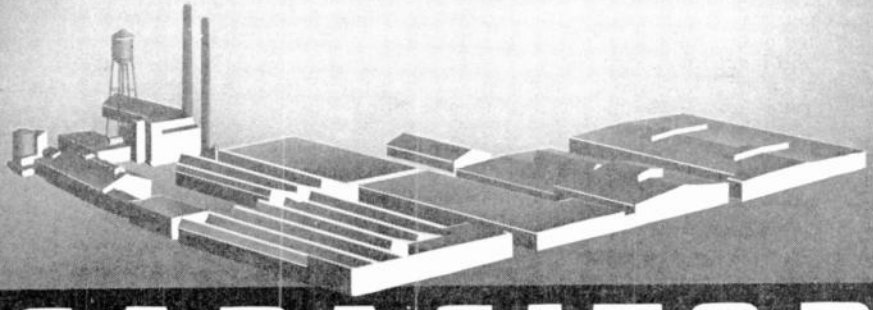
THE C-D CAPACITOR



Vol. 5 AUGUST, 1941 No. 8

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

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 Unpublished items will not be returned.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.

Protection for Pickup Crystal Cartridge

The complicated switching mechanisms on some radio-phono combinations, or the breakdown of the audio input tubes, sometimes places a temporary D.C. voltage across the crystal cartridges in pickups thus ultimately destroying them.

When replacing any crystal cartridges always solder a .01 mfd. - 400 volt paper condenser in series with the live terminal of the cartridge and its lead. The use of this capacitor prohibits any D.C. reaching the cartridge without impairing its tone. Usually, this small capacitor can be fitted right into the pickup arm. — *Millet Schaefer, New York City.*

Silvertone Model 4786

After a considerable amount of checking and circuit tracing in order to find the cause of howling and motorboating in this type set it was finally traced to a 30 mfd. filter capacitor. Adjustment of the volume control might at first seem to indicate a new control will remedy the trouble. However, by replacing the 30 mfd. capacitor (Mfg. Part No. 101201-4808) with a new can type capacitor of 20 mfds. or more will correct the condition completely.—*G. D. Griffin, Ithaca, N. Y.*

Bad Insulation on Push-Button Switches

On several types of receivers employing electrical touch tuning, such as the Zenith Model 6S532, which have five separate trimmers, very often it will be found that the center buttons fail to function properly. Upon close examination it will be noted that this is due to warping of the thin insulated strip holding the stationary contacts.

To remedy this trouble merely fit a small piece of insulation under the contacts so that it will prevent them from touching the metal frame of the assembly.—*Ray Bramley, Silvertown, N. Y.*

Check Pilot Lamp Trouble

When working on AC-DC sets using a ballast tube, from which voltage passes through pilot lamps, always have the lamp of correct rating in the pilot lamp socket. If the lamp is omitted or burned out, it is possible the filament voltage will be low on the tubes in the set, resulting in poor operation. If the lamp is not shunted across the ballast tube, less current flows, and thereby the filaments receive less voltage. When this happens the set will not have the pep it should, or, in superhets, they will operate only on one side of the dial. —*George Vesecky, Chicago, Ill.*

Stewart Warner Model 91-53

The filter block in this set consists of an 8-4-4 mfd. electrolytic rated at 400 volts. A slight loss of capacity in either section will cause an annoying hum. The cure, of course, is to install three separate capacitors even though only one section may be defective.

Shunting new capacitors across the old unit will not be effective in this set, and we recommend that the leads be disconnected from the defective capacitor. Failure to do so will result in a certain amount of hum remaining to cause future trouble.

The leads are coded as follows: Red - positive; Green, Black, Brown - negative.—*I. Hyman, Norfolk, Va.*

Midget Power Supply

The power supply as shown in the accompanying diagram will deliver about 300 volts D.C. at one mill or about 150 volts D.C. at 10 milliamperes.

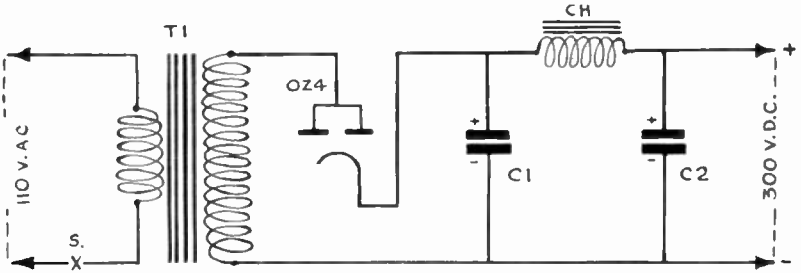
An OZ4 gaseous rectifier tube has about 220 volts or more A.C. applied to it by using an audio transformer of at least 3 to 1 ratio to step up the 110 volt A.C. line voltage to the rectifier tube. This is sufficient to start current flow in this tube and filtering is accomplished by using an 8 mfd. 450 volt D.C. tubular electrolytic condenser and midget filter choke.

This power supply features extreme compactness, low cost with simple construction. Requires no power transformer or filament supply. It is ideal for use with a ¼ watt neon lamp for condenser leakage tests or as a power supply for a high resistance reading ohmmeter.—*P. M. Ohlinger, Portsmouth, Iowa.*

Inspect for Faulty Lead-in Strips

When a set is repaired and operates completely satisfactory at the shop and not as well when installed at the customer's home it is recommended to inspect the lead-in strip and other parts of the aerial and ground leads.

Many of the lead-in strips made to fit through windows have riveted connections which cause high resistance contacts at the clips. Clean around rivets and solder contacts at clip connections and all other parts where poor contacts are apt to occur as the result of corrosion.—*O. K. Powell, Ainsworth, Neb.*



S. - 110 V.A.C. Switch.
T1 - 3-1 ratio or more Audio Transformer.
OZ4 - OZ4 Gaseous Rectifier Tube.
C1 - C-D 8 mfd. 450 volt Beaver Tubular Electrolytic Capacitor.
C2 - C-D .05 mfd. 600 volt Tubular Bypass Capacitor.
CH - Midget Filter Choke.
Socket for OZ4 tube and miscellaneous hardware.

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—Rider's service manuals, volumes 1 to 8 inclusive. Please state condition and lowest price asked. Will pay cash. Leon Miley, 9 East Orange St., Lititz, Pa.

FOR SALE—We have a lot of 6 foot trumpets and units made by Racon. All in A1 condition. National Sound Equipment, 625 Main St., Worcester, Mass.

ATTENTION — Radio-Bugs, and Crystal-Bugs, get acquainted with each other. Membership free, strictly non-profit. Postcards welcome. Write immediately, Experimenters International Club, L. Hulet, 209 East 21st St., New York City.

WANTED—3 inch oscilloscope, frequency modulated signal generator. Rider's manuals 8-10. Late tube tester. Sell-trade 300 watt a.c. generator, 1¾ H.P. Briggs-Stratton gas engine, Peak preselector 15-250 meter. Evan W. Edwards, 4740 Johnson Ave., Hammond, Indiana.

FOR TRADE—Late model N.R.I. Professional all wave, all purpose signal generator and multimeter tester. Also test tubes by the comparison method. Used only once. Want Supreme 385 or 389 combination tester. If interested send description of tester. Harry Andresen, 3317 N. Albany Ave., Chicago, Ill.

FOR SALE OR SWAP—Medium Chemistry Laboratory Outfit, Shure Model 74B Spheroid Xtal mike in factory carton. Want well-known make field glasses of at least 8X, Instructograph, or what have you. Raymond H. Ives, 822 Windsor Ave., Norfolk, Virginia.

FOR SWAP—Various shielded fil-trans-formers, 2-852 tubes, complete parts for 10 watt amplifier and 250 watt transmitter, etc.

WANT—Thordarson T 19 P 57, T 15 D 82, T 11 M 77, T 75 C 51; Triplett 0-200 and 0-500 M.A. 3 in. Sylvania 203 A Carbon. W. Dixon, 400 West 128th St., New York City.

FOR SALE — Rider's Service Manuals, volumes 2 to 10 inclusive. Perfect condition. What are we offered? Council C. Cooke, New River Light and Power Co., Boone, North Carolina.

WANTED—Rider's Manuals. Need complete set, must be in good condition. State lowest cash price. Frank G. Rector, Box 573, Kalamazoo, Mich.

FOR SALE—RCA model 156 tube checker with Loctol adapter, good as new, $20.00, and Model No. 339 Supreme analyzer complete, good as new, $20. T. H. Cook, 507 1st Ave. No., Great Falls, Mont.

WANTED — Good used ¼ inch heavy duty electric drill, portable. Must be priced reasonable. Paul Capito, 637 West 21 St., Erie, Pa.

FOR SALE — 1 Weston tube checker Model 676R in perfect condition, best offer takes it. French Radio Store, 476 Main St., Stamford, Conn.

WANTED — Tungar battery charger for charging 2, 4, and 6 volt batteries. Westinghouse or General Electric make preferred. Quote lowest price and send picture and description. F. E. Flint, P. O. Box 86, Elizabeth, W. Va.

(Continued on page 9)

FILTER DESIGN*

Design and characteristics of low- and high-pass filters

IN designing a low or high-pass filter the quantities which are usually known are the frequency at which cut-off is desired, f_c, and the resistive impedance, R_o, into which the filter is to work. These two quantities determine the elements of a prototype or m-derived, T or π, low or high-pass filter. By means of the chart and curves, the desired filter may be quickly designed and some of its characteristics predicted.

If f_c and R_o are known, the intersection of the f_c line and the R_o line on the chart determines a point with which is also associated a value of L and C as read from the lines sloping downward and upward. Next pick the desired filter section from those tabulated in Fig. 1; using the values of L and C obtained above, the elements of the filter can be computed as indicated in the figure.

The characteristics of a filter include the variation of characteristic impedance, attenuation, and phase shift as a function of the operating frequency. These characteristics can be obtained by first consulting Fig. 1 for the number of the curve showing characteristic impedance variation, Z_o, attenuation, α, and phase shift, β. The characteristic impedance curves are given in Fig. 2. Note that the abscissas are in terms of ratios of cut-off frequency to operating frequencies, f/f_{c_1} in the case of the

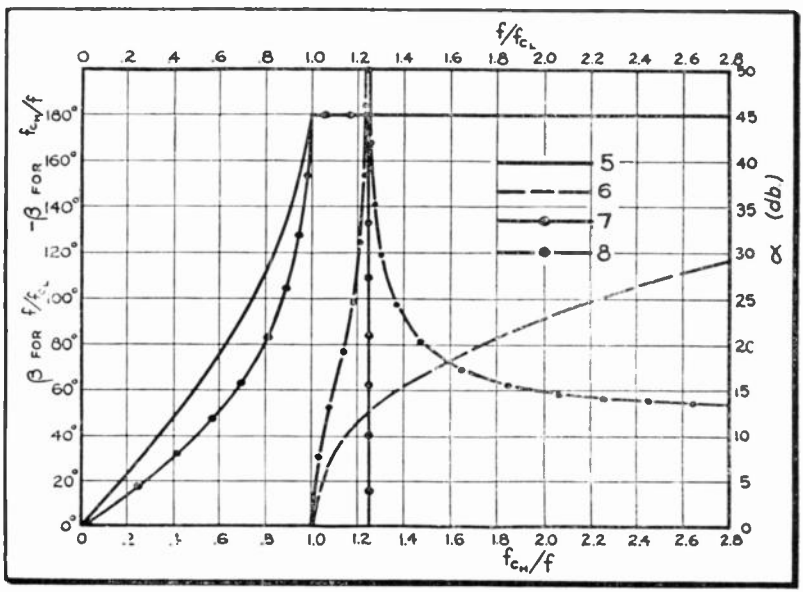


FIG. 3—Attenuation and phase shift for the filter sections.

* *By L. J. Giacoletto in "Communications."*

low-pass filter and f_{ch}/f in the case of the high-pass filter. The ordinate is plotted in terms of the ratio of characteristic impedance to R_o, where

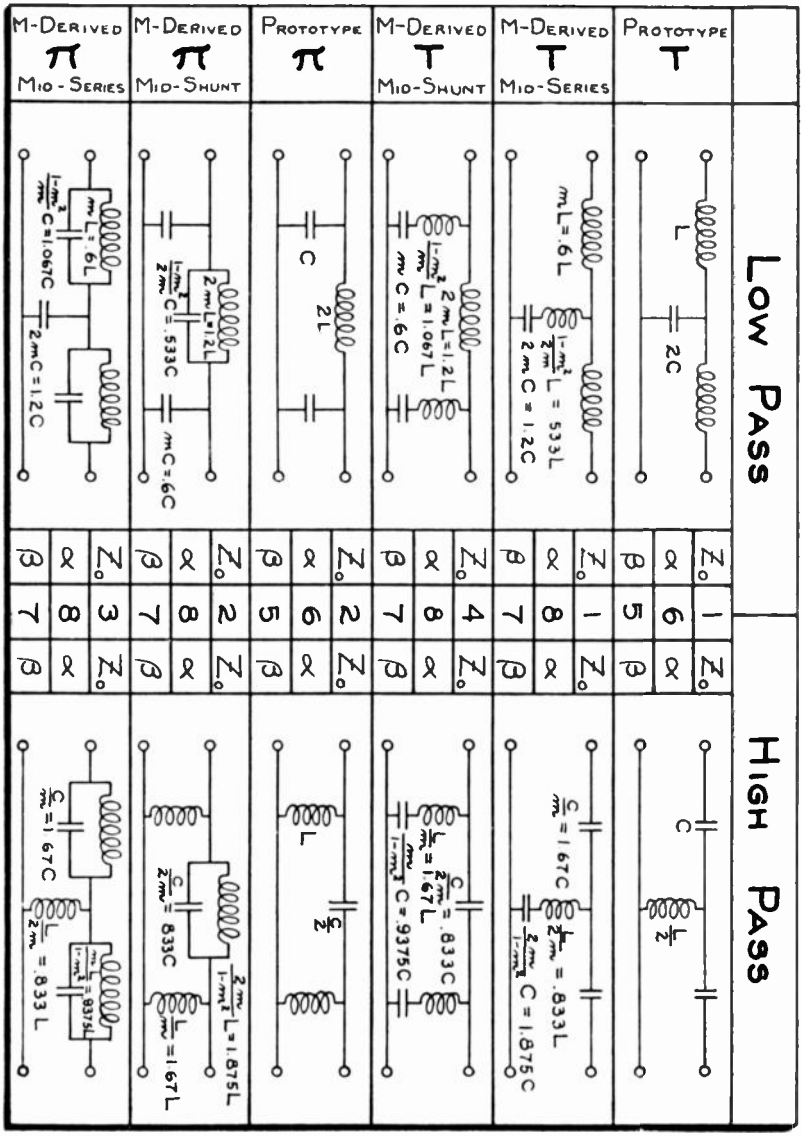


FIG. 1—Tabulation of filter sections.

R_o is the characteristic impedance at zero frequency in the case of low-pass filters and at infinite frequency in the case of high-pass filters. The characteristic impedance is a pure resistance as long as the frequency ratio is less than unity and above unity changes to a pure reactance. The curves of Fig. 2 are drawn in solid lines to the left of the unity frequency ratio and as broken lines to the right of the

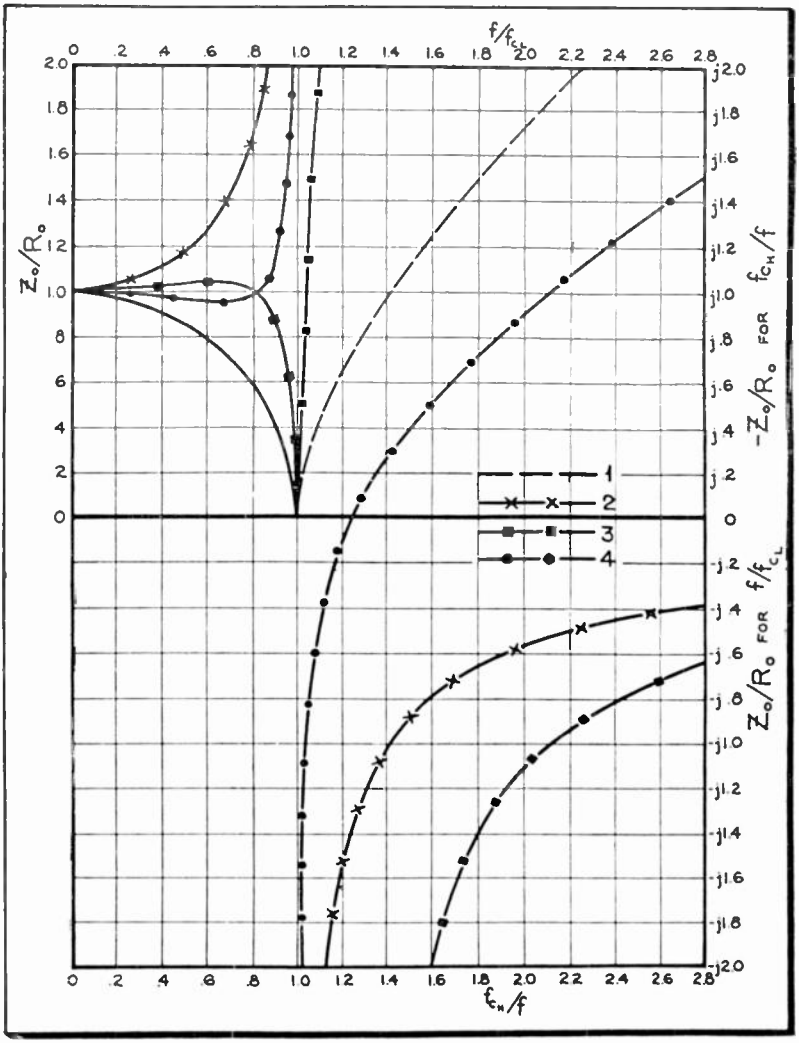
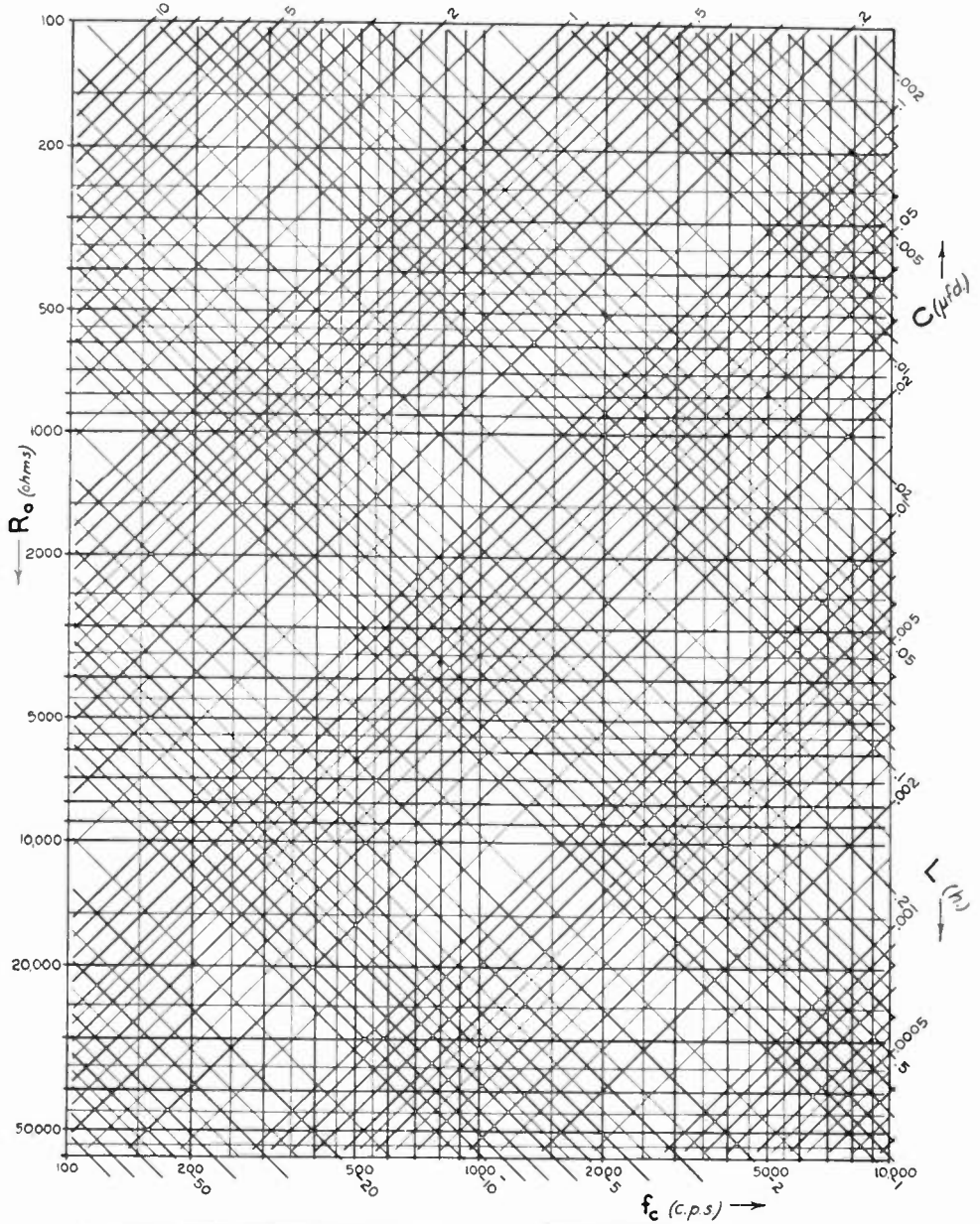


FIG. 2—Characteristic impedance variation for the filter sections tabulated in Fig. 1.



unity frequency ratio. The left-hand ordinates are to be used with the solid line curves and the right-hand ordinates, with the correct sign, are to be used with the broken line curves.

Attenuation and phase shift characteristics are given in Fig. 3. It must be borne in mind that these data assume that the filter is always terminated in its characteristic impedance, Z_o, rather than in R_o.

The elements for the m-derived filter sections shown in Fig. 1 have been computed for $m = 0.6$ and the characteristic curves for the m-derived filters are those for $m = 0.6$. This value of m gives a more constant input impedance throughout the pass band as indicated by curves 3 and 4 in Fig. 2. As contrasted with the m-derived sections the prototype sections, when terminated by a fixed value, have input impedances which vary over a wide range, and in general the input impedance may be something other than a pure resistance.

The chart is a plot of the relations,

$$R_o = 2\pi f_c L \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$R_o = \frac{1}{2\pi f_c C} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

and can therefore be used to obtain the absolute value of reactances for condensers or inductances at any operating frequency. Whenever necessary, scales on the chart may be extended preferably by multiplying by some power of 10. If scale extension is employed, equations 1 and 2 may be used to determine the proper multiplying factors.

THE RADIO TRADING POST

(*Continued from page* 4)

WANTED—QST's of the years 1936, 38, 39 also the year of 1934. Have transmitting tubes, condensers, radio books, magazines, Western Electric type resistors, two tube homemade communications receiver with tubes and coils, and many other parts to trade. Write for list. Wayne McClung, 1114 Dawson Road, Albany, Georgia.

WANTED—Candler junior code course. State particulars and price asked. Kardos Radio Service, 385 Hall Ave., Perth Amboy, N. J.

FOR SALE—1 Supreme model 89 deluxe tube checker with volt-ohmmeter and capacitor test. To highest bidder. C. F. Delagi, 2175 Southern Blvd., Bronx, N. Y.

WANTED—Used camera, Kodak 35 or Kodak Six-20, or similar type. State full particulars in first letter. N. A., Post Office Box 814, Plainfield, N. J.

WILL TRADE—I. C. S. Radio Servicing Course or complete Advertising course for movie camera or a good enlarger. Please write and let me know what you have. Cooper's Radio Clinic, Chicago Heights, Ill.

WANTED—Will buy late model signal generator and signal tracer or V.T. volt meter. Also radio and refrigeration books. Edward E. Douglas, 1155 Harker Ave., Sta. A, E. Liverpool, Ohio.

FOR SALE — (55) Sky Buddy receiver $14.00. Has new Meissner IF transformers, (one iron core). Would like to obtain 1916-17 issues of QST. N. V. Bradshaw, W2ELN, 172-23 Baisley Blvd., Jamaica, Long Island, N. Y.

WANTED—Best cash price paid for Hickok tube tester, late model, 530 or 510X portable. Must be in A1 shape. Radio Repair Service, 173 Main St., Mexico, Maine.

WANTED—RME DM-36 Band Expander and LF-90 Inverter, state price and condition. Walter Kryger, 912 W. 151st St, East Chicago, Indiana.

FOR SALE—Weston counter tube checker Model 773 Type 2 in first class shape, checks some of the octal tubes, $16.00 cash takes it. One Jewell test panel Model 579 with 7 meters in A1 shape will sell for $35.00. Arcturus Radio Tubes all types offered at 50% off list. Audiograph sound systems, get a copy of sound catalog. Anchor Radio Distributing Service, 203 Elm Street, Ithaca, New York.

HAVE about 250 stereoscope views and viewer. Want photographic equipment (camera, etc.), radio portable, AC-DC volt-ohmmeter, or what have you. Philip Gurshewitz, 219 Herzl St., Brooklyn, New York.

WILL SWAP—A tenor banjo, with case, practically new, and a Francis Holten silver saxophone, with case, in first class condition., for test equipment and Rider manuals. If interested get in touch with M. Massey, 802 F St., N.W., Washington, D. C.

(*Continued on page* 13)

ANTENNAS FOR FM*

How to choose the proper sky-wire when installing FM receivers

IN THE cities that are at present served by FM stations it has been found by many dealers that only a short piece of wire laid on the floor or hung on the wall will bring in the local stations with satisfactory results.

Since these stores are practically in the shadow of the station antennas and enjoy a high signal strength the reception would normally be very good. Although exact figures are not easy to come by at the present time it appears that this condition exists up to about five miles airline distance from the average station.

Receivers that are installed at a greater distance from the transmitter than this usually require an external antenna of some sort and it is with these that we are mostly concerned.

Perhaps the simplest procedure for servicemen to follow would be to try the existing long wire broadcast antenna that still exists in many homes. This may be matched to the input circuit of the receiver by use of a small coil as shown in figure 1. The tap connections will need some cut-and-try experimenting to obtain the best possible impedance match. The coil should have a fairly

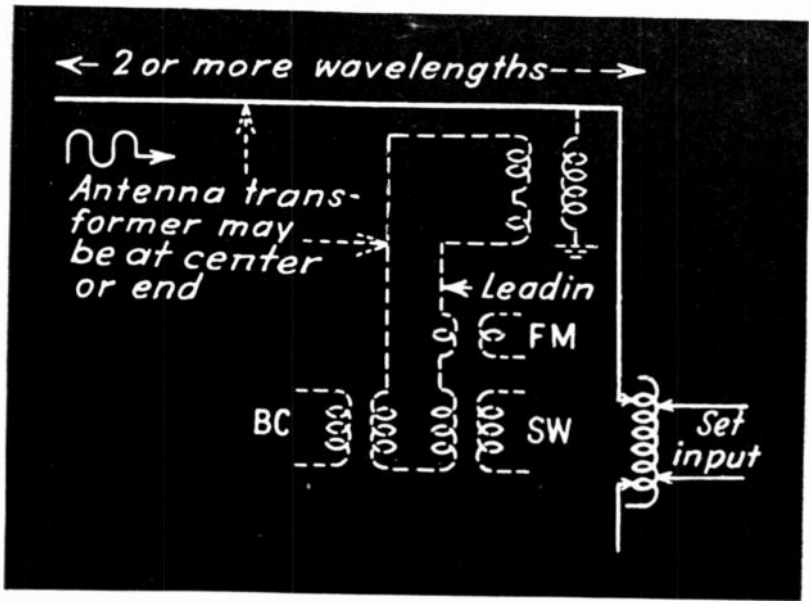


FIG. 1—The long wire antenna needs to be matched to the input coil of the receiver.

*By Vin Zeluff in "Radio and Television Retailing."

high Q and may be similar in construction to the type employed in low power amateur transmitters.

Long Wires Directional

This type of antenna is quite directional if its length is greater than two wavelengths, about forty-four feet. The directional effect increases with the length but this need not be greater than four or five wavelengths. Longer wires than this are not usually warranted by the increased mechanical difficulties. Reception is best from stations in the direction of the open end, opposite the leadin. For reception on the standard bands a changeover switch may be installed at the receiver.

Several antenna kits are now on the market that incorporate this type of antenna. The changeover switch is eliminated in these by the use of an impedance matching transformer at the antenna and separate transformers at the set end of the leadin for broadcast, short wave and FM reception. In some cases it may not be possible to install the leadin at the end of the antenna and the antenna transformer may then be installed at the center.

For best reception at the FM frequencies the antenna should be erected as high as practicable. This helps in two ways, to allow a greater signal pickup from the transmitter and to insure location of the antenna as far as possible from the noise source, usually found near ground level.

Half Wave Dipole

For reception from several directions the half wave dipole or doublet is probably the most popular type in use at this time. Illustrated in figure 2 it may be composed of suspended wire or rigid metal tubing. The latter requires but one mast and

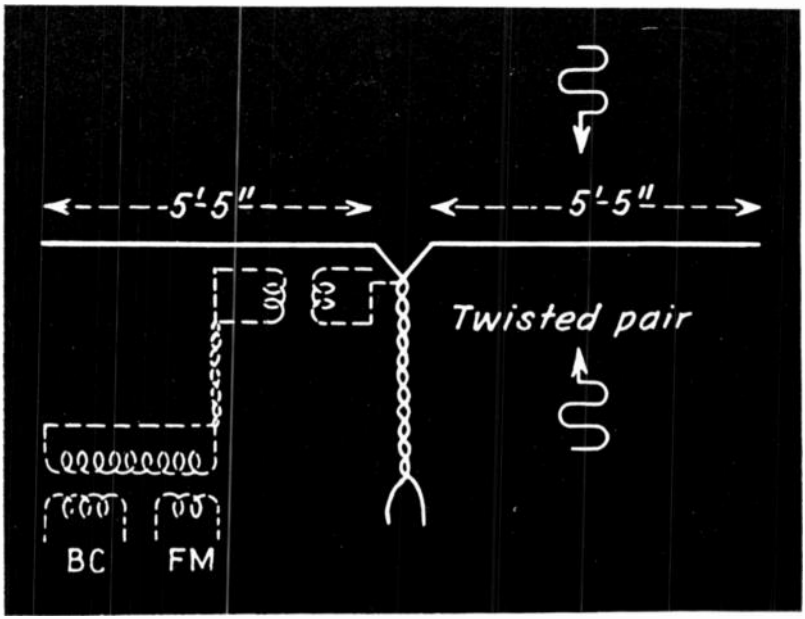


FIG. 2—A half wave dipole receives signals from two directions.

may be easily rotated to find the best position.

The length of each section is a quarter wave for the center of the FM band if optimum performance is desired over the whole band. The two sections connect to a twisted pair transmission line whose impedance is practically the same as that appearing at the center of the antenna. The input circuit of most receivers has a rather low impedance and will readily match the line. If the length of the line is greater than 70 feet it may be necessary to use a special low loss transmission line to prevent attenuation of the signal.

The dipole may also be used for standard broadcast reception if desired. If the bottom leads of the line are connected together the horizontal portion operates as a "T" antenna with considerable pickup added by the vertical leadin. In noise-free locations this will be satisfactory but in places where man-made static abounds only the horizontal portion should operate as the antenna. Transformers are available that may be connected to the antenna and the receiver and allow the line to operate as a noise reducing coupling line.

On FM signals the dipole receives best from stations broadside to the antenna and has a minimum pickup of signals received along its length. By rotating the antenna at the time of installation a compromise position can usually be found favoring the weaker signal if several stations have different intensities.

Although the waves from most stations are horizontally polarized a few are vertically polarized. Reports from the field indicate that both types of transmissions are quite well received if the antenna is tilted at a 45 degree angle.

Reflectors

The dipole may be made to operate in one direction if a reflector is added parallel with its length and

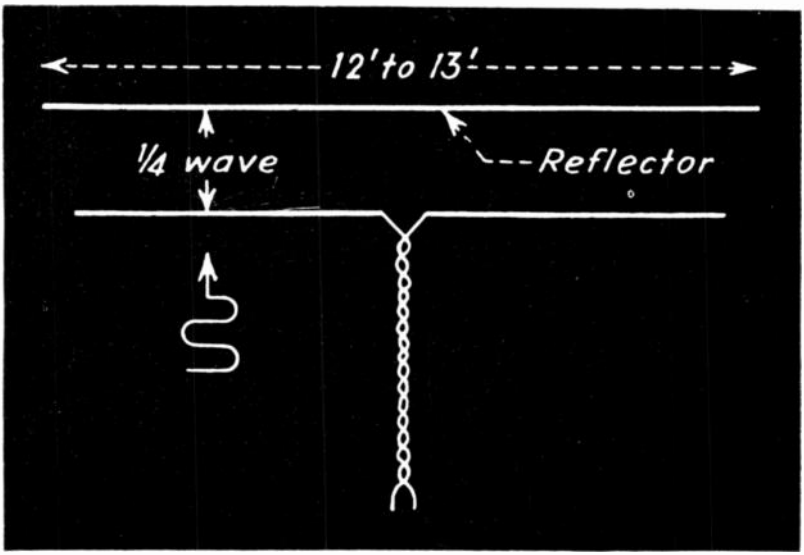


FIG. 3—Reflector behind a dipole increases the signal in one direction.

spaced a quarter wave from the dipole. Its length should be about ten per cent greater than the dipole. Signals approaching the reflector side of the dipole will then be blocked to a considerable degree. At the same time signals intercepted by the dipole at its free side will be reinforced by reflection from the additional element.

Since the reflector and dipole combination receives signals in but one direction it is necessary to provide some means of rotation if stations located at widely separated points are to be received. If the receiving location is at a considerable distance from a number of closely grouped stations the uni-direction feature will permit pickup of the several stations without rotation of the array and at the same time prevent stations in the opposite direction from being received.

Double dipoles with reflectors may also be used for FM reception. These and other more complicated arrays have so far been seldom found necessary.

THE RADIO TRADING POST

(*Continued from page* 9)

WANTED—Will buy inverter from 110-120 volts a.c. to 6-8 volts d.c. for auto-radio work. Want latest type. State all particulars in writing. C. Sandberg, 436 Snediker Ave., Brooklyn, N. Y.

WANTED—Gene-motor small size for 30 watt amplifier, 6 volt d.c. input, 350 volt d.c. output at 150 or 200 mills. Southern Radio Service, Thomasville, Ga.

WANTED—Radio News 1940 full range amplifier, built from revised circuit in Feb., 1940 issue. Need not be working or completely assembled, everything except tubes. Jeeve Radio Service, Baltic, Ohio.

WANTED—United States stamps. Will trade radios, test equipment, Rider's Manuals for them or pay cash. Write a description of what you have or send for valuation. Rod Hertel, Wahoo, Nebr.

WANTED—Used Candler course. State price. Have slightly used Echophone receiver. Herbert Schumann, Battery C 26th C.A.T.B., Camp Wallace, Texas.

FOR SALE—Airline 60-watt amplifier, 4 inputs. In A1 condition. Cost new $75.00. Sure crystal mike with 50 foot cable. What am I offered in cash? J. Otto Higgins Radio Sales and Service, Union City, Indiana.

FOR TRADE—Tube Checkers, Tubes, Receivers, Parts, Magazines, Meters, Motors, Typewriters, Firearms, Cameras, Books, 1100 v. Transformer, Analyzer, Trombone, "Everhot" Cooker, Electric Clocks, Tools, Skates, etc. For what have you? Your list for mine. Roby's Swapmart, 63C5 Kenwood, Chicago.

WANTED—Super 38 Colt automatic pistol and Bausch & Lomb binocular, power 6x30, 7x35, 8x30, 8x40, prefer the 8x40 power binocular. Will pay cash. Harold Buckley, Gen. Del., Indianapolis, Ind.

WANTED—Power amplifier suitable for hi quality recording. 78 Db. gain; at least 14 watts undistorted; up to 10,000 cps.; inaudible hum; may be pro or home built. Prefer 2A3 output. Write lowest price, tube lineup, etc. R. H. Coddington, Mapleton, Iowa.

WANTED—Most Often Serviced Radios, Most Popular 1940 Diagrams, Simplified Radio Servicing by Comparison Method. All published by Supreme Publications. Delbert Shaffner, Deepwater, Mo.

FOR SALE OR TRADE — Will print 500 $\frac{3}{4}$x2$\frac{1}{4}$" gummed stickers with your business, name, address, other matter, 4 lines, in exchange for what have you, or 25c cash. A. Penquite, 513 South 5th St., Marshalltown, Iowa.

WANTED — Need a neon sign (Radio Service) without transformer. Willing to pay cash or trade. I have many well known makes of meters, and parts. Will send list of parts on request. Arnold Halpern, Tudor Radio Service, 119 Tudor Place, New York City.

FOR SALE OR TRADE—26 issues "Radio Craft" years 1931-1934, 34 issues "Radio News" 1926-1936, Journal of the A.I.E.E. Jan. 1929 to July 1931, Proceedings of the I.R.E. 1925-1929. Want testing equipment. H. R. Ringold, 132 N. Doheny Dr., Beverly Hills, Calif.

FOR SALE—1 Readrite 431 tube tester, $6.50; 1 Superior 5 band S. Gen. $6.50; 1 Supreme V. Ohm Meter including amp. and output, 0-5, 0-1250 v. a.c.-d.c. $15.00; 1 complete N.R.I. Lab. Course $25.00. Pesarchic, Box 462 A Fairfield Ave., Johnstown, Pa.

WANTED—Rider's 9, 10, 11 or either. Also late model precision signal generator, state condition and best cash price. J. B. Mosley, 1426 North 24th St., Birmingham, Ala.

FOR SALE OR SWAP — Deforest's complete Radio-Sound-Television Course. I.E.S. Radio Engineering Course (1940) for radio-electrical experimental apparatus. Give full details in first letter. Also interested in facsimile, recording equipment, etc. Paul Brassard, Cumberland St., Brunswick, Me.

FOR SALE—Instructograph, built in oscillator (a.c.) and speaker, ten tapes and instruction book. Want good direct dial reading signal generator, Rider manuals, or what have you? Also have Clough Brengle O.C. signal generator to trade. Samuel Hornick, 8707 12th St., Detroit, Mich.

WANTED—6½ x 9 (120) roll film adapter. Have covers (first day, airmail dedications, first flight, naval, etc.) stamps and radio parts. Or will pay cash. Harry Gursh, 66 Herzl St., Brooklyn, N. Y.

WANTED—Used electric motors, power tools and metal-working lathe, 6 volt input, 110 v. a.c. output Genemotor. State the condition and price. Anthony Marcellus, 37 Sturtevant Ave., Norwood, Mass.

POSITION WANTED — Young man 28. RCA graduate. 2 years service experience. First class radiotelephone license. Wish electric or radio job. Francis Morse, Marcellus, Mich.

WANTED—All issues "Radio Broadcast." Must be in excellent condition. Hook-up and first IF transformer for Majestic No. 59 super. Swap for small parts, meters, or cash if reasonable. Send stamp for list of stuff for sale. Ralph V. Osborn, General Delivery, Stamford, Conn.

FOR SALE — Official Refrigeration Manuals I and II by Gernsback, Armature and Magnet Winding by Horstmann and Tousley, The Cathode Ray Tube at Work by Rider, Official Radio Service Handibook by Bernsley. All like new. All offers acknowledged. Edwin Larason, Martinsburg, Ohio.

WANTED—Kodak Bantam Special or Exakta Kine. Will pay cash, or trade RCA Oscilloscope 155. Fred T. Griffin, Box 18, Batesville, Ark.

WANTED — Automatic record changer, state make, model, condition, and price. Ed. Sujak, 5321 West 30th Place, Cicero, Illinois.

FOR SALE—Toxic Energy Neutralization Instruments, made by T.E.N. Laboratories. Or will trade for radio instruments or Rider's Manuals. Want also RCA or similar type record changer. General Radio Service, 1203 Eckart St., Fort Wayne, Ind.

WANTED — Late model tube checker, such as Triplett 1621; Triplett 1213; Readrite 432A; state make, model, price. Price must be right. Frank W. Jones, 569 Stillwater Ave., Fallon, Nevada.

FOR TRADE—Will swap 16 mm. silent Keystone, DeVry or 35 mm. DeVry projectors and cameras, or mikes or amplifiers for oscilloscopes. Will sell reasonable 35 mm. sound on film recording camera, and mechanical shooting gallery for amusement park. Retiring. W. W. Wehr, 618 Hanover Ave., Allentown, Pa.

FOR SALE—Limited number of "Code Mastery" at $1.00 each postpaid. Best course in code. Complete from beginning to high speed work. Scientific and thorough. Trades considered. W9NXL, 304 South Rutan, Wichita, Kans.

WANTED — Communications Superhet. "Skyrider" or similar. Will swap Analytical Balance, B. & L. New Gem Microscope, 20 modern tubes, Weston 3A RF meter, Jewell 40 m.a. meter, photocell and relay, telephone handset, radio parts, cash. M. Trentini, 119 Tudor Place, Bronx, New York.

FOR SALE OR TRADE—Triplett Model 1210A tube checker, Triplett Model 1670 Vibrator checker, Simplex Model OP P.A. System and carbon microphone, 58 copies of Short Wave Craft. In good condition. Need electric drill or camera. Edwin Larason, Martinsburg, Ohio.

WANTED—Shotgun and/or rifle. Have xformers, tubes, cameras, elec. clock, mike, etc. All letters answered. Ralph Freyberger, Fleetwood, Pa. RFD No. 1.

FOR SALE—1200 volt 200 M.A. power transformer with 5, 7.5, 2 volt filament windings. 2 2 mfd. 1000 volt condensers, oil filled. 2 10 henry, 200 M.A., 120 ohm resistance chokes. All new. What am I offered? J. Schmermund, 401 N. Main St., West Milton, Ohio.

WANTED—Two Six Volt Trumpets with units, and a 6 volt turntable, also can use all types baffles, metal or wood. Swap good new 110 volt turntable for six volt turntable. Have good Velocity mike in good shape to trade for high gain amplifier, factory made, over 15 watt power, less tubes. Send list of what you have. Shines Radio Shack, 69 West 23rd Street, Chattanooga, Tenn.

FOR SALE—Rider's Manuals 1 to 9 inclusive, with index, also nine bound volumes of RCA Service Notes. Like new, $50.00 takes all. S. E. Pence, 705 North Front Street, Wheeling, W. Va.

FOR SALE—Rider's Manuals 1 to 7 inclusive; Mid-West Manual; two latest Mallory Encyclopedias; R.M.S. Manual, Philco Car Radio Manual and numerous diagrams all in first-class condition. Lot $40.00 cash. T. H. Cook, 507—1st Ave. No., Great Falls, Mont.

WANTED—Rider's chanalyst, test oscillator, oscillograph, Junior volt ohmyst, Aerovox 95 LC checkers, audio oscillators, vacuum tube volt meters, tube checkers, speakers 12" or larger, microphones, used amplifiers. Strictly cash. We have nothing to trade-in. John J Spankowitch, 239 No. 9th St., Allentown, Pa.

FOR SALE OR TRADE—Various and assorted radio parts. Sonora A-44 radiophono combination, less cabinet. Midwest 18 tube All Wave receiver in large console, 2 speakers. 3½ octave Deagan Marimba, Howard car radio, 1940 Studebaker Champion control head. E. R. Bushman, c o Union Public Service Co., Box 133, Canby, Minn.

FOR SALE—McElroy de luxe model speed key. Cost $9.00. What am I offered for it? Also have double button mike and stand for $1.00. Cecil Mick, 1001 S. Ledford St., Harrisburg, Ill.

FOR SALE—R.C.A. Portable Recorder, MI12701, listed at $179.50, slightly used, less mike, $50.00. V. F. Daidone, 212 Fairmount Ave., Newark, N. J.

FOR SALE OR TRADE—First National Radio Course, also Superior test oscillator Model 1130-S. Superior tube tester 1140-S. Make offer. J. P. McAtee, c-o Radio Station KCAM, Pittsburg, Kan.

WANTED—Rider's Manuals vols 1, 2, 3. Must be in good condition, state lowest price. R. J. Sherman, 619 So. Euclid Ave., Sioux Falls, S. D.

TRADE OR SALE—1 filament transformer pri.-115 v. sec.-1.5 v. to 7.5 v., 4-WE type 264C AF triode tubes new, 4-8 mfd. 500 v. electrolytics, 4-20 mfd. 500 v. condensers, 1-Weston box meter, range 0-125 v. a.c., and 3 WE type 205D transmitting tubes. I will sell all for only $15.00, trade for X-tal headphones, X-tal mike, 40 meter crystal, radio magazines, or what have you. Wayne Mc Clung, 1114 Dawson Rd., Albany, Ga.

WANTED—R.C.A. Signalist in good condition, wish to trade in R.C.A. T.M.V. 97C generator which is in excellent condition. R. J. Sherman, 619 S. Euclid Ave., Sioux Falls, S. D.

WANTED—Motor generator or converter, 110 v. d.c. to 110 v. a.c. about 100 watts output. Rider Manuals 9, 10. State price F.O.B. N. Y. C., and condition. M. Wangler, 234 W. 13 St., New York, N. Y.

FOR SALE—Stewart panel kits for 1935-36-37 and some '38 cars. Complete with knobs, hardware, etc. Twelve for three dollars or will swap quantities for test equipment. Samuel Blatnuk, 103 Cambridge St., Boston, Mass.

SWAP—Volumes 5, 6, 7, 8, 9, 10 of Rider's, excellent condition, with index, for Solar No. 2 enlarger, or Senior Super Omega B, with lens—must be in good condition. E. C. Eones, Box 7, Brownfield, Texas.

FOR SALE OR TRADE—Argus C3 camera. De luxe readycase. Five optical glass filters and sunshade. Like new. Also back issues of short wave magazines and assortment of radio parts. Carl A. Karhuse, 1546 E. 31st Court, Lorain, Ohio.

SELL OR SWAP—Weston 0-1.5 R.F. thermocouple ammeter, auto radios, oscillator sets, tubes meters, turntables, books, magazines, manuals, genemotor, S.W. converters, parts, etc. Reasonable. Want a good short wave superhet receiver or what have you. O. F. Klein, 2235 N. 39 St., Milwaukee, Wis.

WANTED—Have you any ideas or suggestions that you feel would help to increase sales and stabilize the radio servicing business? Let's hear from you today. Burton V. Selle, 308 Depot St., P.O. Box 308, Elyria, Ohio.

FOR SALE—Highest offer, one Shure double-button carbon mike, model 5B, with desk stand. Also mike trans. Have receiving tubes and small parts. George Hague, 82 Varley St., Fall River, Mass.

FOR SALE OR TRADE—Instructograph, built in a.c. oscillator, speaker, ten tapes. Also Clough Brengle O.C. test oscillator, recalibrated recently. Want good direct dial reading signal generator, Rider Manuals or what? Sams Radio Service, 8707 12th St., Detroit, Mich.

WANTED—Candler junior code course. State price and condition. Will also swap 2 tube Ocean Hopper with tubes and coils, cost $8.50, almost new, for new or used broadcast set. Kardos Radio Service, 385 Hall Ave., Perth Amboy, N. J.

FOR SALE OR TRADE—15 lessons of Radio Technical Institute course. 1 book—"Short Cuts to Radio." Several radio parts. Would like to have radio magazines or a N.R.I. course. Guy Young, Ponca, Ark.

WANTED—Radio serviceman. Must have had auto-radio experience. Sam's Radio & Auto Service, 103 Cambridge St., Boston, Mass.

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