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CORNELL-DUBILIER ELECTRIC CORP.
 HAMILTON BOULEVARD
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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 Unpublished items will not be returned.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.

Reducing Oscillation

Oscillation in pentode-type tubes may be reduced in some sets by connecting the suppressor grid to ground instead of to cathode.

With this arrangement a slight bias is placed on the suppressor equal to the control grid bias which increases the impedance of the plate circuit sufficiently to prevent oscillation.—*John Arrington, Haganville, Ga.*

Soldering Upside-Down Work

Servicemen who have trouble in getting solder to stick on connections being made on coil form prongs, tube base prongs, or connector plugs may find this wrinkle useful. Instead of turning the work upside down and trying to make the solder stick without running off, just bore a hole about $\frac{3}{8}$ " in diameter and about $\frac{1}{8}$ " deep in one face of your soldering iron. With this "cup" filled with solder it is an easy matter to dip the prong and connection down into the solder and make a joint that looks and works as well as those on the prongs of new tubes.

This will not injure the soldering iron in any way as the other three sides of the tip will still be flat.—*E. Kano, Winston-Salem, N. C.*

Rubber Cement for Cone Repairs

The way which the writer finds makes the most satisfactory repair of damaged speaker cones is to apply a thin coating of rubber cement, such as used for tire repairs, to the cracks which results in a flexible seal of the ruptures.

In cases of badly damaged cones a piece of model aeroplane tissue may be used to bind the tear. The cement is first applied around the crack and permitted to dry for several minutes. Then a coating of cement is spread on one surface of the aeroplane tissue patch and carefully applied over the crack or rupture in the cone.—*B. Frank Prichard, Paterson, N. J.*

Silvertone - 1917, 1967

This model set is provided with a high fidelity switch and when placed in the sharp position a condenser C-37 is automatically connected in the circuit to give bass response. It was found while aligning with frequency modulator and oscilloscope the wave form was distorted on the sharp position of fidelity switch, to improve performance of set place condenser C-37. .003 mfd. in plate circuit of the 75 tube.—*V. D. Walker, Pittsfield, Mass.*

Substituting I. F. Transformers

A second I.F. transformer replacement may be quickly made with a first I.F. transformer when this is the only kind you have in stock by unsoldering the control grid connection clamp and carefully removing coil from shield can, then running control grid lead out through the bottom of can with the other leads and then replacing coil in shield can. This works nicely in sets where the resistance of first and second I.F. coils are approximately the same and also in late model sets using 12SK7 or similar tubes with no top cap connection on tube.—*Gordon Hamilton, Broken Bow, Okla.*

Check Power Transformers of Auto Radios

In many types of the older models of auto radio receivers vibrator points are burnt out as the result of overloads of current. The writer suggests that a careful check of the high voltage side of the power transformer be made before installing a new vibrator since it may be found that leakage across the two high voltage sides of the transformer may be the source of this trouble. To install a new vibrator would only mean that in time the new vibrator will burn out. Therefore, it is suggested that a new or repaired power transformer be replaced before installing a new vibrator.—*Hansen's Radio Shop, San Francisco, Calif.*

Repairing Noisy Volume Controls

Here is a suggestion which many servicemen may not approve, but has been found practical in most

every case with units repaired by the writer.

The noisy volume control is taken apart by removing the small washer at the back of the unit which permits the shaft to slide out.

Wipe all contacts with a clean cloth, but do not use carbon tetrachloride as this may affect the resistor element. Clean the shaft thoroughly and also the shaft hole. Reassemble all parts but do not use any lubricant.—*Walter Smith, Vine Grove, Ky.*

Crosley Model 52 Series

In sets of this type, such as the Model 52 a.c.-d.c. series TE, TG, TP, etc., poor tone quality may develop. Careful inspection of the rotor wheel of the gang condenser should be made for a short to the back of the dial face-plate.

The remedy for this trouble the writer finds is to push the speaker forward, since the dial face is attached to it. Place a piece of scotch tape behind the dial face to prevent the short.

When placing the chassis into the cabinet care should be taken not to push the chassis in too far into the cabinet to press against the face-plate to again cause this trouble.—*Rickey E. Gagliano, Brooklyn, N. Y.*

Sears Roebuck Model 4608-9

This model, several of which developed a loud hiss and lacked sensitivity, was cured by removing R.F. stage, and shunting a 33r resistor across filament of 105G socket, and using R.F. coil as antenna coil, with an improvement also in volume and clearing of the hiss.—*O. M. Stapleton, Alamo, Ga.*



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.

WANTED — Home recording and play-back equipment. Turntable, cutting head, pick-up, phono amplifiers, etc. Cash of $\frac{3}{4}$ HP Single Cyl. Maytag Gasoline engine in exchange. Send full details. Calvin Showalter, RFD 3, Box 372, Vienna, Va.

FOR SALE — Al Hickok Radio Tube Tester A.C. 51, \$47; Supreme Generator Model 570, \$20; Philco Signal Generator Model 016, \$15; Solar Capacity Resistor Bridge Analyzer, \$15; Triplett Milliammeter Model 321, \$15; Cornell-Dubilier Capacity Bridge, \$5. Also many books and diagrams. Write for list. Economy Radio Service, 950 Michigan Ave., Hammond, Ind.

PERSONAL — Will the man from Plymouth, Wis., who was interested in radio equipment, and called on me Feb. 19, kindly write me as I have some things he can use. Oliver F. Klein, c-o O K Radio Service, 2235 N 39th St. Milwaukee, Wis.

WANTED — Signal Generator, tube checker, and manuals. Late models. Have H.O. gauge model railroad equipment. engine American Flyer 14 volts A.C., 7 complete cars, 50 feet of track. Curt Stewart, R.F.D. 1, Box 153, Charleston, W. Va.

WANTED — Meters, test equipment of every description. Radio Technical Laboratories Tube Checker \$4.95. Stamp for list. Roby's Swapmart, 3569 Cottage Grove, Chicago, Ill.

FOR TRADE — Communication Engineering, Everitt; High Frequency Measurements, Hund; Radio Engineering Handbook, Henney; Theory of Thermionic Vacuum Tubes, Chaffee. Will trade for Rider's Manuals number 5, 6, 7 and 8 or later issues. Nathan Glenner 1695 Gladstone Ave., Detroit, Mich.

FOR SALE OR TRADE — 2 Majestic Eliminators A and B (A not assembled) both 110 volt 60 cycle A.C.; B No. M28642 60 Mils at 180 volts; A No. 12628 6 volts at $2\frac{1}{2}$ amps max. Also No. 245 Readrite Portable Analyzer test tubes and A.C. or D.C. volts, ohms, and mils. Need beginners' short wave receiver (A.C. preferred) complete with plug in coils and tubes. Russell D MacPherson, 118-02 101st Ave., Richmond Hill, L. I., N. Y.

WANTED — RCA chanalyst, Rider's Manuals and modern test equipment. Metairie Radio Shop, 341 Metairie Road, New Orleans, La.

SELL OR SWAP—Service manuals, radio magazines, new tubes, large quantity of new resistors, etc. Oliver F. Klein, c-o OK Radio Service, 2235 N. 39th St., Milwaukee, Wis.

WANTED — We pay top prices for Rider's Manuals and test equipment. What have you for sale? National Sound Equipment Co., 625 Main St. Worcester, Mass.

FOR SALE — 1 Brand new Astatic D-104 Crystal Microphone, never in service. Complete with long cord, protective cover, and detachable handle. \$10. Winston Brown, 51 Sixth St., N.E., Atlanta, Ga.

FOR SALE — Several Stromberg-Carlson 180 volt B eliminators. Best offer takes one or all. Edson's Electric Shop, Greenfield, Ind.

TO BUY OR TRADE — Clough Bringle mounting rack. Have used Amperite Kontak mike SKH and Westinghouse ammeter type 210500 for sale or trade. Sahr Radio, Fairmont, Minn.

(Continued on page 10)

SERVICING UNIVERSAL A. C.-D. C. RECEIVERS*

PART I

ONE of the most common types of receivers brought in for servicing is the "cigar box" type universal A.C.-D.C. receiver using a T.R.F. circuit with 4 or 5 tubes. Sets like these have been widely distributed over the entire country and have been sold at extremely low prices. Since manufacturing costs must obviously be kept down when a receiver complete with tubes is to sell for less than \$10, low-grade parts are often employed. Breakdowns are frequent, and Service Men are expected to make prompt repairs.

Unfortunately for the customer, it costs very nearly as much to repair one of these small receivers as a larger set.

be no better than those in the old one, and the same trouble will undoubtedly develop in a short time. On the other hand, if the old receiver is repaired, using first-class parts which the manufacturer could not afford to employ, excellent results may be expected. The cost of service work on one of these sets should really be considered a part of the purchase price for the value of the receiver will be increased in exact proportion to the value of the new high-grade parts. Such a line of reasoning seldom fails to bring in the job at a high enough price to give the Service Man a fair profit.

Although this article deals primarily with the servicing of "universal" type

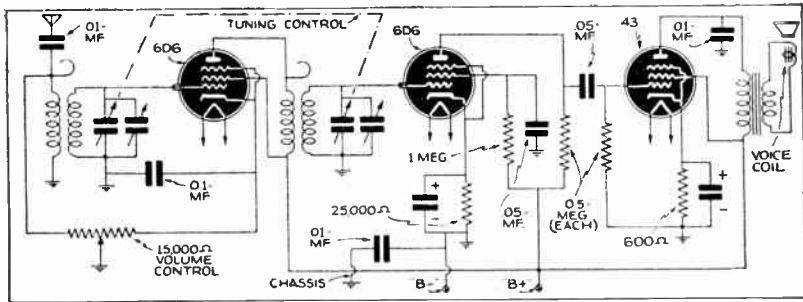


Fig. 1. Typical circuit of a midget A.C.-D.C. receiver.

When a customer hears the estimate of service costs, he generally exclaims: "Why, I can buy a new radio for less than that!"

This is true, sad to say, but the business-like Service Man will point out that the parts in the new receiver will

(or A.C.-D.C.) T.R.F. receivers for which circuit diagrams are not obtainable anywhere, the procedures described apply equally well to these T.R.F. receivers when circuit diagrams are at hand and will also prove of value in servicing universal A.C.-D.C. superheterodyne receivers.

* By courtesy of "Radio-Television Reference Manual."

The signal circuits of a midget T.R.F. radio set are extremely simple. Generally there is one stage of radio-frequency amplification using a 6.3-volt super-control pentode tube such as the 78, 6D6 or 6K7. The former two types have the same base and are interchangeable, while the latter uses an octal base.

The R.F. amplifier feeds into the detector, which uses a pentode tube having a sharp plate-current cut-off characteristic. Interchangeable, type 6C6 or 77 tubes, or the octal-base 6J7 tube will generally be found in the detector stage.

The audio output of the detector is fed by means of resistance-capacity coupling into the power output tube, which is generally a type 43 pentode.

TYPICAL "UNIVERSAL" CIRCUIT

In Fig. 1 is shown the typical signal circuit arrangement of an A.C.-D.C. T.R.F. receiver. There are several peculiarities which should be noted; these are: (1) the chassis may not be an electrical part of the circuit, in which case the ground symbols simply indicate that the parts so marked are connected together; (2) the screen-grid of the R.F. tube gets the same potential as the plate; (3) an external ground connection is not used because one side of the power line (which connects to the receiver circuits) is grounded; (4) the small coils connected to the primary R.F. coil windings provide capacitive coupling in addition to the usual inductive, primary/secondary coupling.

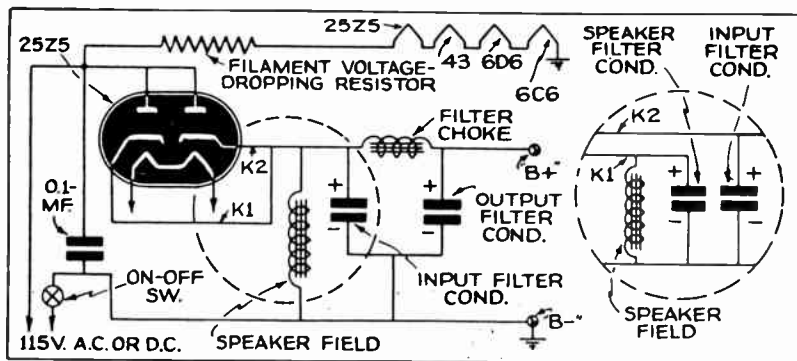


Fig. 2. Typical power-supply circuits of A.C.-D.C. sets.

This tube in turn feeds the loudspeaker; although a dynamic loudspeaker is more often used, you will occasionally encounter a magnetic speaker.

In some sets one or more dummy tubes will be found, with only the filaments connected into the circuit. As long as the filament circuit is not open, the condition of a dummy tube is immaterial; in fact, defective tubes are often used originally by the manufacturer to keep costs down while making the customer think he is getting a larger receiver.

The aerial for a midget set is usually of flexible wire, permanently attached to the set and connected to the receiver input circuit through a small tubular or mica condenser. This aerial wire may be grounded, in which case the R.F. signals picked up by the ungrounded side of the power line will flow through the primary of the 1st R.F. transformer, then through the antenna condenser and the aerial wire to ground. The R.F. signals passing through the primary induce a signal voltage in the secondary in the usual way.

If the chassis is an electrical part of the circuit and the line cord plug is inserted in such a way that the chassis connects to the hot (ungrounded) side of the power line, you may get a shock when you touch the chassis if some part of your body is grounded. If you get a shock, reverse the line plug if the source is A.C.; this will connect the chassis to the grounded side of the power line. In the case of D.C. power you cannot reverse the plug, for that would make polarity incorrect; you will simply have to avoid standing on a concrete floor (a good ground), and avoid touching any grounded object while working on the set with power on. With either A.C. or D.C. power, never make a direct connection from the chassis to an external ground, for this may short-circuit the power line and blow the line fuse.

TYPICAL A.C.-D.C. POWER SUPPLY

Figure 2 shows a typical power supply circuit used for both T.R.F. and superheterodyne universal A.C.-D.C. sets. A 2Z5 tube is connected as a single half-wave rectifier, but where the loudspeaker field coil is energized independently of the receiver circuit, there will be a separate connection to each cathode and an extra filter condenser speaker field, as indicated in the dotted circle at the right in Fig. 2.

The tube filaments in a universal receiver are wired in series, with each filament requiring 0.3-ampere. The filaments of the type 2Z5 and 43 tubes require 25 volts each, while the 6D6 and 6C6 tubes each require 6.3 volts. This makes a total of approximately 63 volts, and means that the filament voltage-dropping resistor must drop 115 — 63, or approximately 52 volts. Since 0.3-ampere flows through this resistor, it will have an ohm value of $52 \div 0.3$, or approximately 175 ohms.

If pilot lamps are used, they are usually placed in series with the voltage-limiting resistor. Each lamp is operated at about 4.25 volts, and hence

the required voltage drop across the limiting resistors is reduced by this amount. Two pilot lamps connected as in Fig. 3A reduce this required voltage drop by 8.5 volts. (Although the lamps are rated at 6.3 volts, they are operated at 4.25 volts to prevent burn-out on surges.)

Pilot lamps are always shunted by resistors, for these lamps do not draw as much current as the tube filament. The shunt resistance will be equal to the shunt current (the difference between the 0.3-ampere filament current and the pilot lamp current) divided into the voltage across the lamp or lamps.

Pilot Lamp Color Code. On A.C.-D.C. sets, only 2 types of pilot lamps are ordinarily used; these can be identified by the color of the glass bead through which the filament-supporting wires pass. A mazda No. 40 lamp with a miniature screw base draws 0.15-ampere and has a brown-colored bead. A mazda No. 46 lamp with a miniature screw base draws 0.25-ampere and has a blue bead, while a mazda No. 44 lamp with a bayonet base also draws 0.25-ampere and has a blue bead. A third type of lamp, having a white bead and drawing 0.20-ampere, is frequently encountered. Replace burned-out lamps with new lamps having the same bead color and voltage rating (6.3 volts).

You will occasionally find 2 pilot lamps connected in series directly across the 110-volt line, with no shunt resistor across them. These will be 110-volt mazda-type lamps similar to those used on Christmas trees. They are connected in series to operate at half-voltage, thereby having longer life while still giving sufficient light to illuminate the tuning dial.

Types of Filament Resistors. Various types of filament voltage-dropping resistors are used in universal A.C.-D.C. sets. Many of the earlier models use ordinary wire-wound resistors mounted under the receiver chassis. The chief disadvantage of these is that the heat which they radiate causes deterioration

of nearby receiver components, chiefly the electrolytic condensers.

Line cord resistors, having the resistance wire embedded in asbestos and placed in the line cord along with the usual 2 copper wires, are now widely used because they keep the dissipated heat entirely out of the chassis. Line cords are easily identified by the fact that they have 3 leads instead of 2; the resistance wire is connected to one of the line wires, the connection being made directly to one of the prongs on the line cord plug. The line wire which connects to this same prong may be identified with an ohmmeter, and always goes to the rectifier plates. The other line wire will go to the ON-OFF switch which is mounted on the volume control of the receiver.

When a receiver which uses a line cord resistor is in operation, the line cord becomes quite hot, but this is natural and is no cause for worry. Never attempt to shorten the line cord when it has a built-in resistance, for this would reduce the resistance value and affect the operation of the receiver.

Ballast tubes are even more satisfactory than line cord resistors for filament voltage-dropping purposes. These

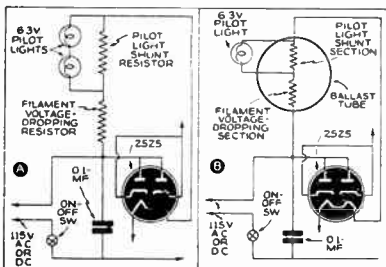


Fig. 3. A and B are different pilot light hookups

tubes can now be secured with either glass or metal envelopes, the metal envelope being the more popular. The resistance element is mounted inside the envelope and connected to prongs on the tube base. Oftentimes taps are provided, with connections to tube

prongs, to eliminate need for separate pilot lamp shunt resistors; an example of a ballast tube having one tap for this purpose is shown in Fig. 3B.

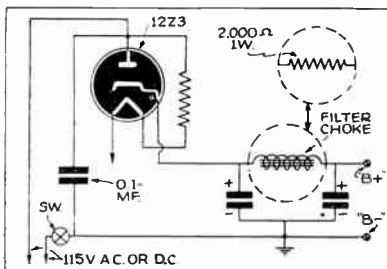


Fig. 4. The rectifier and filter circuit.

When a ballast tube burns out, always replace it with another having exactly the same number. This is necessary because the tubes are made with many different ohmic values and with many different arrangements of prong connections. Ballast tubes become very hot while in use, but as the heat is above the chassis, critical parts in the receiver are not damaged.

Service Men are sometimes asked to replace line cord resistors with ballast tubes; space limitations make it inadvisable to attempt this, for midget receivers are quite compactly constructed. Incidentally, an ohmmeter provides the quickest way of identifying the various prongs on a ballast tube.

Rectifier Circuit Variations. A single 12Z3 rectifier tube or even a type 37 triode with grid and plate connected together may be found in a circuit arrangement like that in Fig. 4. Since supplying field excitation to a dynamic speaker would place too heavy a drain on the rectifier, you may expect to find a magnetic loudspeaker in a receiver having this power pack circuit. The 0.1-mf. condenser connected across the power line tends to prevent interference from entering the receiver by way of the power line. Oftentimes a 2,000-ohm, 1-watt resistor is used in place of

the more efficient but bulkier and more costly filter choke, as indicated inside the dotted circle in Fig. 4.

Sometimes you will find a circuit which uses two 12Z3 tubes connected

cated by the dotted line, instead of point y. The ohms value of the inserted resistor is so chosen that the voltage drop across the resistor equals the correct bias voltage for the tube.

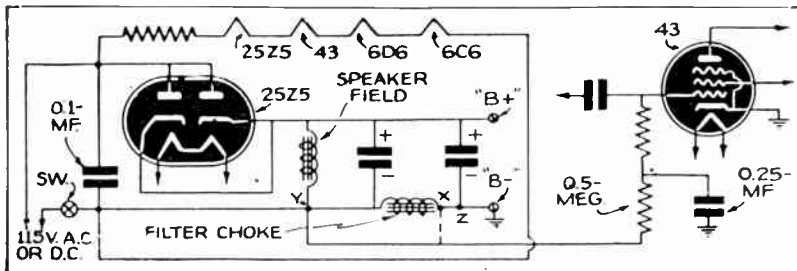


Fig. 5. Another power-supply circuit with the filter choke in the negative plate-supply lead.

in place of a single 25Z5; the circuit will be the same as that in Fig. 2 except that the 2 diode sections of the rectifier tube will be in separate envelopes. The filaments of the two 12Z3 tubes will be in series and will together be electrically equivalent to the filament of a single 25Z5 tube. This gives the set an extra tube and is therefore an advantage from a sales standpoint. The 2 tubes supply sufficient power for loudspeaker field coil excitation and hence a dynamic loudspeaker will usually be found. A single 12Z3 tube cannot however, supply enough current for both the loudspeaker field coil and the receiver circuits and last a normal length of time.

Another power pack circuit using a 25Z5 rectifier tube is shown in Fig. 5. Here the filter choke is placed in the negative plate supply lead, and the voltage drop across the choke is used as C bias for the control grid of the power tube. When the voltage drop across this choke is not correct for biasing purposes, a resistor is inserted between points x and z in Fig. 5, and the control-grid return lead of the power tube is run to point x, as indi-

Notice that the cathode of the power tube is grounded, eliminating the need for a cathode bypass condenser and resistor. A decoupling resistor and condenser are required in the control-grid circuit of this tube, however.

A rather unique method sometimes used to secure a positive screen-grid voltage for the detector screen-grid voltage for the detector tube is shown in Fig. 6. Observe that here the detector screen-grid is connected directly

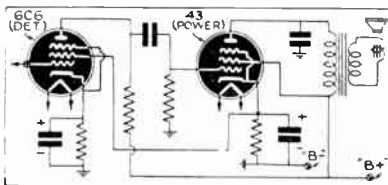


Fig. 6. The detector screen-grid obtains its bias from the cathode of the power tube.

to the cathode of the power tube, which is sufficiently positive with respect to the detector tube cathode for this purpose.

(To be continued)

THE RADIO TRADING POST

(Continued from page 4)

FOR SALE — New Reading Chain Hoists, Spur Gear, Ball Bearing— 3 1/2 ton, 8' lift \$70 each; 2 1 ton, 8' lift \$90 each; 2 2 ton, 9' lift \$140 each; 1 3 ton, 10' lift \$180. - 20% off. 1 1/2 ton (used) Triplex Spur Gear, A-1 \$40 cash. R. Bertolette, 505 Astor St., Norristown, Pa.

WANTED — General Electric Receiver, 1938, with electric tuning and electric clock program preselector for full week programs. Must be electrically and mechanically perfect. State price and condition. Bates Laboratories, 33 Sunset Drive, White Plains, N. Y.

WANTED — Rider's Manuals 1 to 12. Must be in good condition. Any or all with index and supplements. Thos. Squartino, 572 N 7th St., Newark, N. J.

WANTED — Good short wave receiver, mechanical drawing or drafting set, slide rule, binoculars. Describe fully stating best cash price and what can you use in exchange. Oliver F. Klein, c-o OK Radio Service, 2235 N. 39th St., Milwaukee, Wis.

FOR SALE — Two Neon Window Signs, four inch letters in red, size approximately 16" x 36", one sign reads "Radio Sales & Service," other sign reads "Electrical Supplies," each sign equipped with heavy duty 110 volt A.C. transformer. Will sell singly or together very reasonable. Write to C. Leslie Purcell, 137 Murray Ave., Goshen, N. Y.

FOR SALE — Hickock RFO4 Oscillograph, Hickock Microvolter, Hickock 210X Zero current voltmeter, Hickock 155 Traceometer, Hickock 51X tube checker, Solar Capacitor checker, Wright DeCoster test speaker, Weston 664 AC and capacity meter, Weston 663 volt ohmmeter. Charles G. Peroz, 46 Commonwealth Ave. Ext., Middletown, N. Y.

WANTED — New or used self-contained record player and amplifier or wireless record player. Have single tube 50 watt c.w. transmitter, new Taylor T240, Bliley crystals for 160, 80, and 40 meter bands, Westinghouse 1/4 HP 110 v. a.c. washing machine motor, and all kinds of camping equipment. John E. Cann, 1607 Terrace Rd., Mt. Washington, Baltimore, Md.

FOR SALE OR SWAP — 5 tube public address system about 9 watts output, homemade job. Robert Roach, 3036 Marcy St., Omaha, Neb.

FOR SALE — Supreme model 339 de luxe analyzer; A-1 condition, portable carrying case; DCV 5-1250, DCMA 5-1250; Ohms 0-2 M. \$17.50 cash. Art Radio Service, 1422 7th Ave., Rock Island, Ill.

WANTED — Books entitled "Wireless Telegraphy" by Zenneck & Seelig and "Light Waves and Their Uses" by Michelson. State price, condition, and edition of books. Oliver Riddel, 1332 Hood Ave., Chicago, Ill.

FOR SALE — Used parts for all makes and models of radios. Obsolete and scarce parts. Please order by make and model of set and part number. Martin L. Pitts, Terrell, Texas.

WANTED — Hickok RFO-5 oscillograph or Clough-Brengle or RCA 3 or 5" models; also floor stands for microphones. State condition and price. Will trade any radio merchandise or pay cash. A. G. Penman, Radio Labs., Hudson, Wis.

WANTED — Weston meters 301 0-100 mils to 0-500 milamps., and Weston 476 or 425 meters. Also any Weston 528 and 489 meters. Leo F. Kersey, B4, White Sulphur Springs, W. Va.

FOR SALE OR SWAP — Supreme 85 tube tester, relays, electronic bug, tubes, Western Electric 25B amplifier, 3/4 HP gas motor A-1 shape, T20,825,884 duplicating machine, new Sunbeam shave-master. Want multimeter, oscilloscope, National receiver, good typewriter. R. D. Dawson, 1308 "F", The Dalles, Ore.

WANTED — We are in the market for a complete set of Rider's Service Manuals. Must be in good condition. Will pay cash. Robertson Radio Service, 221 1/2 W. Main St., Greenwood, Ind.

FOR SALE — One rotary converter 120 volt a.c. to 120 volt d.c. at about 2 1/2 amps., almost new. One Martin saxophone (soprano low pitch with case). One 6 volt motor generator to 180 volts at 40 mills. A. W. Kline Radio & Electric Service, 510 S. Hudson, Oklahoma City, Okla.

WANTED — RCA Rider Chanalyst. Must be in good condition. Also a RCA voltohmmeter, a 912-P Precision portable tube tester 1941 model, and RCA tip file. Paul Copito, 637 21 St., Erie, Pa.

SALE OR TRADE — Radio parts and test equipment, refrigerating tools, tanks, Graphic and Graflex cameras and photo equipment. Want slide rules, pocket or small microscope, tool chest, micrometers and precision measuring tools, surface gauge, vernier calipers, etc. Wm. Hansen, Niles, Mich.

WANTED — Weston Model 669 Vacuum Tube Voltmeter and good make of Radio Communication receiver. Best cash price paid for same. Radio Repair Service, 173 Main St., Mexico, Maine.

WANTED — Vacuum Tube Voltmeter, Signal Tracer, Rider's Manuals, and condenser tester. Will pay cash. Lawrence Chronister, Paola, Kan.

WANTED — Capacitor-resistance analyzer similar to Solar model CB; also Beat-frequency audio oscillator. Philco, Clough Brengle or similar. Give ranges, condition, shipment F.O.B., best cash price, or what would like in trade. Bob Eubank 1227 Windsor Ave., Richmond, Va.

FOR SALE — Hi standard model C target pistol, with 4½" barrel. Practically new, fired only a few times. New Red Head holster included. Will send express collect \$19.50. Will send subject to inspection if requested. Malcolm D. Burdick, Hampton Station Road, Hampton, Conn.

HAVE — 1 Jewell pattern 88, 0-200 milliammeter; 1 Jewell pattern 78, 0-150 a.c. voltmeter; both 3" bakelite cases. Three Jewell pattern 135, 0-5 d.c.v. "plug in" type; 3 Weston model 506 type L-21, 0-5 v. "plug in" type, 2" metal cases. Want capacitor and resistance bridge analyzer, oscillator, cash or what have you? L. Putnam, Woodward, Iowa.

FOR SALE OR TRADE — Rider's Manuals 1 to 12 with supplements, Triplett meters, tube checker, signal tracer, oscillator, condenser decade box, tubes, speakers, all parts. A.C.-D.C. power drill, assorted tools. Send stamp for list. Al's Radio Service, 460 Atlantic St., Stamford, Conn.

SWAP — National FBXA and Peak 2 stage pre-selector. Set has crystal filter, air tuned IF and coils, 20, 40, 80 meter coils and 7000-11500 k.c. Peak covers 15-200 with 9 tubes. Rola PM 8 inch speaker. Also pack if desired. Excellent condition. Cost net \$97.50. Want electric drill, capacitor-resistor bridge, camera, V.T.V.M., movie camera, projector, or what have you. Bob Eubank, 1227 Windsor Ave., Richmond, Va.

HAVE German Folding Fine Camera using 120 film F3.8 lens F.10CM Compur Shutter. Best offer. Want C-D Capacitor analyzer Model BF50 in trade. W. S. Crooks, Gen. Del., Akron, Ohio.

HAVE RCA communication receiver; 7 tubes; Beat Oscil. Want a signal generator or \$35 cash. Also need a filterol adapter for Weston (771) tube checker. Arnold Halpen, Tudor Radio Service, 119 Tudor Pl., Apt. A., Bronx, N. Y.

WANTED — Used communication receiver. Must be in very good working order. State make and model, condition and price. What do you want in swap? Have many parts to trade. Anthony Pusateri, 1101 Fleming St., Coraopolis, Pa.

WANTED — A volume of RCA Victor Service Notes for 1929-30. The above is one volume. It must be in good condition and readable. Joseph R. Houston, Box 31, New Florence, Pa.

TRADE — Have a Clough Brengle 88A VTVM cost \$50. Will trade for Triplett Modulation monitor, Abbott MRT or TR-4, Hallcrafters HT-7, Browning Frequency Meter, or good amateur receiver. Walter Kryger, 912 W 151 St., East Chicago, Ind.

FOR SALE OR TRADE — 30 tube Scott Philharmonic with robot control in Waverly Console complete with 15" and 2 tweeter speakers plus extension speakers (T Pad controlled). Scott F.M. Tuner. Scott 23 tube high fidelity set complete in Tasman Console. Also 3 all wave Lincoln de luxe 12 tube high fidelity receivers, 1 complete with Console. Wanted: Noiseless Typewriter, Chanalyst, Signalyst, Volt Ohmst, Jr., 12 Rider's Manuals. Henry Bal, 20 South 13th St., Newark, N. J.

WANTED — .22 cal. Winchester rifle. State condition and lowest price. Geo. A. Gould, 1540 E. 24th St., Brooklyn, N. Y.

WANTED — One or two 884 Gas Triode tubes. State price and if new or how long used. Would prefer new tubes. George C. Anderson, 2236 Indiana Ave., St. Louis, Mo.

WILL TRADE — Dumont type 164 Cathode Ray Oscillograph in perfect condition for Hickok Oscillograph Model RFO or a Hickok Model 155 Tracometer. Must be in good condition. Will add cash if necessary. John Bennett, 184 Midland Ave., Garfield, N. J.

WANTED — Will pay cash for Rider's Manuals 7, 8, 9, 10, 11, 12; Rider chanalyst; late precision tester, 1941, for low price; and a.c. power drill, and tools. Joseph E. Trahan, 45 Dyer St., Danielson, Conn.

WANTED — Rider's chanalyst, must be in A-1 shape and cheap for cash. Southern Radio Service, Thomasville, Ga.

FOR SALE OR TRADE — Gardiner-Levering tape sender, type J with fresh rolls tape. Excellent condition. Also 100 1-watt carbon resistors. Want Univex Mercury F3.5 35mm camera or \$15 cash for above combination. Earl Collins, 114 Carroll St., New Bedford, Mass.

TRADE OR SELL — 1930 Model A Ford cabriolet in good condition all around. Will trade for \$125 worth of equipment. Want Precision or Hickok signal generator or combination tube checker and multi-meter condenser analyzer or 3" oscilloscope or late model a.c.-d.c. communication receiver or Contax camera F.2 lens or cash. R. Dopler, 436 E. 59th St., New York.

FOR SALE — New and used receiving and transmitting parts and equipment. What can you use. Send stamp for list. Herman Yellin, 351 New Lots Ave., Brooklyn, N. Y.

WANTED — Milliammeters, v.o.m., Radio Physics Course by Ghirardi or similar books. F. A. Graulich, 323 Palmetto St., Brooklyn, N. Y.

WANTED — Instructograph, with tapes, in good condition or similar code machine. Have Shure Xtal mike, chemical apparatus, etc. All letters answered. Raymond H. Ives, 822 Windsor Ave., Norfolk, Va.

WANTED — Model 660 R.C.P. electronic multimeter; Simpson rotor dial tester; condenser tester that tests condensers while in set. Cash or will trade. Have radios, console or table models and radio parts. Graham Pickles, Sand Creek, Mich.

WANTED — A good Signal Generator. State price and condition. No junk wanted. Am willing to pay a fair price. Write to Arthur A. Hale, 357 East Park Blvd., Akron, Ohio.

FOR SALE — Knight 4 tube portable battery radio. Requires 3 standard flashlight cells, for the "A" battery and one 45 volt "B" battery. It's a camera type radio, in black bakelite finish. Used only 4 months. Will sell for \$10. Marion Francis, 1232 E. 75th St., Chicago, Ill.

WANTED — Rider's Manual No. 1. Must be complete, clean and cheap. Lee W Nygaard, Box 97, Gillett, Wis.

WANTED — Tubes, parts, transformers, and batteries on consignment from dealers, companies, factories. Good reference. Lee Nordan, Benson, N. C.

FOR SALE — Crosley facsimile reproducer (printer) used only 10 hours. Complete with OZ4 tube, stylus, 1 roll of printing paper. In beautiful walnut cabinet. Requires 8-10 watts audio driving power. Make offer. All letters answered. Thompson Irwin, Jr., 37 Cottage Park Road, Medford, Mass.

WANTED — A complete television set wired or in kit form. Need also a five inch 1802P4 tube and other parts for television. What have you? State condition. Aaron Ignal, 850 E. 156th St., New York, N. Y.

WANTED — Rider's Manuals 1 to 10 incl. in good condition and priced low. Will pay cash. Will answer all letters. C. N. Cheadle, Box 377, Salem, S. Dak.

FOR SALE — Brand new rack and panel power supply unit. Has one 1000 v.d.c. 300 m.a. power supply and one 600 v.d.c 200 m.a. power supply. Highest quality parts throughout, including 866-A rectifiers and C-D capacitors. Must sacrifice at \$60. Will send photos on request. Charles Blockman, 1011 South Ledford St., Harrisburg, Ill.

TRADE — Two 15 watt PA systems, phono motor, phono oscillator one 2 amp. battery charger, one half amp. battery charger, five 2 amp. tungar bulbs, QST's. Need auto A battery eliminator, tube tester, Rider's Manuals 4 to 12. Stanley, 2748 Meade St., Detroit, Mich.

FOR SALE — 1 Model 151 RCA Cathode-Ray Oscillograph \$25; 1 Model OS-10 Hickok Oscillator \$25; 1 SR-80 Amperite 200 ohms Studio Microphone \$35; 1 Thordarson T-10W-11 Tru-Fidelity Amplifier. Lists at \$172 with tubes \$65. All this equipment is in A-1 condition, mechanically and in appearance, too. John J. Spankowitz, 239 N. 9th St., Allentown, Pa.

FOR SALE — Sell Bliley B-5 7175KC (never used). Mallory Vibrapak No. 554 new. Hytron HY75 never used. QST's 1923-1939, fine condition. Weston meters, transformers, filter condensers. R. V. Osborn, Gen. Del., Stamford, Conn.

WANTED — Hickok RF04 Oscillograph; also Hickok 155 Tracemeter. Must be in good shape. Cash. Theo. L. Seybold, 9316 Colesville Rd., Silver Springs, Md.

FOR SALE — Million Signal Generator Model OD cost \$22.50. Cash price \$18. Used 1 week in perfect condition. Westinghouse Bulb charger in perfect working order \$4. Arthur H. Steinberg, 515 1st St., S., New Ulm, Minn.

WANTED — Oscilloscope, 3 or 5". C-D or Solar capacitor checker. Rider channelyst. State model, condition, price. Beck's Radio Service, 21 Myrtle Ave., Passaic, N. J.

WANTED — Rider's Manuals 10, 11, 12. A. H. Alderson, Spring Hill, W. Va.

WANTED — Late model portable tube checker in one of the standard makes. C. M. Fulcher, 2415 W. Main St., Richmond, Va.

FOR SALE — One Hickok Tube Checker, counter model No. 46, takes all tubes to 30 volts. Like new with adapters for many new tubes. One Triplett Counter Portable Tube Checker, like new, model No. 430 with Locktal adapter. What do you offer? Leading Radio, 114 E. 3rd St., Mt. Vernon, N. Y.

WANTED — Recording equipment, or any parts thereof; 16" dual speed turntable, pickups, recording heads, etc., also 16mm movie camera. Will trade or pay cash. Mention condition and price. H. W. Fees, 8766 115th St., Richmond Hill, L. I., N. Y.

WANTED — RFO-5 Hickok Oscillograph or 560A Supreme Vedolyzer and 561 Supreme Oscillator. State condition, tubes used and price. O. F. Hamm, 4751 Louisiana Ave., St. Louis, Mo.

FOR SALE — Triplett V.O.M. and Triplett signal generator, excellent condition, late model. Also lessons, diagrams, tubes and parts. Write for particulars. Arthur W Albee, Oshkosh, Neb.

WANTED — A two tube Kadet radio with white bakelite cabinet and in working order if possible. If not in working order must be repairable. Original set was about five or six years old. Main point is white cabinet and essential mechanical parts. If you have one let me know what you want for it. Libbys Radio Service, 18 Ward St., S. Boston, Mass.

WANTED — Capehart or RCA record changer which will play both sides successively, with or without amplifier. State make, model, condition, and price. L. A. Schafer, 131 N. 24, Camp Hill, Pa.

WANTED — Small miniature machine lathe in A-1 condition with all attachments you may have. Will pay reasonable price and cash, what have you to offer. Emil Lapiana, 106 E. 181st St., Bronx, N. Y.

WANTED — Position in a radio defense factory for young man, ineligible for draft. Graduate of RCA School, but no experience. Willing to learn. Will accept nominal salary, but must have opportunity for advancement. Sidney J. Brass, 560 Beck St., Bronx, N. Y.

WANTED — Weston ohm voltmeter No. 663 or Weston analyzer No. 665 in A-1 condition only, no junk. Will pay reasonable price and cash, what have you to offer. Emil Lapiana, 106 East 181st St., Bronx, N. Y.

CASH — For Rider's, Hickok, Supreme, Superior, etc., Signal Chasers, V.T. voltmeters or meters. State price, condition and model. The Simplex Shop, Salina, Kan.

WANTED — Any make 12" television receiver, cash, new or used. Also Rider's Manuals 1 to 12 inclusive. M. B. Davis, 807 S. 6th St., Philadelphia, Pa.

FOR SALE OR TRADE — One army communication receiver, one instructograph with oscillator, phone, five tapes and instructions, AC oscillator with speaker in case, misc. radio parts. Want camera, photographic equipment, etc. F. L. Emerson, 7½ N. Second St., Yakima, Wash.

FOR SALE—Rider's Manuals 1 to 11 inc., 1 and 2 black, 3 green, balance standard blue. Complete with all supplements, some never opened. Sell for forty-five dollars cash. Also Lafayette model 275A 6 volt 25-35 watt amplifier with Rola 6v. G12 speaker, and Amperite RB-H mic and stand. Sell \$40. Battery Radio Service, 206 Branch Ave., Red Bank, N. J.

WANTED — 3" oscilloscope or Supreme Vedolyzer, good condition. Will pay cash. State price. Tone's Radio Service, 126 Fourth Ave., Paterson, N. J.

CASH for 561 Supreme Signal Generator, resistance decade boxes, medical microscope, back issues of Aerovox Research Worker, Jan., Feb., and Mar., 1928, General Radio Experimenter Apr., 1934, Aug., 1935, Sept., 1936. John T. Lipani, 157 Leverett St., Boston, Mass.

FOR SALE — New GE Model LB350 5 tube, AC and 2 volt, Batt. Portable List \$44.95. \$30.50 takes it. Anchor Distributing, 203 Elm St., Itasca, N. Y.

SELL OR TRADE — Rex typewriter \$10; R.T.L. tube checker \$4.95; modernizing transformer \$1; N.R.I. Servicing Course \$8; .22 and .38 cal. rifles; 500 radio magazines, radio parts; 5 tube S.W. receiver \$13.50; RCA 500 v.-1100 v. transformer \$3; meters \$2.50 each. Roby's Swapmart, 3569 Cottage Grove, Chicago, Ill.

SWAP — I want to exchange Motorola call letter books with some dealer who needs letters for his state. All I use are California letters. The remainder of the books are intact. Stan McKay Radio, 2001A Hopkins St., Oakland, Calif.

WANTED — Cash for Rider Chanalyst; Rider's Manuals 8 to 12; late model Solar or C-D condenser tester and late model oscilloscope. R. B. Jolley, Valdosta, Ga.

FOR SALE OR TRADE — 41 issues "Proceedings of the IRE 1930-35, Journal of the AIEE Jan., 1929, to July, 1931, Radio Craft 1931-1938, and Radio News 1926-36 some complete years. Make offer. H. R. Ringold, 132 N. Doheny Dr., Beverly Hills, Calif.

FOR SALE — 4 Racon 3½ ft. trumpets; 2 six foot aluminum trumpets; 10 Racon Giant Dynamic units six volt fields; 2 Webster, Racine 50 watt class A amplifiers, rack mounted; 1 20-watt 6 volt mobile amplifier, two mike inputs and phono; 1 six volt General Industry two speed turntable. Rodger Radio Service, Potsdam, N. Y.

WANTED — Vacuum tubes and vacuum tube apparatus made prior to 1919. Also books, periodicals, catalogs, and other advertising literature dealing with vacuum tubes or wireless, published prior to 1919. Will buy or trade. Gerald F. J. Tyne, 191 Claremont Ave., New York City.

FOR SALE OR TRADE — 1 6 volt, 200 watt lighting plant; 1 Majestic "B" power pack; 1 10" oscillating fan; 1 ultra violet bulb. Want Rider's Manuals 10, 11, and 12. S. T. Smith, 90 Summit St., Manchester, Conn.

SWAP — GTC Porta Power Battery Pack for two volt sets for one that works on 1.4 sets. Philco set tester for sound equipment. Want 6 volt sound system. Less speakers. Shines Radio Shack, 69 West 23rd St., Chattanooga, Tenn.

FOR SALE OR SWAP — Kadatte Tunemaster model KRC2 also Penwood Electric Numerical Clock in walnut case, good condition. M. Francis, 1232 E. 75th St., Chicago, Ill.

WANTED — Automatic record changing player unit, preferably Garrard or Capehart. Please state model number, condition, and cash price. Dexter Kurs, 4525 45th St., Long Island City, N. Y.

WANTED — Factory built all-wave receiver any make. Age, cabinet or condition no object just so it is complete. Also want testing equipment any description. All letters answered. Glenn Watt, 415 W 1st St., Chanute, Kan.

SELL — Many receiving tubes; condensers, variable and fixed types; tuning forks 60, 256, 320, 384, 512 cps.; GE 1KVA 4400-0-4400v. transformer; telegraph sounders, output trans., etc. No reasonable offer refused. Want meters, acorn tubes, Edison storage cells, 24/1500 v dynamotor, 150w 110v DC to AC 60 cps. converter. Grote Reber, 212 W. Seminary Ave., Wheaton, Ill.

FOR SALE — Hickok tube tester model ACS1 \$45; Rider's Manuals Vol. 3, 5, 6, 7, 8, A-1 condition \$35; Philco Signal Generator Mod. 016 \$12; and many other tubes, parts, etc. E. R. Service, 950 Michigan Ave., Hammond, Ind.

WANTED — 3" panel type dc voltmeters, 1000 ohms per volt, range 0-50 or 0-300. Also impedance bridge for measurement of inductance. Tobe-Deutschman or similar. Bliss Electrical School, Takoma Park, D. C.

WANTED — RCA TMV-133A Crystal Calibrator. State condition and lowest price. R. Bronson, 142-18-230 Place, Rosedale, N. Y.

CASH — For oscillators and oscillographs. State price, condition, and description. The Simplex Shop, Salina, Kan.

WILL TRADE — D.C. multimeter, full wave, copper oxide rectifier, Radio Craft magazines and parts for experimenting and set building. Want Service manuals, chemical apparatus or what have you? My list for yours. Floyd Goff, Black Mountain, N. C.

CASH — We will pay cash for Rider's Manuals 7 to 12 inclusive if in good condition. We also wish to purchase a Supreme Vedolizer in good condition. All inquiries answered. Moch Radio & Sound Service, 5925 S. Albany Ave., Chicago, Ill.

FOR SALE OR TRADE — Radio and Television Today magazine, from December, 1939, to August, 1941. Also November, 1941, copy. Service magazine from April, 1940, to April, 1942. Make offer. Paul H. Prokes, 1955 W. Schiller St., Chicago, Ill.

FOR SALE — Triplett tube tester, signal generator, volt-ohm milliammeter, Solar capacitor analyzer. Analyzer parts of all kinds. Meters, speakers, most anything one wants. Rider's Manuals, turntables, pickups. \$200 takes all. Radio and Electric Service, E. V. Coleman, Woonsocket, S. D.

FOR SALE — Proceedings IRE, 1936-1940, in one lot or will sell separately. Also number of technical books on Radio, Sound, Recording, etc. Also Transactions of Society of Motion Picture Engineers, 1921-1941. Norton, P. O. Box 7011, Coral Gables, Fla.

WANTED — 0 to 1 m.a. moving coil type meter. Will buy even if coil is burned out, as long as the meter's resistance was 50 ohms. State price in letter. Arthur Manuel Lee, Gen. Del., Boonville, Mo.

FOR SALE — 1 new Thordarson model T-25W28 Universal 6 volt DC - 110 volt AC amp.; 1 new X-10 Astatic Crystal mike; 1 Atlas large type baffle sound speaker projector; 1 Utah P.M.D. 136 oz. magnet speaker; 1 100' extension speaker cable, plug, and sockets; 1 Warner 3rd hand man, for microphone; 1 new complete auto top speaker. All merchandise is brand new. Will sell complete outfit at present factory wholesale price. Cash or terms. Berry's Radio Service & Distb. Co., Box 243, Olive Hill, Ky.

WANTED — 30-watt mobile P.A. system complete with two projectors, car platform, etc. A direct drive 78 RPM recording motor. State make, price and condition. Rays Radio Service, 3160 Grayson Ave., Ferndale, Mich.

WANTED — Will pay cash for a No. 10 Riders Manual and a 16" 2500 ohm field dynamic speaker that will handle 30 watts. State condition and best cash price. Also interested in testing equipment. Prices must be right. Lovett's Radio Shop, Box 143, Newland, N. C.

SALE OR TRADE — Over 60 Weston and Jewell meters, all ranges. Want camera, .22 repeater rifle or cash. L. Tulauskas, 104 N. Eaton Ave., Indianapolis, Ind.

WANTED — CRI engineering course, oscilloscope, VOM, marine receiver, and 50-100 watt cw transmitter. Will pay cash. Percy Ott, 507 Juniper St., Quakertown, Pa.

WANTED — Any or all of Rider's volumes. State lowest price, condition, etc. Radio Service, Pollock, Mo.

U. S. SIGNAL CORPS NEEDS ENGINEERS

THE War Department, Aircraft Radio Laboratory at Wright Field, Dayton, Ohio, has a shortage of qualified civilian engineering and inspection personnel. Wright Field is the home of the Materiel Division of the Army Air Corps and there are concentrated all the experimental laboratories which are making such tremendous advances in the development of aircraft and aircraft accessories. The Aircraft Radio Laboratory is responsible for research, development, engineering, and inspection required in the radio field, incident to design, supply, and installation of radio equipment on aircraft.

The basic duties of a radio engineer are to perform or supervise the performance of professional engineering work in design, construction, research, and investigation. Responsibilities and duties are commensurate with the grade.

The Civil Service standards for Junior Radio Engineer, which pays \$2,000 per year, are a degree in electrical engineering from an accredited college. The next higher rating, Assistant Radio Engineer, \$2,600, has requirements of two years of progressive professional experience, plus substituted experiences year for year for college education that is lacking. A college degree, while very desirable, is not essential. A well qualified engineer without a degree is eligible for consideration.

Inspectors of Signal Corps Equipment are required to make inspections and tests of aircraft radio equipment to determine compliance with specifications, etc. This duty is usually performed at the plants of the contracting manufacturers. The salary range is from \$1,620 to \$2,000 per year.

Engineers and service men who are interested in these positions are invited to submit a letter outlining their education and experience directly to:

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