Vol. 5 OCTOBER, 1941 No. 10

CORNELL-DUBILIER ELECTRIC CORP.
HAMILTON BOULEVARD
SOUTH PLAINFIELD, N. J.

Sec. 562, P. L.&R.
U. S. POSTAGE
PAID
So. Plainfield, N. J.
Permit No. 1

Mr. George M. Beale
130 25th Ave.
San Francisco, Calif.

RADIO SERVICE HINTS

Practical Suggestions on Solution of Radio Servicing Problems Encountered in Actual Experience by Servicemen Everywhere

This section, conducted by our servicemen readers, will be a regular feature of the C-D Capacitor, and is intended to provide other servicemen with helpful notes on testing, locating troubles in specific models of sets, repairing them, or any other suggestions to simplify service work.

Cornell-Dubilier will pay $2.00 for each hint published in this section. Notes must be limited to 75 words, or less. Any number of hints may be submitted at one time. Unpublished items will not be returned. Be sure to give your name and mailing address. Send hints to: Editor, C-D Capacitor, Cornell-Dubilier Electric Corp., So. Plainfield, N. J.

Replacing Speaker Field Coils

Several types of dynamic speakers, such as employed in some of the RCA Victor and GE models, are built so that their field coils cannot be removed for replacement. However, the writer solved this problem by sawing through both sides of the frame at the rear end. The frame is taken apart and the defective field coil removed. Holes are then drilled through the back part of the frame and corresponding holes drilled into the side members of the frame and tapped for standard machine screws. A new field coil is then put in place and the frame then bolted together with machine screws, being careful to properly align the pole pieces before tightening the screws.

This repair has given excellent service in a number of sets and saves the expense of replacing an entire new speaker.—*W. F. Kelley, Central, S. C.*

Admiral 5N Portable

If this model receiver is found inoperative on a.c.-d.c., but satisfactory on battery, the following procedure may correct the trouble. Remove the 1,000 ohm resistor and add a ½ watt 250 ohm resistor across the 1H5 gt filament. Be sure that the 1A7 gt is a good oscillator and also be sure that the 70L7 gt has normal emission. This output-rectifier tube supplies the filament current to the 1.4 volt tubes by the current in the cathode circuit. Therefore low plate current, low filament voltage and no oscillator action.—*R. H. Yell, Chicago, Ill.*

Vibrator Repair

It often happens that a serviceman is called on to replace a vibrator that, save for the pin arrangement, is identical with one he has in stock. In normal times an exact replacement may be readily available but during the national emergency it may be days before it could be obtained.

The remedy is simply to replace the plug of the stock vibrator with the one from the damaged one, care being taken to see that the elements are connected to their proper prongs.

Of course an understanding of the operation of the different types of vibrators is essential but that information is readily available free from the vibrator manufacturers.

A hole slightly larger than the largest type tube prong drilled into a soldering iron just back of its soldering face will make the job of removing the leads and resoldering them an easy one. Then too, any job of prong soldering is handled faster and neater.—*Charles L. Culley, Melville, La.*

Eliminating Auto Tire Static

Tire and wheel static in automobile radios may be easily and permanently removed by using the following procedure. Mix two ounces of powdered (not flaked) graphite with two small sized tubes of cold-patching rubber cement, two tablespoons of ordinary black house paint for coloring and a little gasoline for thinning. Apply this mixture on the outside of all four tires with a paint brush starting at the center of the tire tread and painting to the rim. Make sure that the mixture runs in between the tire and the rim so that it will make good contact. It is only necessary to paint one half of the casing, preferably the inner side towards the car so that it won't cover white side walls, etc. As the graphite is a good conductor this procedure is much more effective than installing wheel springs as it eliminates two different types of radio interference and takes care of all four wheels with one application. The writer has found this method very effective in eliminating tire static on some of the later model Buicks and Nashes.—*Dave Hobson, Jr., Stevens Point, Wis.*

Improving Tone of Midget Sets

One of the chief complaints of customers who have brought into our shop midget sets of the cheap variety is that they have a "tinny" tone. When we at our shop correct this, as described in the following, all customers are very pleased with the results. Here is what we do.

A .02 mfd. 600 v. tubular type capacitor is connected from the plate of the final audio tube to the ground through a 2,000 ohm resistor for better bass response. For increased volume and selectivity, the first R.F. screen grid is bypassed to ground with a 4 mfd. 150 v. electrolytic capacitor.—*Robert Javelin, Brooklyn, N. Y.*

Zenith 1941 Model Midgets

The writer had considerable difficulty locating a bad a.c. hum in one of these sets. Filters and tubes proving to be OK, the pilot lamp socket which is encased in a metal sleeve, was found to have sufficient leakage between sleeve and ungrounded side of filament circuit to cause this trouble. It is best practice to change the type of lamp socket for one which will not give this trouble.—*A. B. Chismar, Streator, Ill.*

Soldering Iron Holder

Most servicemen use one of the many standard types of soldering iron stands which hold the iron in a horizontal position. A good part of the heat is dissipated through the barrel which contains the heater element and wastes away into the air. To overcome this waste and assure more rapid heating and a hotter iron, the writer uses a soldering iron holder which holds the iron in a vertical position with the tip upwards. It consists simply of a sheet steel holder mounted on asbestos to the side of the work bench away from instruments or materials which may be affected by the heat. The heat from the barrel of the iron kept in an upright position rises and heats the tip.—*Forrest H. Frantz, Coplay, Pa.*

Phono-Pickup Test

When a phono-pickup of any type, either magnetic or crystal, is judged to be defective by failure of operation, the simplest way to make definitely sure is to disconnect it from the amplifier circuit and connect a pair of crystal headphones to the pickup leads. Then play a record. If the pickup is O.K., the recording can be heard distinctly in the headphones; otherwise it is defective.—*V. F. Daidone, Newark, N. J.*

A Free Market-Place for Buyers, Sellers, and Swappers.

These advertisements are listed FREE of charge to C-D readers so if there is anything you would like to buy or sell; if you wish to obtain a position or if you have a position to offer to C-D readers, just send in your ad.

These columns are open only to those who have a legitimate, WANTED, SELL or SWAP proposition to offer. The Cornell-Dubilier Electric Corp. reserves the right to edit advertisements submitted, and to refuse to run any which may be considered unsuitable. We shall endeavor to restrict the ads to legitimate offers but cannot assume any responsibility for the transactions involved.

Please limit your ad to a maximum of 40 words, including name and address. Advertisements will be run as promptly as space limitations permit.

FOR SALE—6 Racon super giant electrodynamic horn units. 6-8 v. field excitation, 25 watts continuous operating capacity, peak 50 watts. List $66. Will sell for $15. each. All in good working condition. Daidone Radio Service Laboratories, 212-14 Fairmount Ave., Newark, N. J.

FOR TRADE—Crosley Xervac hair grower in perfect condition for chanalyst, piano accordian or oscilloscope. Park Circle Radio, 3451 Park Heights, Baltimore, Md.

FOR SALE—Back copies of Radio Service Magazine, from Nov., 1932 to Sept., 1941, except Aug., 1934. L. T. Deatelhauser, State Sanatorium, Md.

WANTED—Rider chanalyst in good condition. State lowest price. Edward Blewett, 3976 Rombouts Ave., Bronx, N. Y.

FOR SALE OR TRADE—Heavy duty R.C.A. relay rack, standard 4½" tall; G. E. monitor top refrigerator with defective unit; Supreme model 89 de luxe tube tester; Evinrude 5 h.p. outboard motor; 7" open face Westinghouse amp meter, 0 to 1,200, without shunts. Taylor Radio Repair, Beaver Dam, Ky.

FOR TRADE—Complete course in sound and movie projection by Hollywood Sound Institute, and Supreme model 502 tube tester and analyzer. Want late model communication receiver of ham type. Joe Emerald, 6057 Hereford Dr., Los Angeles, Calif.

WANTED—Rider's Manuals 7, 8, 9, 10, complete with index. Will take part or all but must be reasonable. Reed's Electric Co., 621 High St., Palo Alto, Calif.

WILL SWAP—Operadio 30 watt portable amplifier with R.C.A. velocity floor mike and 2 adjustable floor stands and speakers for a Rider chanalyst and oscilloscope. Blue Diamond gasoline driven generator, 350 watts output, for a piano accordian. Park Circle Radio, 3451 Park Heights, Baltimore, Md.

WANTED—R.C.A. 150 test oscillator. State condition and lowest price. R. Bronson, 142-18-230 Place, Rosedale, N. Y.

FOR SALE—Well established radio store, lot 65 x 300 including 6 rooms stucco. Net earnings over $3,000. last year. Only shop in town of 20,000. Price, $6,000., invoice to suit stock $3,200. Home Radio Service, 12618 Willowbrook Ave., Willowbrook, Calif.

WANTED—Rider's Manuals, 9, 10, and 12. Please state condition and price. City Repair Shop, 716 S. Stanton, El Paso, Texas.

FOR SALE—Supreme model 585 diagnometer, de luxe series. This is 2 meter combination tube tester and analyzer, in good condition. Cost $95., will sell for $30. Ralph Hunter, 12 North St., Catskill, N. Y.

WANTED—2" and 3" Weston panel meters and old manufactured radio equipment. Will swap Rider's Manuals, service books, and test equipment. Will trade lists. Anthony J. Dybowski, 1531 Main St., Buffalo, N. Y.

FOR SALE—Meissner analyst model 10—1154. Perfect condition, $50.00. Cash only. Complete ready to use. Home Radio Service, 136 Martine Ave., White Plains, N. Y.

(Continued on page 11)

DIPOLE ANTENNAS*

Fundamentals for the Serviceman

THE increased uses of high frequencies for broadcasting services are bringing new equipment and service methods to the serviceman.

One particularly important field for the serviceman is dipole antennas which are being used in frequency modulation, television, and short-wave reception. This efficient type of antenna is practical at the high frequencies used for these services, while it would be impractical at broadcast band frequencies.

Dipole antennas are balanced to ground electrically and depend upon the magnetic component of the radiation field for the voltage pick-up. The common single wire type of antenna, including the "hank" on the AC-DC sets, depends primarily on the electrostatic component of the radiation field for pick-up. That is, the single wire type of antenna acts as one plate of a capacitor, the other is the earth, and the electric charge stored in this capacitor by the electrostatic radiation field, flows through the antenna input coil to introduce the signal into the receiver.

Radiation Fields

The dipole in a horizontal position has theoretically equal capacities between each arm and ground, therefore, very little difference in charge exists between the two halves of the antenna due to the electrostatic component.

What are these electrostatic and electromagnetic components which have been mentioned? The current that is sent into the radiating antenna at the transmitter is alternating at the assigned frequency. The current may be amplitude modulated, or it may be constant in the case of frequency modulation. This current flowing in the antenna sets up an electromagnetic field in concentric circles with the antenna as an axis. This is similar to the magnetic field set-up about any conductor carrying a current. At low frequencies, that is below approximately 10,000 cycles, the energy stored in the magnetic field about a conductor is returned to the circuit. At frequencies above this however, less and less of the energy is returned from the magnetic field, and this energy is said to be radiated. About 90 per cent of the energy supplied to a good high frequency antenna is radiated.

Static Component

The electrostatic field about the antenna is representative of the electric force in the dielectric or air surrounding the antenna. This electrostatic force is similar to that which exists between two plates of a condenser which have a difference of potential between them. This electric field exists only in a dielectric or non-conductor and therefore can be made ineffective by shielding. This is done on some broadcast loops by surrounding the loop with a grounded copper screen. Only the magnetic component reaches the loop to produce a voltage.

Both the electromagnetic and the electrostatic field travel together at approximately the speed of light, 300,000,000 meters per second, or about 186,000 miles per second. The direction of travel of the wave front is perpendicular to the electrostatic and electromagnetic lines of force which are in turn perpendicular to each other. This can be seen in Fig. 1. Reversal of either the static or magnetic lines reverses the direction of transmission, reversal of both does not alter the direction of travel. The polarization of the wave is that of the electrostatic field which is parallel to

* *By courtesy of "Radio Today."*

the antenna. Thus, horizontal antennas send horizontally polarized static lines and the wave is said to be horizontally polarized. The reverse is of course true for vertical antennas.

Placing the Antenna

Since the dipole antenna receives its voltage from the electromagnetic field, it must be placed so that its axis is perpendicular to this component in order that the advancing wave is "cut" by the receiving antenna. This process of "cutting" magnetic lines of force is similar to the action of a generator where the conductors are whirled through a magnetic field. Here, the magnetic lines move past the conductor, or antenna, with the same results.

Referring to Fig. 1, it will be seen that the receiving antenna must be parallel with the transmitting antenna in order to be cut by the magnetic lines of force. If the transmitting antenna is vertical, the magnetic lines are in a horizontal plane, and the receiving antenna must be vertical also. This is one of the polarization problems which must be solved by standardization of broadcasters to one method. The FM stations have chosen horizontal polarization as the standard. The stations which are now operating vertically polarized are to be changed to conform with the standard.

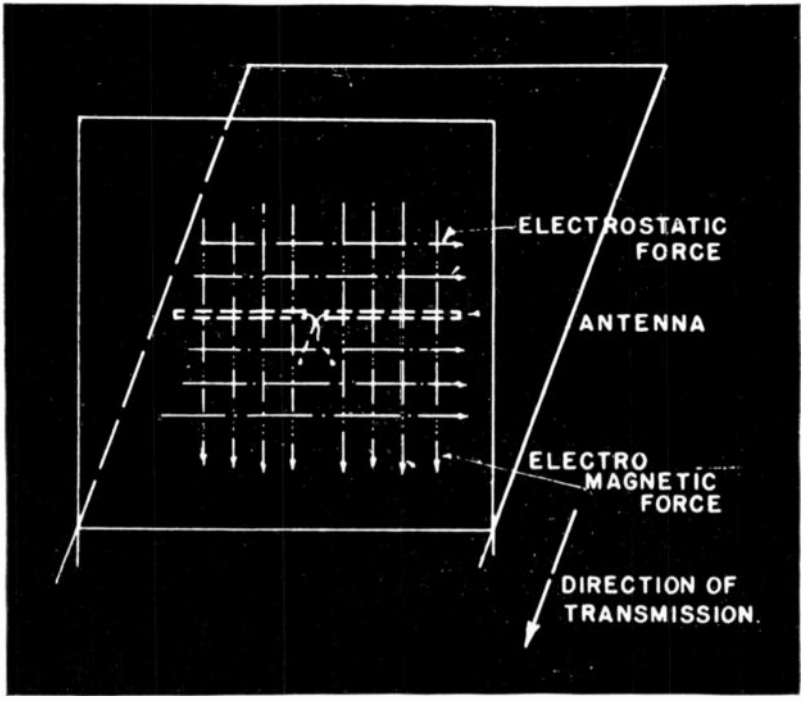

FIG. 1—Approximate space relation of dipole antenna and the electrostatic and electromagnetic forces. Actual wave front is a curved surface. Vertical lines are electromagnetic.

Polarization of the wave at the receiver is not determined solely by the position of the transmitting antenna with respect to the earth. It may change once or several times during its travel. Splitting and re-combining of a wave, reflection and refraction, all tend to change the polarization. The receiving dipole should in every case be adjusted to give the best possible signal from all stations in the receiving area.

Dipole Characteristics

The design of the dipole receiving antenna will in many cases be no problem to the serviceman. The receiving range of nearly every set can be increased, however, with the use of a more elaborate antenna. In many localities where FM stations cannot be heard with ordinary dipole antennas, good reception can be obtained if reflectors are added to the installations and attention is paid to impedance matching, elevation, and orientation.

Dipole antennas are designed to resonate within the band of frequencies that are to be covered. That is, the antenna is cut to approximately one half the wave length of the center of the band. The formula for figuring half

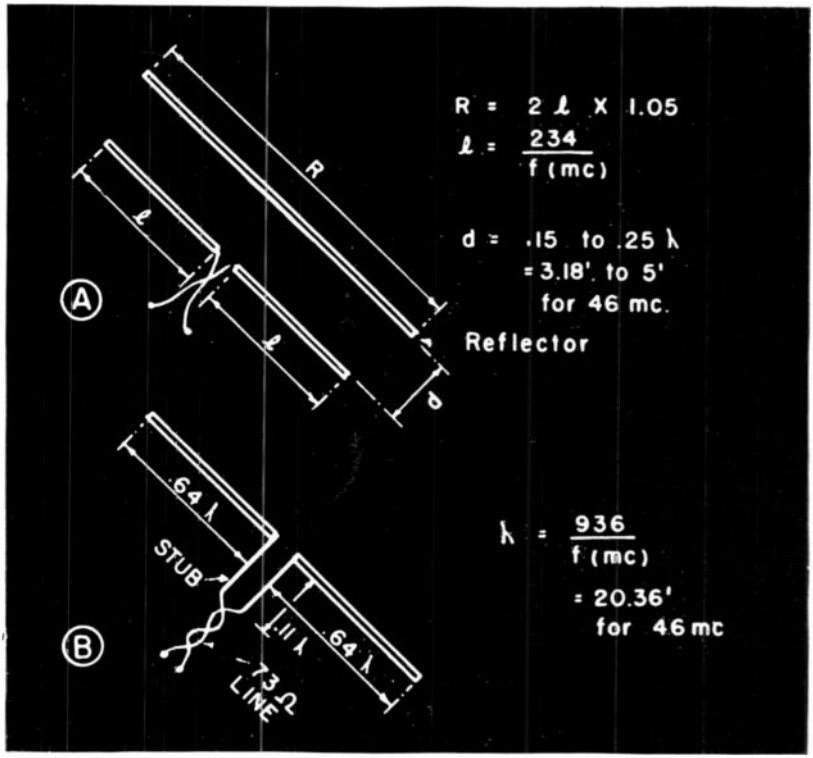

FIG. 2—Dimensions for FM antennas in 42-50 mc. band. A is plain dipole, and B is so-called extended zepp. B with reflector is many times as efficient as A. Note matching stub.

wave antenna lengths is $L = \frac{468}{f(mc)}$

For the center of the FM band, 46 mc., the length is 10.18 feet. Each quarter wave "arm" is half of this value, or 5.09 feet. These lengths are about 95% of the actual wave length in order to correct for the "end effect," which prevents all antennas from being theoretically correct.

A simple half-wave dipole has directional characteristics which are broadside to the antenna. As the length of the antenna is increased to 3/2 wave lengths, or a greater number of odd half waves, the directional pattern becomes such that it is more receptive to signals approaching at an angle to the axis of the antenna. For example, a three half-wave length antenna has six lobes of maximum reception. The two main lobes are broadside and the four minor lobes are located two on each side of the main lobes and about 30 degrees from the axis of the antenna.

Greater Gain

With such a 3/2 wavelength antenna, stations which are about 60 degrees apart can be received without turning the antenna. Reception of both probably would not be possible with a simple half-wave dipole. If reception in opposite directions is not required, a reflector can be placed behind the antenna to increase the pick-up gain on the front side. The reflector should be about 5% longer than the antenna, and the exact length should be adjusted for maximum reception. The spacing between the reflector and the antenna determines the amount of gain over a plain dipole. The gain is maximum at about 0.15 wavelength or 3.18 feet and is slightly less at 0.25 wavelength or 5.09 feet. The reflector length should be adjusted for best performance if the distance between it and the antenna is changed.

Another important factor to consider is the height of the antenna above the ground. The ground reflection of a received wave combines in various phase conditions with the wave received at the antenna. Whether the reflected wave aids, or opposes the direct wave depends upon the height of the antenna, and the angle above the horizon at which the waves arrive. In general, the higher the antenna, the more improvement there is in reception of low-angle signals. Since FM waves travel either on a line of sight or at low angles to the horizon, this low angle reception is to be desired. The actual height of the antenna should be changed slightly during the testing period, since a difference of 1/4 wavelength, or a 5 feet may mean that a weak distant signal will be received. It is best to have the antenna as high as possible, but a few feet up or down may greatly improve reception for certain stations.

Impedance Match

The impedances of the transmission line and the antenna must be matched in every case for maximum results. With the simple half-wave dipole the low impedance line is connected to the center where the impedance is about 70 ohms. If longer antennas are used for better directional effects, matching stubs must be used to secure the proper match. These stubs are short parallel conductors, usually 1/8 to 1/4 wave long which are connected between the antenna elements and the transmission line. The transmission line is moved along the matching stub until best performance is secured. Fig. 2 shows the dimensions of an extended dipole antenna with matching stub for connecting a low impedance transmission line. As the high frequency broadcast services become more numerous, so will the need for service experts who can install correct antennas.

HOW TO SERVICE OSCILLATORS*

Defects which have little or no effect upon other stages sometime kill the operation of this one entirely

MANY servicing "headaches" originate in the oscillator circuit of superheterodyne receivers. Defects which do not greatly impair the operation of other stages often cause serious trouble in oscillator circuits. It is not strange that this should be so since the oscillator is by far the most critical of all circuits in operation and adjustment.

Sometimes troubles are intermittent and hard to identify as oscillator breakdowns. Often it is not easy to isolate the defective part even when the trouble is localized to the oscillator circuit. In some cases proper operation can not be restored even by replacing every part in the oscillator stage because the actual defect may begin in some other section of the receiver.

In other cases it may be necessary to revise completely the oscillator circuit in the set to be repaired in order to accommodate available replacement components. So, let us look into this subject and see what common oscillator troubles are, how they may be located, and what can be done to fix them.

Typical Circuits

Typical oscillator circuits are shown in the accompanying diagrams. Those shown, to aid discussion, employ two tubes, one as the mixer, one the oscillator.

In Fig. 1 the output of the triode oscillator is fed through condenser C1 to the cathode of the pentode mixer. Note that the cathode resistor

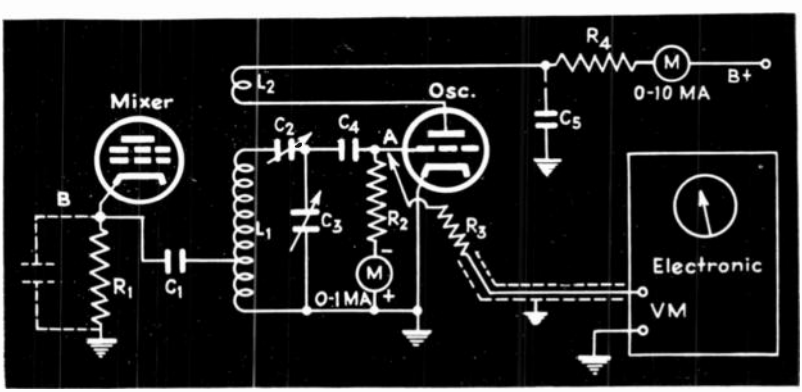

FIG. 1—Check points for a typical oscillator stage employing capacity coupling to the cathode of the mixer.

R1 is not bypassed. If it were, as indicated by the dotted lines, it would serve to short-circuit the oscillator voltage applied to the mixer and little or no reception would result. We mention this because it is frequently the case that many sets with obscure defects develop such troubles because of mistakes by inexperienced service-

*By John Potts in "Radio and Television Retailing"

men, many of whom have the belief that bypassing every cathode resistor must necessarily improve receiver performance. In circuits such as this, it is important not only that no condenser shunt the cathode resistor but also that the condenser C1 and its associated wiring be kept well away from the chassis to avoid capacity to ground.

Insofar as the oscillator circuit itself is concerned, during operation grid current flows through R2, causing a voltage to be developed across this resistor so that point A becomes negative with respect to ground. If, for any reason, the oscillator is inoperative, the voltage at A will be zero

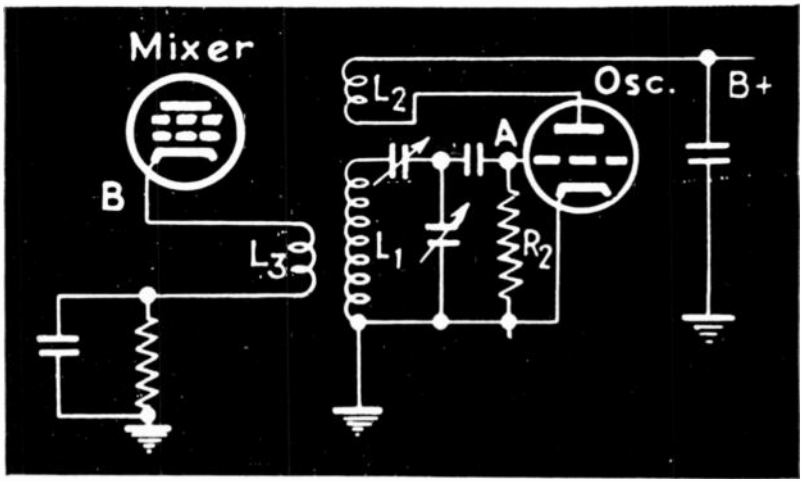

FIG. 2—Inductive coupling from the oscillator to the mixer with a by-passed cathode resistor.

or even slightly positive. To measure this voltage an electronic voltmeter, or other extremely high input resistance meter, is best. Most electronic voltmeters have a 1-meg. resistor built into the probe (shown as R3 in Fig. 1) which isolates the capacity of the voltmeter leads from the oscillator circuit and thus avoids detuning the circuit under test.

Alternatively, an 0-1 ma milliammeter may be inserted in series with R2 as shown and the current in the circuit may be read. The actual rectified d-c voltage across R2 is then equal to the reading of the milliammeter times the resistance of R2 (usually about 50,000 ohms). Thus, if the reading of the meter is 0.2 ma (equal to .0002 amps) and the grid resistor is 50,000 ohms, the voltage is 50,000 times .0002 or 10 volts. We should expect the voltage to be from 10 to 20 volts (negative, of course) in receivers operating over the standard broadcast band. This voltage should remain fairly constant as the tuning condenser is turned over the band. On short-wave bands, however, such uniformity is not to be expected, but the voltage should be fairly high because a low oscillator voltage means reduced sensitivity in the entire receiver.

Often there will be a 2-to-1 variation in voltage from the high to the low frequency end of the dial. It is a good idea to make a check over each band of an all-wave receiver, because occasionally you may find points over the tuning range where the voltage reading drops to zero: this indicates a "dead spot" and the band affected

should receive attention. Possible causes of inoperation over a portion of the range are a defective tube, disarranged leads, moisture absorption in coil, wiring and associated parts and corrosion of the oscillator tuning condenser wiping contacts, creating a high resistance in the tuned circuit.

Plate Current Variation

If neither an electronic voltmeter nor an 0-1 milliammeter are available, a 0-10 ma milliammeter can be inserted in the plate circuit of the oscillator, as shown in Fig. 1. The reading will change if the grid is touched with a finger or if oscillation is stopped by short-circuiting one of the oscillator coils. This meter will serve to indicate uniformity (or the lack of it) of oscillation but is not nearly so convenient to use as the grid meter. As the electronic voltmeter does not require any connections in the circuit to be unsoldered, it represents an excellent method for this type of check.

It is not enough to be able to check uniformity of oscillation: we need sometimes also to be able to check oscillation frequency. Many signal tracing instruments are equipped with tuned r-f receivers and indicators for just this purpose. When tuned to the oscillator frequency, an indication is obtained. Since this indication is obtainable even when the probe is not directly connected to the receiver under test, it is particularly valuable in checking intermittent receivers. Quite often, with such receivers, any metallic contact to the set is sufficient to restore operation, making trouble-shooting very difficult. By this means, it may be ascertained if trouble is present in the oscillator circuit without actually making a connection to the set.

If no signal tracing instrument is available, it is possible to substitute an all-wave receiver, preferably one equipped with an indicator eye. When the set is tuned to the oscillator frequency, it will then be indicated on the tuning eye and frequency may be determined from the dial setting of the receiver.

The presence of the oscillator voltage in the mixer circuits of Figs. 1 and 2 can also be checked in the same manner. When a connection is made at point B and the signal tracing instrument is tuned to the oscillator frequency, an indication should be obtained. A sensitive vacuum tube voltmeter is also useful for this type of test, although it will not, of course, indicate the oscillator frequency.

THE RADIO TRADING POST

(*Continued from page* 4)

FOR SALE OR SWAP—Issues of The Institute of Radio Engineers, complete from 1933 to 1938 inclusive, and nearly complete from 1931 to 1932 inclusive, in excellent condition. Make offer. Gene Shevick, Box 15, Mareisland, Calif.

WANTED—Will buy first ten of Rider's Manuals, providing they are in good condition, or will take No. 4, 5, 6, 7, 8, 9, and 10. Raymond Wingfield, Philo, Ill.

WANTED—Jewell 199 and 444 set analyzer in working condition with all adapters; Jewell pattern 57 d.c. voltmeter, 0-50 amperes, 0-50 volts, all in instrument; back issues of Radio Craft, Radio Today, and Radio News, from 1920 to Sept. 1941; R.C.A. tip file; R.C.A. No. 156 tube checker; R.C.A. Rider chanalist. Quote cash prices and what have you. Howell's Radio & Electric Service, H. B. Howell, Anna, Texas.

FOR SALE OR TRADE—Infinitometer—V.T.V.M., has 500 microampere meter, $12. Radio Service sign, 100 watt lamp, $2.00. R.C.A. electric clock—20", $3.00. Radio Craft—12 issues, $1.25, any year. Want—oscilloscope—2". W. F. Onder, Rt. 1, Box 269, Kimmswick, Mo.

WANTED—Cameras and lens of all types. Will pay cash or trade for radio and electric equipment. John Tyler, Box 451, Cresskill, N. J.

WANTED—Solar exameter for cash. Have test equipment, analyzers, tube checkers, oscilloscope and V.T.V.M. Ed. Tischler, 138 Vine St., Plymouth, Pa.

FOR TRADE—Majestic chassis 90, Kolster sets and power dynamics, Crosley chassis, R.C.A. 18-33, Atwater Kent 40, Crosley and Zenith A and B eliminators, powerizer, A-B-C power pack and amplifier, P.T.s' parts, power packs. Want set testers, tube testers, oscillators, typewriter, hand drills power a.c. or universal. Goldstone Radio, 1279 Sheridan Ave., Bronx, N. Y.

FOR SALE OR TRADE—500 gummed business, name or address stickers—25 cents prepaid or what have you. Pay cash or swap for Superior Multitester. A. Penquite, 513 S. 5 St., Marshalltown, Iowa.

WANTED—Late Radio Engineering Course, also Electrical Engineering Course. Please state price and all particulars. Melvin J. Hilz, E Calumet & Jefferson St., Appleton, Wis.

FOR SALE—Shure "Uniplex" microphone, in good condition, $17.00, 25' microphone cable included. E. B. Lowall, 4032 Oregon Ave., St. Louis, Mo.

FOR SALE—Ship models, Santa Marie, 43" high, 62" long, antique style. Has room in hull for a 5 to 8 tube radio and 7" speaker. Colored lights behind sails and in body. Ryer Radio Shop, 2259 Ryer Ave., Bronx, N. Y.

FOR SALE OR TRADE—Have an assortment of short wave plug in coils and 1 and 2 gang short wave variable condensers, 2 keys, and parts for amateur. Want capacitor analyzer or what have you. W. Shuman, P.O. Box 222, Folkston, Ga.

FOR SALE OR TRADE—Jewell 199 analyzer, $8; Triumph tube checker, $7.50; five tube short wave receiver, $12; Remington noiseless portable typewriter, $30; Weston, Jewell meters, each $2.25. Want signal generator or what have you. Cutler, 6309 Kenwood, Chicago, Ill.

FOR SALE—700 watt rack and panel type transmitter. Tube components: 6L6, 210, 800, and T155 in output stage. Triplett meters throughout. Precision Radio Service, Langdon, N. D.

WANT—Your swap list. Will send my 2 page list in exchange, also need modern type pickup and phono motor, cash or swap. A. Penquite, 513 S. 5th St., Marshalltown, Iowa.

FOR SALE OR TRADE—Bound copies of QST, 1928 to 1931. Also Howard 6 tube amateur receiver — mechanical band spread. Make offer. William A. Brownback, R.D. 1, Trooper Road, Norristown, Pa. — W3RG.

WANTED—Servicing equipment in first class condition—signal generator, oscilloscope, etc. State lowest cash price. Wm. L. Wilcox, Water Valley, Miss.

FOR SALE OR TRADE—5 Vibrapacks, 200 MA supply, phono-amplifier, CW transmitter, "Radio and Television" from 1935, "QST" from 1936, both to date, ventilating and watchmaking course, 10 midget motors—6 v. a.c.-d.c. Make offer. Stanley Zuchora, 2748 Meade St., Detroit, Mich.

FOR SALE OR TRADE—Triplett tube tester, model 1502, for portable or counter use. Dottie Stutts, Box 300, Lakeland, Fla.

WANTED—Supreme 561 signal generator. Will give good trade. Frederick R. Shutt, Box 89, Bishop, Va.

FOR SALE OR TRADE—Rare old violin, Remington noiseless portable typewriter, Agfa speedex camera. Want television or F.M. radio sets, new radio tubes, parts, or cash. Charles A. Kuhns, Box 15, Lansdale, Pa.

WANTED—Will pay cash for Supreme 555 diagnomoscope; 580 or 561 oscillator; 546 oscilloscope; 560 vedolyzer; 562 audolyzer; Hickok oscillator and oscilloscope; Triumph 77 1 or 2 inch or 830 oscilloscope or CB 127 Graphoscope. J. W. White, Jr., Box 66, Galax, Va.

FOR SALE OR SWAP—2 handsets consisting of S.B. carbon mike and earphone, 2 power packs, power transformers, and assorted parts. Want some cheap meters or what have you. Also want low priced used ham receiver such as Sky Buddy. Will pay $10. to $15. W. B. Myers, 556 Bradley St., Columbus, Ohio.

FOR SALE—Jackson 7 band signal generator model 441-A—$10, or will trade for Rider's Manuals 2 and 5. Have R.C.A. neon output meter—$2. Ayres Radio Service, 121 Rosemont Dr. Syracuse, N. Y.

SELL OR TRADE—30 watt portable P.A. system; Kadette Tunemaster, model KRC-2; Clough-Brengle all-wave oscillator; Wilcox-Gay wireless record player; 2 reflex speaker cases; 1 9" H.D. dynamic speaker. What have you to trade? Byron Radio Shop, Byron, Ill.

FOR SALE—Hickok tube tester model 510X, Solar condenser tester model CE, 1175 triplett tester, 12 vols. Rider's Manuals, Superior oscillator, ATR 6 v. eliminator, 200 new tubes, neon radio service sign, electric drill, 1/4 v. eliminator, 5 power transformers, 3 utility cabinets, 300 resistors. Trade for R.C.A. sound projector, 16 mm. W. C. Ellison, 211 W. Main St., Sedalia, Mo.

WANTED—Communications receiver, machine lathe, laboratory equipment. Will trade 32 v. gasoline driven generator, television power supply, pair new W.E. 500 watt transmitting tubes and sockets, Triplett 1252 V.T.V.M. R. Mautner, 1011 Nielson Ave., Far Rockaway, N. Y.

SELL OR SWAP—Complete set of welding torches and burners, auto radios, genemotor, heavy duty studio type turntable, meters, speakers, phones tubes, motors, parts, etc. Want mechanical drawing or drafting sets and instruments, artist's supplies, art books, etc. Oliver F. Klein, 2235 N. 39 St., Milwaukee, Wis.

FOR SALE—Vols. 1, 2, 3, 4, 5, Rider's Manuals. What's offered? Readrite model 550 oscillator, $5. List for 3c stamp. Andrew F. Benedict, 375 Wilson St., Sharon, Pa.

FOR SALE—6 W.E. 216A tubes like new. One 33 1/3 RPM G.I. Blue Flyer turntable motor. R.C.A. PG-10 theatre amplifier with speakers. Wright DeCoster 315 and 207 speakers. Items sold separately. Edward Scribner, Schoharie, N. Y.

WANTED—R.C.A. Rider chanalyst in good condition. Will pay cash. State lowest price. C. A. Goditus, 358 E. Market St., Wilkes-Barre, Pa.

FOR SALE OR TRADE—Amplifier, genemotor, Astatic model D-7 crystal pickup, power transformers, chokes, speakers, new and used tubes. Want Rider's Manual No. 6, or good late tube tester, reasonable. Royce Saxton, R. 1, Pontiac, Ill.

FOR SALE OR TRADE—Western Electric tubes—two 211E 65 watts, four 248A 65 watts, two 261A 100 watts, four 282B 70 watts, 2 284 A 100 watts, three 275A 15 watts. Want Western Electric 262A or 262B's. H. H. Harrison, 300 37 St., Sacramento, Calif.

WILL SWAP—New and used speakers, coils, transformers, chokes, variable condensers, etc. Want stamps, first day, jubilee, covers, and censored envelopes. What have you? Robert Grant, 7021 Clover Lane, Stonehurst, Upper Darby, Pa.

WANTED—Hickock 177-188 signal generator with or without crystal. Also oscilloscope. Have Contax camera with f.2 lens, foremanship course, radio supplies. Huntress Radio, 418½ West Spring, Freeport, Ill.

WANTED—Late model test equipment, Rider's volume V. Write stating particulars. Boege's Radio Service, 203 Main St., Cedar Falls, Iowa.

FOR SALE—Recent files of the following magazines: I.R.E. Proceedings, Radio, QST, Radio News, etc. If interested, write Wm. D. Hayes, Box 1433, Oakland, Calif.

FOR SALE—Rider chanalyst, Aerovox 95 L.C. checker, Philco 077 oscillator, superior 1280 analyser and tube checker, R.C.A. volt ohmist jr., and 87 issues of Radio-Craft beginning with first issue. Make cash offer. George C. Anderson, 2236 Indiana Ave., St. Louis, Mo.

FOR SALE—National FB-7 amateur receiver complete with tubes, power supply, speaker and 8 sets of coils—$15. R. Bronson, 142-18 230th Pl., Rosedale, N. Y.

FOR SALE OR SWAP—Underwood portable typewriter with case in very good condition. Want ham receiver, photo enlarger, or other equipment. J. A. Mc Gregor, 18 Carney Ct., Charlestown, Mass.

FOR SALE—General Industries type A 10" turntable in first class condition—$6.50 postpaid. Will also consider slide rule or set tester. A. A. Fazakas, 1 Cathedral Ave., Nutley, N. J.

WANTED—Shure xtal 7A or 7S mikes, Shure 750B xtal hand mike, the amateurs D-104 xtal mike, any Brush xtal mike or headphones. Have Western Electric hipower transmitting tubes, photocells, transformers, etc. Wayne Mc Clung, 1114 Dawson Rd. Albany, Ga.

FOR SALE—Rider's Manuals 1 to 7, $35., Supreme No. 189, all wave signal generator, $20.; Weston analyzer, modernized for 8 prong tubes both a.c. and d.c., $20.; solar type No. 6B resistor and condenser checker, $12.; Million vacuum tube voltmeter model XM, $15.; mimeograph—legal size, $25.; set of Philco Manuals. William F. Gibson, 8332 S. Vernon Ave., Chicago, Ill.

FOR SALE OR SWAP—Latest model 1240 Superior tube tester. Slightly used. Will trade for cameras or supplies—still or movie. Theo. R. Colvard, Arlington, Kansas.

WANTED—Rider's Manuals 1 to 12 in good condition with indexes and supplements. Willing to pay good price for good merchandise. Joseph Frank, 1365 Sheridan Ave., Bronx, N. Y.

FOR SALE OR TRADE—Brush BR2S crystal microphone, good condition, recently rebuilt at factory. Want Turner 22X or what have you. Walter Nicely, 604 Wycoff St., Middletown, Ohio.

FOR SALE—20 watt CW transmitter for all bands from 160 to 10 meters, includes automatic frequency doubler, power supply, tubes, and two coils, all in A-1 condition, $20. Also have home made receiver in good condition, with two coils and tubes. Wayne Mc Clung, 1114 Dawson Rd., Albany, Ga.

WANTED—Battery chargers, bulb type, 2 or 6 amp. capacity. Can use large quantity at right price. Also desire late type test equipment, Rider's chanalist, etc. Roger H. Hertel, Wahoo, Neb.

FOR SALE OR TRADE—60 watt final amplifier, 4 channel preamplifier mixer unit, amperite velocity microphone, portable P.A. system. Want good microscope, and showy mineral specimens or gem cutting materials. Will send details to any inquiry. George W. Roper, Public Market Bldg., 13 and J Sts., Sacramento, Calif.

FOR SALE—Complete sales and service business good location opposite post office, no competition. All Rider's manuals, chanalyst, CB oscillator and tube tester, solar condenser analyzer, nice test bench, 150 tubes, resistors, condensers, desk, oil burner, pa 6/110 volt, all nice tools, set of refrigerator tools, gas and drums, gauges, etc. Bottled gas agency, virgin territory, gold mine for hustler. No meddlers. Jack Watt, Supreme Radio Service, Ontonagon, Mich.

FOR SALE—15" Jensen A15 H.F. dynamic speaker, 2,500 ohm field with 20 watt universal output transformer—$7. Scott 11" dynamic speaker, 2,500 ohm field with output transformer—$3. C. L. Goebel, 221 W. 233 St., Bronx, N. Y.

FOR SALE—Supreme standard diagnometer designed to check octals, Supreme No. 546 3" oscilloscope in good condition, Superior channel analyzer, used slightly. Want Rider chanalyst, Rider Manuals 7, 8, 10. Joe Krajcovie, Box 192, Empire, Ohio.

FOR SALE—National NC80X communication receiver, in metal cabinet, 10 metal tubes, 4 band super, 550 k.c. to 32 m.c., slide rule dial, operates on 110 v. a.c. or d.c. with 8" speaker, brand new, in original crate. Robert Patterson, 128 Thatford Ave., Brooklyn, N. Y.

FOR SALE—National NC80X communication receiver, brand new in original crate, speaker in carton never opened, want $35. Set in metal cabinet, 10 metal tubes, 4 band super 550 kc. to 32 mc. slide rule dial. Works on 110 v. a.c. or d.c., has 8" speaker. Robert Patterson, 128 Thatford Ave., Brooklyn, N. Y.

FOR SALE—Best cash offer takes a Patterson PR16C radio. Will trade for good recording equipment. Also interested in up to date test equipment for radio shop. Sam A. Sutton, Box 202, Brawley, Calif.

FOR SALE—Readrite model 430 tube checker with adapters C, D, E. Superior model 1130-S signal generator. Also various types of tubes. William Sullivan, 379 Evans, North Tonawanda, N. Y.

SWAP—Will give all the following for a Superior multi-tester or similar, in good condition; battery charger with bulb, trickle charger, power transformer, and ½" micrometer. Joseph Marsh, 34 Hartwell St., New Brunswick, N. J.

SELL OR SWAP—100 Bohemian crystal prisms, 2 sides ground third side unfinished. Want 2" C.R. tube, radio parts, or what have you. Send list. Will send sample for 50c, refunded on trade. C. Vorleceh, 5103 Fleet Ave., Cleveland, Ohio.

WANTED—8 mm. movie camera and projector, also refrigeration service manuals and small screw cutting lathe. Have R.C.A. radio, sound and television course, model gas engine, model steam engine, Bertman wiring manuals of 1925-40 popular sets, photography and technical books, cash, etc. Anthony F. Grimaldi, 133-24 84th St., Woodhaven, L. I., N. Y.

FOR SALE OR TRADE—Speak-o-phone model 88 recorder complete with microphone, will sell or trade for good communication receiver. Also have 8" PM speaker in metal wall baffle. Fred E. Lee, 4015a Grove St., St. Louis, Md.

WANTED—R.C.A. Rider chanalyst, Rider's Manuals 1, 2, 3, 8, 9, 10, 11, 12. No trade. State lowest cash price postpaid. Nelson's Radio Service, Mayville, N. D.

FOR SALE OR SWAP—Eastman model E 16mm. movie camera. Want test equipment. What am I offered. Charles A. Reeves, Radio Station WHUB, Cookeville, Tenn.

FOR SALE—Supreme vedolyzer model 560. Used only once. Complete with instruction book. Lists at $126.90, sell for $90. Shipped in original carton—$10. down, balance C.O.D. N. F. Randall, 804 So. Westnedge Ave., Kalamazoo, Mich.

SALE OR TRADE—"Radio Operating Questions and Answers," Nilson and Hornung, 6th edition, like new. Trade for commercial and amateur licenses—all classes. Joe Horvath, 5810 Velma Ave., Parma, Ohio. W8QKA.

FOR TRADE—Argus C3 camera with case for Sky Buddy or equivalent receiver. Mack McCormick, c-o The College, Pittsburg, Kan.

WILL TRADE—N.R.I. course, Readrite analyzer, and Burton Rogers tube checker, for an amateur super such as Sky Champion or Sky Buddy. Chester L. Price, Watervliet, R.F.D. 2, N. Y.

FOR SALE—Gernsback Official Radio Service Manuals, volumes 1, 2, 3, 4, and 5. Will sell separately if desired. C. A. Goditus, 358 E. Market St., Wilkes-Barre, Pa

FOR SWAP—Radio parts, most of them new, including power transformer. Want Wollensak 425X microscope or one of good quality and equal power—state make. Will send list of parts to anyone interested. J. Vincent Backlund, 228 S. Chestnut St., Lindsborg, Kan.

FOR SALE—Weston counter model 773 type 2 tube checker. Weston model 692 type 1 tube checker. Haukin Electrical Guides—10 books, second edition. Make offer. Want Weston oscillator. John Mitcho, Freeland, Pa.

FOR SALE—All kinds of new radio tubes, condensers, resistors, parts, magazines, etc. Closed my store and have no further use for them. Also N.R.I. Radio Course and electric sign. Would consider movie camera and projector in trade. Anyone interested write for list. Glen L. Mack, 107 E. 35th St., Vancouver, Wash.

FOR SALE—Rider's manuals 1 to 9 inclusive, with index, hardly used, $35.00. John Bargamian, 164 Lester St., Providence, R. I.

POSITION WANTED — Radio engineer, Broadcast studio control engineer, 16 years experience, college education. Sound recording, radio and development, experimental laboratory, trouble shooter, single, draft exempt. Prefer position as master control supervisor in broadcast station or research engineer in a manufacturing plant. Peter Wise, 1258 Fair Ave., Columbus, Ohio.

WANTED—Complete radio course of any kind. Please state condition and lowest price. John Hradil, R.D. 2, Avella, Pa.

WANTED—Rider's Manuals 2 to 8 inclusive, complete and clean. Price must be very low. Will pay cash. W. R. Fletcher, Ellsworth, Maine

WANTED—1½ v. farm battery sets, less batteries. State make, model number, and condition. Lincoln Radio Service, Star City, Ark.

WANTED—Tubes, parts, transformers on consignment from dealers, companies, factories. Good reference. Small Corona typewriter for V.T.V.M. Shines Radio Shack, 69 W. 23 St., Chattanooga, Tenn.

FOR SALE OR TRADE—Good reconditioned a.c.-d.c. radio, radio tubes, vibrators, transformers, volume controls, other radio parts, also books and magazines on radio and photography. Want miniature camera, like Argus A or A2f. Wayne Storch, Beecher, Ill. W9FOC.

FOR SALE—Rider's Manuals, vol II, in as good as new condition. Best cash offer takes them. J. C. Wunderlich, c-o Berg's Radios & Appliances, Galesburg, Ill.

WANTED—Used B eliminator which will operate from a 6 v. storage battery that will give up to 135 v. B supply or small generator motor which will do the same job. "Popular Science Monthly" from Aug., 1940 to Aug., 1941. Sherman Rice, Mt. Olivet, Ken. (Star Route).

WANTED—Vertical pick-up head and arm. Do not confuse this with lateral pick-up. Will pay cash or swap a good R.C.A. 833 transmitting tube used 1500 hours. Joseph Mackora, 63 Pratt St., E. Hartford, Conn.

WANTED—Good camera, preferably 35mm. W. J. Brennan, 352 N. Grove St., East Orange, N. J.

FOR SALE—Jackson 660 dynamic signal analyzer, like new, cost $80, sell for $45. Jackson 420 universal oscillator, like new, cost $60., sell for $35. 10% down, balance C.O.D. James Radio Service, 2909 Buena Vista, Alton, Ill.

FOR SALE OR TRADE—Simpson 7 inch d.c. voltmeters panel type size., 4 range scale, 200 ohms per volt, Arsonal movements. What is your offer? Write for list. J. Shack, 434 Liberty St., Joliet, Ill.

FOR SALE OR SWAP—Superior dynarometer, new, original packing case. Want Rider's Manuals 6 to 12 and oscilloscope. A. (Al) Baker, 225 So. Washington St., Spokane, Wash.

FOR SALE—Tungar 2 bulb battery charger, four Maytag washer engines—two cylinder, 16mm. motion picture projector—sound, one 16mm. silent—750 watt lamp, accordion. Frank Miller, Wyalusing, Pa.

WANTED—Rider's Manuals 1 to 12 inclusive. Will pay cash. State condition, etc. R. Scarbarough, Electric Shop, Coldiron, Ky.

FOR SALE—Weston 676R tube checker in perfect condition. Best offer takes it. French Radio Store, 476 Main St., Stamford, Conn.

FOR TRADE—22 cal. Remington rifle in A-1 shape, late I.C.S. General Radio Course, Superior signal generator, 12 ga. shotgun—single, arc-welding course, and handbook. Want outboard motor, communications receiver or good mobile amplifier, 6 v. & 110 v. a.c. Bob's Radio & Welding Service, 417 Pine St., Calumet, Mich.

FOR SALE OR TRADE—Triumph No. 420 tube tester, $7.50; silver plated trombone and case, $8.00; 8 mm. Univex movie camera, $5.50; 41 cal. Mauser rifle, $5.00; 5 tube short wave receiver, $13.50; Weston No. 301 0-5 voltmeter, $2.25; Jewell No. 64 thermocouple 0-5 ampere meter, $3.00. F. George, 1359 E. 63rd St., Chicago, Ill.

FOR SALE—Readrite 430 tube tester, oak carrying case, tests metal tubes—$10. Triplett 1230 all-wave oscillator, battery operated—less batteries—$8. Both in perfect condition. P. L. Lozano, 202 Callaghan Ave., San Antonio, Texas.

FOR SALE OR TRADE—Jewell No. 199 analyzer, $8.50; Everhot Electric cooker with extra pans, $9.00; Triumph No. 420 tube checker, minus cabinet, $4.50; 22 cal. Winchester repeating rifle, $9.00; Weston, Jewell, Triplett, etc. meters, $2.25 each. George F. Roby, 6305 Kenwood, Chicago, Ill.

MICA • PAPER • DYKANOL • WET AND DRY ELECTROLYTIC CAPACITORS

Cornell Dubilier

ELECTRIC CORPORATION

1049 HAMILTON BLVD. • SO. PLAINFIELD, N. J. • BRANCH DIVISION: NEW BEDFORD, MASS.

MORE IN USE TODAY THAN ANY OTHER MAKE