personal name _____ Age _____ Telephone _____

Home address _____ City-State _____

Firm name _____ Address _____

Experience: Radio Service _____ years. Other memberships? _____

Present status _____
Serviceman-Owner-Dealer-Jobber-Etc. (Part or Whole Time).

Testing equipment _____

Training _____

Other work now engaged in _____

"I do solemnly swear (or affirm) that I will faithfully fulfill my obligation as a member of the NATIONAL RADIO SERVICE ASSOCIATION, will to the best of my ability preserve, protect, and defend the Constitution of the NATIONAL RADIO SERVICE ASSOCIATION and the Constitution of affiliated Associations."

I enclose herewith One Dollar for a year's subscription to the "NATIONAL TECHNICIAN" and it is agreed that in the event this application is accepted, that I will be credited with the above amount toward payment of dues, in such proportions as to conform with postal regulations embodied in Section 520 P. L. R. It is further agreed that the above credits are applicable only upon my complete acceptance of membership within 30 days after approval.

Signed _____
Applicant—Subscriber.

Note:—Upon approval of this application I will be notified by the proper officials, either State, Local or the National office, at which time I will be fully informed as to dues for my particular State or Local Association, together with additional information, at which time I may either accept or reject membership.

(FILL IN QUESTION BLANK ON REVERSE SIDE OF THIS APPLICATION)

TEAR OUT, FILL IN AND MAIL.

It's In The Air That This Is Texas' Year In The Sun

A WORLD'S FAIR FOR RADIO . . .

DALLAS, JUNE 6th TO NOVEMBER 29th



THE PARADE OF AN EMPIRE in exhibit, pageant, color, romance, music, art — this is the \$25,000,000 Texas Centennial Exposition, the World's Fair of 1936.

Using the latest that radio science can provide, this great show of the year will go on the air the day it opens and continue one of the feature attractions for radio listeners daily until it closes.

On a greater scale than ever in the history of World's Fairs, preparations are being made now for the broadcasting of all audible features of the Texas Centennial Exposition. The Cavalcade of Texas, grand opera, cowboy music, Spanish love songs, the National Folk Festival, and other special events running into the hundreds in number will be presented over the ether.

Turn Your Dial to Dallas Every Day from June 6th to November 29th.

THE TEXAS CENTENNIAL EXPOSITION

(Courtesy of The Galveston Commercial Association)

Another new leader!

RCA UNIVERSAL A.C. BRIDGE



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PRICE **\$49.65**
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Complete with tubes and standards.
Nothing else needed except a high-im-
pedance headphone as null indicator.

Now You Can QUICKLY,
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INDUCTANCE - 100 Microhenries
to 10 Henries

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to 10 Microfarads

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ACCURACY -
5% overall at full scale

HERE is the newest piece of RCA Test Equipment for speeding up service and laboratory work. It gives a quick and accurate check of inductance, capacity and resistance over unusually wide ranges, including the low values that ordinary resistance and capacity meters cannot check. Measurements are made at 1000 cycles per second, and the Bridge includes not only a 1000-cycle oscillator, but also a 2-stage amplifier tuned to 1000 cycles, in order to assure adequate voltage for making any balance required. Service work requires measurement of inductance, capacity and resistance many times daily, and this compact, self-contained Universal A.C. Bridge not only lessens the work of such measurement but greatly increases its accuracy. See it at your RCA Parts distributor.



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