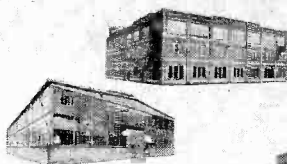
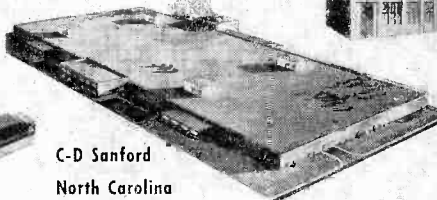


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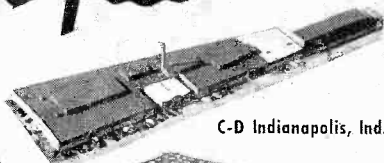
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North Carolina

C-D

Hope Valley, R.I.

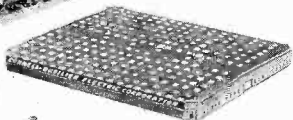


C-D Indianapolis, Ind.

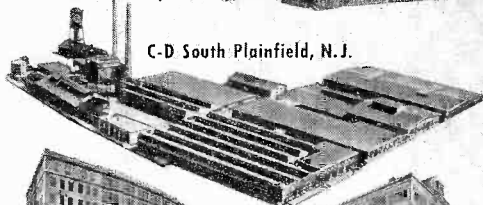


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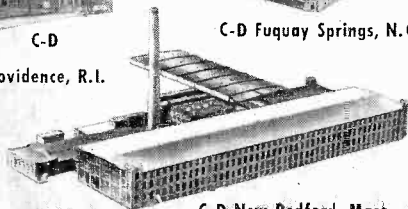
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DECEMBER, 1955

No. 12

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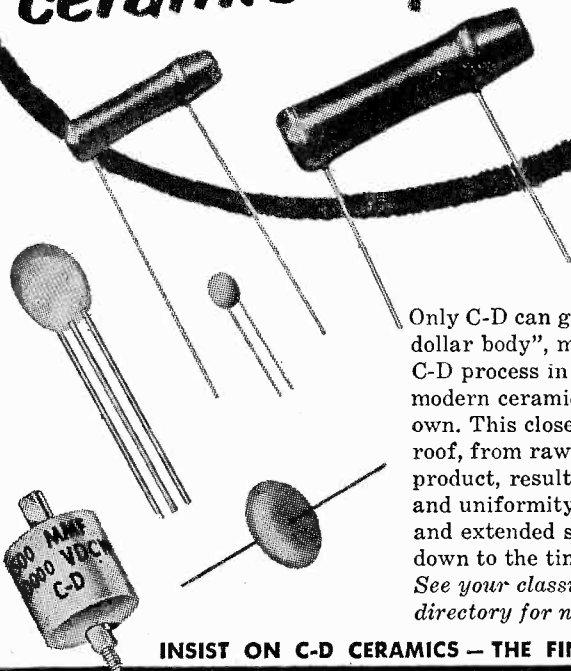
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TWO WHO MADE IT POSSIBLE!

Difficult as it may be to believe today in this fantastic "Age of Electronics," nearly a half century ago, around 1910, Dr. Lee de Forest was arrested by a United States marshal in California and charged with trying to raise funds to finance his revolutionary invention, the audion tube, which an ignorant district attorney labeled "a criminal fraud!" Before a grand jury, the same district attorney

angrily thundered: "De Forest should be sent to the penitentiary for selling stock in this worthless piece of glass! Why it does not give off as much light as a 25¢ bulb!"

This startling, little-known episode from the exciting saga of the broadcasting industry's coming of age was related by William Dubilier, vice-president in charge of research and



HONORING A PIONEER — Four illustrious names in the world of science flank a bronze bust of Dr. Lee de Forest, father of the modern broadcasting industry, at presentation ceremonies in Los Angeles during the 45th anniversary celebration of the Cornell-Dubilier Electric Company. From left to right: Dr. Arnold O. Beckman, president of Beckman Instruments, Inc.; William Dubilier, vice-president and co-founder with Octave Blake of Cornell-Dubilier; Dr. Lee A. Dubridge, president of the California Institute of Technology; and Octave Blake, president of C-D. Dr. Beckman accepted the bust for Dr. Lee de Forest from Mr. Dubilier, one of the honored scientist's oldest friends and associates.

development for the Cornell-Dubilier Electric Company, during an address delivered last April 20, in Los Angeles' Ambassador Hotel at the ceremonies commemorating C-D's 45th anniversary and the opening of the Company's West Coast Division plant in near-by Venice, California.

Bill Dubilier's remarks preceded the presentation to Dr. de Forest of a bronze bust of himself sculpted by the noted West Coast artist, Joe Portonova — a bust subsequently presented to the Smithsonian Institute to be placed with the museum's priceless collection of de Forestania including the original audion. In the absence of the world-famous scientist, ill at the time, industrialist Dr. Arnold O. Beckman accepted the award for him.

It was altogether fitting and proper that William Dubilier, life-long friend and associate of Dr. de Forest and himself one of the authentic pioneers in the field of radio and electronics, should have been selected to make the presentation to his old friend. The names of de Forest and Dubilier stand like beacons in the annals of American scientific progress.

William Dubilier, father and founder of the capacitor industry, applied for his first patent at the age of 18. In the succeeding decades, the United States patent office has issued to this brilliant man of science some 400 additional patents for inventions employed in practically every industry.

In 1910, the same year Dr. de Forest was attempting to finance his newly-



FATHER OF CAPACITORS — William Dubilier, vice-president in charge of research for Cornell-Dubilier, is pictured at the podium during his address to the notable assemblage at the 45th anniversary fete of the company he founded. Dubilier's moving address, delivered at the Ambassador Hotel in Los Angeles, California, was highlighted by the presentation of a bronze bust of Dr. Lee de Forest, radio pioneer.

invented audion tube, the young William Dubilier made his first radio, using a primitive Dubilier condenser.

Called to the podium during the 45th anniversary fete of the company he founded in 1910, Bill Dubilier spoke with deep feeling and eloquent simplicity of the early struggles and tribulations of men like de Forest and himself in the face of ridicule and scorn typified by the comments of the benighted California law officer. Recollecting how that first year Dr. de Forest made a pair of three-stage amplifiers for him — "almost as big as a three drawer filing cabinet and

as heavy — costing \$600 each," he said: "I presented them to the British and French Governments. They were the very first operating amplifiers for the Allies and formed the foundation of the equipment used for the detection and destruction of almost 50 German submarines during the early days of the First World War."

Fortunately, too, for the United States and her Allies just before World War I, William Dubilier designed a small, inexpensive mica condenser for the storage and release of electrostatic energy. This replaced the cumbersome Leyden Jar, the only condenser apparatus then known. During World War I, it was virtually impossible to obtain German glass needed to manufacture the Leyden Jar.

Nearly four decades ago, Dubilier's condenser could be equated in importance to the development of radar during the second global conflict. Not only did his new Micadons replace the Leyden Jar — made of unavailable glass — they also provided a source of far greater dependability in radio communications.

Recalling those early exciting days of hope and experimentation and final triumph, Bill Dubilier, in his 45th anniversary address, put it this way: "The references made here this afternoon to my work at the beginning of the century brings to mind many stirring incidents and early struggles in the development of the wireless. Then, the most important technical

element was the condenser — the glass Leyden Jar. My experiments compelled me to develop a substitute. That was the beginning of the first commercial power capacitor. It became standard for all wireless equipment not only for the United States, but throughout the world. All previous developments were dwarfed by Dr. de Forest's audion — probably the most important contribution in our generation — the very foundations of modern communication — broadcasting, television, motion pictures, and almost every other industry."

Mr. Dubilier closed his remarks before making the official presentation with these words: "So it is Lee de Forest to whom the credit should be given for one of the greatest contributions for the betterment of mankind. The civilized world owes him a great debt which can never be repaid. All we can do is acknowledge it. As part of this debt we of the Cornell-Dubilier Electric Corporation offer Dr. de Forest this symbol of our esteem — this handsome bronze portrait. I am sure that ultimately its final resting place will be in the Hall of Fame — that replicas will be made and found all over the world — in schools, museums, technological institutes. This will be Dr. de Forest's compensation — something money could never buy. May I present this to you, my dear friend, as a token of our deepest appreciation for your work and my personal affection for you."

BRIDGE RECTIFIERS

The chief advantage of the bridge rectifier is its ability to supply full-wave rectification without a center tap on the a-c power supply. The advantages of full-wave output are so well known that they need no reiteration here. However, the rectifier bridge is not a true single-ended circuit, since no terminal is common to both input and output.

In tube-type power supplies, the bridge circuit is more easily adapted to indirectly-heated cathode-type tubes than to filamentary types. The reason for this is that a separate filament-heating winding is required for each filament-tube in the circuit (four in a full bridge), while a single winding will supply all cathode-type tubes used. Unfortunately, the higher-powered rectifier tubes are of the filamentary type, and the need for multiple filament windings has been a deterrent

to the widespread use of tube-type bridge rectifiers.

The semiconductor type of rectifier, having no filament, may be adapted to bridge service with no inconvenience. Such rectifiers include copper oxide, germanium, magnesium-copper sulphide, selenium, silicon, and titanium types.

Bridge Circuits

Several types of bridge circuits are available for full-wave rectification. These are classified according to the number of diodes, or rectifier elements, employed. Operation of each of these circuits in single-phase service is explained separately in the following paragraphs.

Full Bridge. The full bridge, shown in Figure 1, employs four diodes. This is the most common of all bridge circuits and is the only one known to many electronic workers.

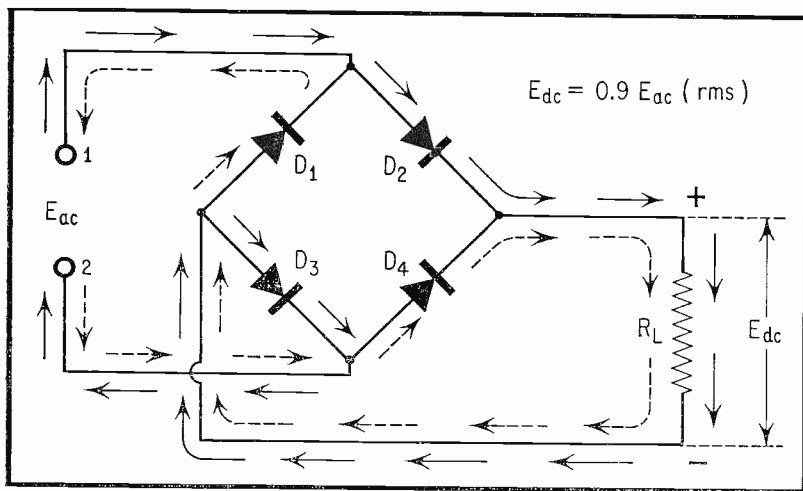


Fig. 1. Full Bridge.

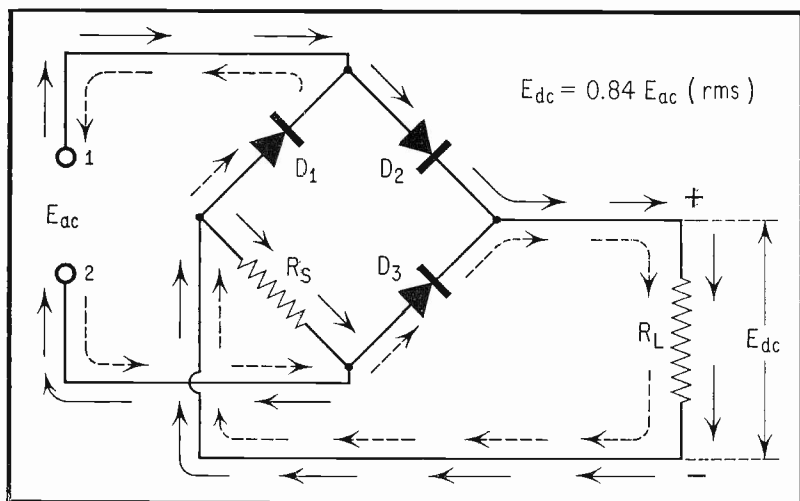


Fig. 2. Three-Quarter Bridge.

This circuit operates in the following manner: When the a-c input terminal 1 is positive, current flows in the direction of the solid arrows from terminal 1 through the low forward resistance of diode D_2 , through load resistance R_L , diode D_3 , and finally to terminal 2 which is negative at this instant. Any conduction through diodes D_1 and D_4 is negligible because these diodes present their high back resistance when terminal 1 is positive and terminal 2 negative.

On the next half-cycle when terminal 2 swings positive, current flows in the direction of the dotted arrows from terminal 2, through the low forward resistance of diode D_4 , through load resistance R_L , diode D_1 , and finally to terminal 1 which is negative at this instant. Any conduction through diodes D_2 and D_3 is negligible because these diodes present their high back resistance when terminal 2 is positive and terminal 1 is negative.

Note that the rectified current, as indicated by the solid arrow for one half-cycle and the dotted arrow for the other half-cycle passes through the load resistance, R_L , always in the same direction. The top of R_L always is positive and the bottom negative. Thus, unilateral flow of current occurs on each half-cycle of a-c input voltage and full-wave rectification is obtained.

With the full bridge circuit, the d-c output voltage is equal to 0.9 of the rms value of the a-c input voltage, E_{ac} .

Three-Quarter Bridge. In the bridge circuit shown in Figure 2, one diode has been replaced with a resistor, R_S . Because this arrangement uses only three of the four diodes employed in the classical full-bridge circuit, it has been termed three-quarter bridge.

In this circuit, when the a-c input terminal 1 is positive, current flows in the direction of the solid arrows from terminal 1 through the low forward resistance of diode D_2 , through

load resistance R_L , resistor R_2 , and finally to terminal 2 which is negative at this instant. Any conduction through diodes D_1 and D_3 is negligible during this half-cycle because these diodes now present their high back resistance and provide effective blocking action.

On the next half-cycle when terminal 2 is positive, current flows in the direction of the dotted arrows from terminal 2, through diode D_3 , load resistance R_L , diode D_1 , and finally to terminal 1 which is negative at this instant. Any conduction through diode D_2 is negligible since this diode now presents its high back resistance.

The rectified current flowing through load resistance R_L is shown by the solid and dotted arrows near this resistance to be in the same direction during each half-cycle of a-c input voltage. The top of R_L therefore always is positive and the bottom

negative. This satisfies the conditions for full-wave rectification.

With the three-quarter bridge circuit, the d-c output voltage is equal to 0.84 of the rms value of the a-c input voltage, E_{ac} . This figure shows that the rectification efficiency of the three-quarter bridge is 93.3% of that of the full bridge.

Opposed Half Bridge. Two diodes have been replaced with resistors in the circuit shown in Figure 3. Using half the number of diodes employed in the full bridge, this circuit is termed a half bridge. Specifically, it is of the opposed half bridge type in which the equal resistors, R_1 and R_2 , are connected in series across the a-c input.

In this circuit, when a-c input terminal 1 is positive, current flows in the direction of the solid arrows from terminal 1 through diode D_1 , load resistance R_L , resistor R_2 , and finally

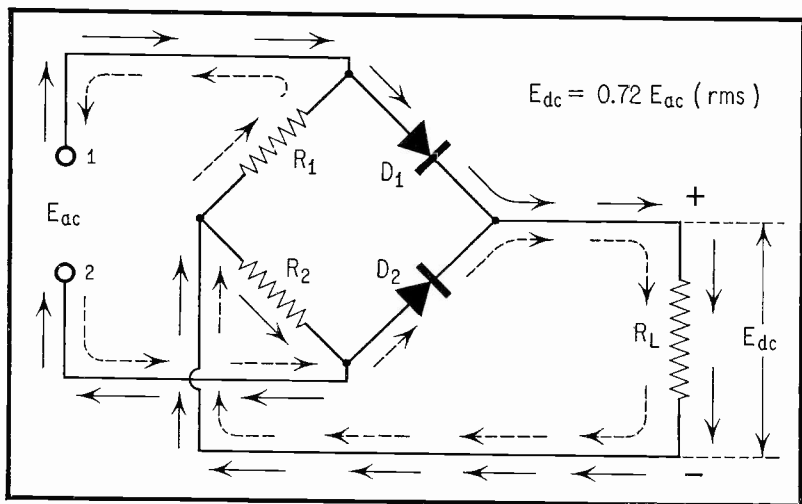


Fig. 3. Opposed Half Bridge.

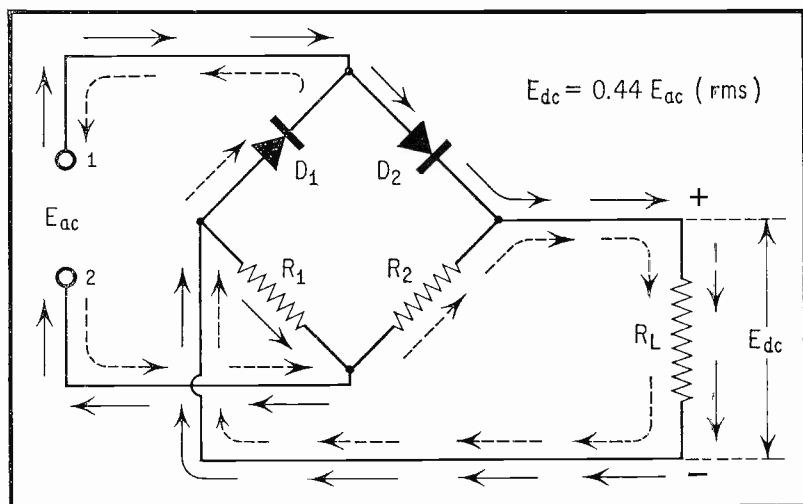


Fig. 4. Series Half Bridge.

to terminal 2 which is negative at this instant. Any conduction through diode D_2 is negligible during this half-cycle, since this diode now presents its high back resistance.

On the next half-cycle of a-c input voltage, terminal 2 swings positive and current flows in the direction of the dotted arrows from terminal 2, through diode D_2 , load resistance R_L , resistor R_1 , and finally to terminal 1 which is negative at this instant. Any conduction through diode D_1 is negligible, since this diode presents its high back resistance during this half-cycle.

The rectified current flowing through load resistance R_L is shown by the solid and dotted arrows to be in the same direction for each half-cycle of a-c input voltage. The top of R_L thus always is positive, and the bottom negative. This satisfies the condition for full-wave rectification.

With the opposed half bridge circuit, the d-c output voltage is equal to 0.72 of the rms value of the a-c input voltage, E_{ac} . This figure shows that the rectification efficiency of the opposed half bridge is 80% of that of the full bridge.

Series Half Bridge. A second type of half bridge circuit (the series half bridge) is shown in Figure 4. In this arrangement, two series diode-resistor legs are connected across the a-c supply, one diode (D_2) being poled for high conduction when a-c terminal 1 is positive, and the other (D_1) for high conduction when a-c terminal 2 is positive.

In this circuit, when a-c input terminal 1 is positive, current flows in the direction of the solid arrows from terminal 1, through diode D_2 , load resistance R_L , resistor R_1 , and finally to terminal 2 which is negative at this instant. Any conduction through

diode D_1 is negligible, since this diode presents high back resistance during this half-cycle.

On the next half-cycle of a-c input voltage, terminal 2 swings positive and current flows from terminal 2 in the direction of the dotted arrows, through resistor R_2 , load resistance R_L , diode D_1 , and finally to terminal 1 which is negative at this instant. Any conduction through diode D_2 is negligible, since this diode presents its high back resistance during this half-cycle.

The rectified current flowing through load resistance R_L is shown by the solid and dotted arrows to be in the same direction during each half-cycle of a-c input voltage. The top of R_L thus always is positive, and the bottom negative. This satisfies the conditions for full-wave rectification.

With the series half bridge circuit, the d-c output voltage is equal to

0.44 of the rms value of the a-c input voltage, E_{ac} . This figure shows that the rectification efficiency of the series half bridge is 48.9% of that of the full bridge.

Quarter Bridge. The circuit given in Figure 5 is interesting in that only one diode has been retained. Each of the other bridge arms is a resistor. Since this arrangement employs only $\frac{1}{4}$ of the number of diodes used in the classical full bridge, it aptly is termed a **quarter bridge**. The quarter bridge is seen to consist of the left (series resistance) half of the opposed half bridge (Figure 3) and the right (diode-resistance) half of the series half bridge (Figure 4).

In the quarter bridge, when a-c input terminal 1 is positive, current flows in the direction of the solid arrows from terminal 1, through diode D , load resistance R_L , resistor R_3 , and finally to terminal 2 which is negative at this instant.

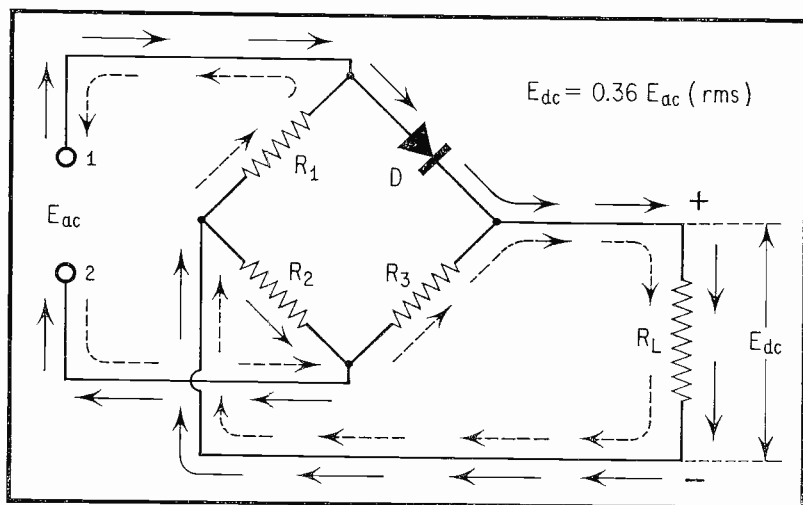


Fig. 5. Quarter Bridge.

On the next half-cycle of a-c input voltage, terminal 2 swings positive and current flows in the direction of the dotted arrows from terminal 2, through resistor R_3 , load resistance R_L , resistor R_1 , and finally to terminal 1 which is negative at this instant.

Here again, the rectified current flowing through load resistance R_L is shown by the solid and dotted arrows to be in the same direction for each half-cycle of a-c input voltage. The top of R_L thus always is positive, and the bottom negative. Therefore, the conditions for full-wave rectification are satisfied.

With the quarter bridge circuit, the d-c output voltage is equal to 0.36 of the rms value of the a-c input voltage, E_{ac} . This figure shows that the rectification efficiency of the quarter bridge is 40% of that of the full bridge.

Current Direction, Resistor Considerations

In each of the preceding explanations, current has been assumed to flow from the positive input terminal, through the circuit, to the negative input terminal. This is in keeping with the popular concept of the direction of current flow and is expected to cause the least amount of confusion among readers. Actually, electron flow is in the opposite direction — from the negative to the positive terminal. When the latter viewpoint is desired, the reader need only to shift the point or head to the opposite end of each arrow in the diagrams.

The bridge circuits that employ combinations of diodes and resistors (Figures 2, 3, 4, and 5) provide

various degrees of economy with respect to rectifier elements, and in low-power applications often enable more compact construction. However, the expression for E_{ac} accompanying each diagram shows that the rectification efficiency of the circuits decreases as we move through the various types from the full bridge to the quarter bridge. The efficiency of the series half bridge (Figure 4) and the quarter bridge (Figure 5) are seen to be less than that of a simple half-wave rectifier circuit (for which the figure is 0.45). For this reason, the series half bridge and quarter bridge seldom are employed in power supply service but usually are restricted to certain light-duty applications in instrumentation and control devices to supply a ripple frequency at twice the frequency of an applied a-c voltage.

In order that both even and odd numbered positive peaks of the d-c output voltage have the same amplitude, insuring maximum average current, the bridge resistors must be correctly proportioned in ohmage with respect to the forward resistance of the diode or diodes at the applied voltage level. Because individual diodes vary somewhat in resistance, at least one resistor in the network must be made variable for the purpose of initial adjustment of the circuit.

Another important consideration concerns power dissipation in the bridge resistors. These resistors must be able to handle safely the power developed by the flow of current through them. As the power requirements of the rectifier circuit are raised, higher-wattage resistors are demanded. Obviously, a point eventually is reached

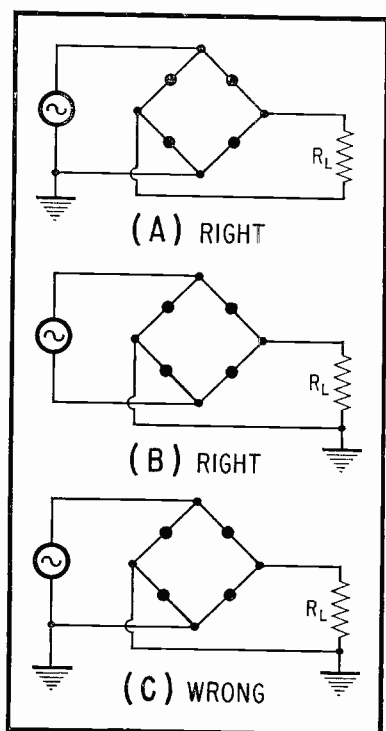


Fig. 6. Bridge Grounding.

at which economy and compactness no longer are afforded by the circuit.

Practical Considerations

Diodes or rectifier elements may be connected in parallel in bridge circuits to obtain higher output currents, in series in order to handle higher a-c input voltages, and in series-parallel for both advantages.

Bridge rectifiers are found in numerous electrical and electronic devices, some of which are power supplies; a-c voltmeters, current meters, and power meters; magnetic amplifiers; frequency multipliers; modulators; demodulators;

servo systems; battery chargers; voltage regulators; current limiters; and dynamic brake systems.

A disadvantage of all bridge circuits, which is important in some applications, is the lack of any common terminal in the input and output portions of the circuit. For example, either the input (a-c source) or output (d-c load) may be grounded, but not both simultaneously. Figure 6 illustrates this point. In Figure 6(A), the a-c source is grounded and the bridge arms are undisturbed. In Figure 6(B), the d-c load, R_L , is grounded and again the bridge arms are undisturbed. In Figure 6(C), however, both a-c source and d-c load are grounded and this common connection short-circuits the lower left-hand arm of the bridge, disabling the circuit.

When safety considerations or hum-reduction problems demand that both source and load be grounded, a suitable isolation transformer may be inserted between the source and bridge.

A particular advantage of the bridge rectifier, often cited, is its ability to utilize the full winding (and total voltage) of a conventional center-tapped transformer, providing full-wave rectification, while the conventional full-wave center-tapped circuit utilizes only $\frac{1}{2}$ the total voltage. While this is true, the reader must bear in mind that the power capabilities of the transformer remain the same. Although twice the d-c output voltage is available with the bridge rectifier used under these circumstances, the permissible power drain will be only $\frac{1}{2}$ that allowed with full-wave center-tap operation.



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FOR SALE — Best cash offers take unused Eico 1955 factory wired tube tester; Ferret 619 audio oscillator RC type; Royal office typewriter; 10" RCA TV; Solar Bridge. Paramount Service, Atlanta, Mo.

FOR SALE — Riders chanalyst, good cond., best offer over \$25; Riders Vols. 6 and 7; \$2,700 list of current and obsolete transmitting and receiving tubes; potentiometers, oil and mica condenser, and selsyns. R. Hoskins, 305 E. Lennox, Yreka, Calif.

SELL OR SWAP — Simpson 260 multimeter; 3" National Co. scope; Mallard 75 and 40 meter loading coils. Want stamps, sig. generator AC VTVM condenser analyzer. J. Durant, 3263-47th St., Sandia Base, Albuquerque, N. M.

SELL OR SWAP — Philco 48-2300 chassis; 12 v. 150 w. Delco power plant; 6 v. 1.25 amp. GE battery charger; 8" coax 10 w. speaker; S-38 Hallicrafters. Carl G. Deuble Sr., 127 1/2 Southampton St., Buffalo 9, N. Y.

FOR SALE — Sam's Photofacts 1 to 60 in binders, exc. cond., \$75 or make offer; also cabinet for 7" Tele-Tone TV, \$5. Chester Wegrzynowski, 51 North Central St., Buffalo 12, N. Y.

FOR SALE — Collins 32V-3 in exc. cond., \$525. George Sperry, 108 Oak Hill Ave., Portsmouth, Va.

WANTED — Any make sweep generator, lower frequency 200 kc., give specs. Sell BX2 Schauer battery charger, output 6.5 v. at 6 amps. or trade and cash for sweep gen. Luckey's Radio and TV, Burns, Oregon.

FOR SALE — ARC-5 40M CW and ARC-5 80M xmitter with 700 v. power supply, \$35; McMurdo-Silver 701 Phone and CW 6 to 80 meters xmitter with 2 power supplies, \$35. John G. Morrice, 57 Rockaway Ave., Rockaway, N. J.

FOR SALE — Riders TV Vol. 1 and 2, \$20 for both; radio rcvr. BC 4543 3-6 mc., \$10; Eico 5" scope, \$35 H. Gathercole, 45 Aberdeen Dr., Huntington, N. Y.

SELL OR SWAP — For ham or Hi-Fi equip.: GE dynamotor 5.6 v. input, 550 v., 325 ma. output; Shure DY30 dynamic microphone. Make offer. M. A. Thompson, R. 3, Box 109, Snyder, Texas.

FOR SALE — Precision E-200 sig. gen., \$30; Triplett 3413-A tube tester, \$50; Waterman S-10-A Pocketscope, \$40; Rytel CRT Rejuvenator, \$8. All FOB. D. Johnson, 2504 North Estrella, Tucson, Ariz.

FOR SALE — Hallicrafters SX-88, \$450; Viking I, VFO, 10 crystals, low-pass filter, \$225; 2 KVA Variac, \$20. G. H. Goldstone, 25416 Parkwood, Huntington Woods, Mich.

SELL OR TRADE — Stromberg-Carlson AM-FM 11-tube model 1210 chassis, 1 n.; Stromberg RC-55 12" speaker; Zenith 3-way portable, model 69001, perfect. Interested in VTVM signal tracers. L. E. Salom, 724 Hunting Tower, Alexandria, Va.

WANTED — Audio frequency wave analyzer for cash. William J. Loucks, 205 Jefferson Ave., Warren, Pa.

FOR SALE — Hammarlund HQ-140-X with speaker, best offer over \$200; BC-453 Q-5er with external power supply, \$15; BC-459A converted to 40 meters, TVI proof, \$15; Eico 221 VTVM, \$15. George C. Solman, Box 386, Poulsbo, Wash.

FOR SALE — 12" Transcription table, Radio Music, \$45; Meissner disc recorder and PA system, \$65; Supreme 333 VOM, 1000 w. per v., \$15; Heath scope, OCB, 5", 1 n., \$50. Cash FOB. A. R. Dayes, 29 Charles St., Merrick, L. I., N. Y.

FOR SALE — Riders vol 1 to 21 and Sams Photofact set 50 to 246. Make offer. Two UHF Electro-Voice tuners, 1 n., \$25 each postpaid. Want freq. meter 2000 kc. to 5000 kc., BC-221 or others. Edward C. Hogge, Bena, Va.

FOR SALE — Crestwood tape recorder, \$85; Cascade 2-speed disc recorder-phonograph, \$45; Airline portable 3-speed record changer, \$35; portable typewriter, \$15; Trav-Ler portable radio, \$5. All new cond., FOB. V. R. Hein, 418 Gregory, Rockford, Ill.

SELL OR SWAP — Complete 10 meter mobile installation; 2 unused '51 Buick radios; RCA 2 v. storage battery radio; TV boosters and parts; 7" Raytheon TV. Want E-200-C generator, KP81 receiver. Chester Benson, 311 South 5th Street, Richmond, Ind.

WANTED — Tubes, test instruments, Rider TV manuals, TV and radio sets. Kansas Radio and TV, 4309 Kansas Ave. NW, Washington 11, D. C.

SELL OR TRADE — Heath V-6 VTVM, complete with high voltage, peak to peak, RF probe and all leads; also unused Transvision 6 in 1 component tester, flyback, yoke, etc. Redd's Radio & TV Service, Box 12, Union Furnace, Ohio.

SELL OR SWAP — 7JP4 tube, \$15; Standard coil tuner, never used, \$12; Heathkit: bar gen., \$8, signal tracer, \$15, portable TC-2P tube checker, \$25, all good cond. F. Berry, 2203 Stevens Ave., Kalamazoo, Mich.

FOR SALE — GE 14 v. dynamotor with large cooling blower and heavy duty starting relay, output 1,000 v. at 260 ma., and 500 v. at 215 ma. Ideal for 12 v. mobile ham. \$10 plus postage. D. Epstein, 5411 Ft. Hamilton Parkway, Brooklyn 19, N. Y.

WANTED — 3-speed automatic record changer, must be in perf. mechanical condition. State manufacturer, model number and lowest delivered price. D. Kurs, 321 Fairmount Ave., Jersey City 6, N. J.

FOR SALE — BC-455 receiver with tubes, \$6; TV chassis with 16" pix tube, \$8; SCR-522 receiver with tubes modified for 2 meters, \$8. All A-1 condition. A. R. Eggensperger, 101 Christie St., Tenafly, N. J.

SELL OR TRADE — Jewell model 560 test oscillator, converted to AC power supply, exc. shape. I need everything, make offer. Earl Helyer, 3845 Banks Avenue, Butte, Mont.

FOR SALE — 872A/872 full-wave bridge rectifier; 2,000 v., 500 milliamperes. Constructed on angle-iron frame; will send photo. BC-348-R and many other items for sale. Kenneth Weimer, 2970 North Druid Hills Rd., NE, Atlanta, Ga.

SELL OR TRADE — Masco R-3 and Eicor 115 tape recorders, 16" professional disc recording lathe, and GE R-90 home-type disc recorder. John T. Moore, Box 63, Seneca, S. C.

FOR SALE — All-band xmitter, 60 w. phone 80 w. CW complete with power supply, low pass filter, spare tubes, \$120; complete mobile station with PE-590. J. Hamerling, 28 Drury Lane, Hicksville, N. Y.

FOR SALE — BC-654-A xmitter-rcvr., 10-meters, good cond., dynamotor and antenna included, \$100. C. E. Hobson, 722 Savannah Ave., Pittsburgh 21, Pa.

SWAP — Radio and electronic parts and equipment for chemical laboratory apparatus and glassware. Also interested in magnetic recording tape, aquanums and microscopic equip. Ralph Saba, 429 Goodsell St., Evansville 8, Ind.

FOR SALE — C-D BF-50 checker, \$25; Presto 16" 78-33 $\frac{1}{3}$ turntable with motor, two pickup arms and recording attachments, \$30; 2 Electro Voice 635 mikes, \$30 each; one Turner U-9, \$15. Prices all l. n., sent FOB. Thos. R. Dunn, Box 105, West Scarborough, Me.

FOR SALE — NRI radio and TV service course with all texts in NRI binders, all exp. books, radio service and TV service plans. Finished less than a year. \$20, cash only. J. W. Eckenwiler, 1664 Betz Dr., Akron 6, Ohio.

SELL OR TRADE — R100/URR Army 8-tube, 3-band, (BC band and 3.5-19 mc. on two bands) rcvr., l. n., 110/230 v. AC/DC or batt. Edward Gass, Box 332, Mena, Ark.

WANTED — GI-R90L recording mechanism and Gonset converter. Give complete details. Cash or send for list of items for trade. Milo G. Burston, 320 Tawas St., Alpena, Mich.

FOR SALE — Oak Ridge tube tester, multimeter, and TV bar generator, in maple carrying case, all \$85; l. n. Vibropack, 100 ma., \$9; Police rcvr., \$35. J. M. Kilroy, 315 $\frac{1}{2}$ Temple Ave., Long Beach 14, Calif.

SWAP OR SELL — L. n. Gen. Industries R-85-L recording and playback unit with magnetic cutter. Need Hallicrafters model S-40-A rcvr. John Morris, 1710 East 14th Place, Tulsa 14, Okla.

FOR SALE — GE model UPX003A pre-amplifier. Unit in new condition, \$6 delivered. D. Kurs, 321 Fairmount Ave., Jersey City 6, N. J.

FOR SALE — Tape recorders: Wilcox-Gay model 2B10 and model 4F10. J. R. Hanson, 66 Seneca Ave., Oneida, N. Y.

SELL OR TRADE — Radio Physics course; TV-FM Rcvr. Servicing; Marine Radio Manual; Audels TV Service Manual. Jos. Cooper, 46 Rockwell Ave., Long Branch, N. J.

FOR SALE — Used Motorola 2-way radio, fairly good cond., rcvr. 2.422 mc., xmitter 30.58 mc. Shure mike included. All, \$50. Kenneth R. Stevens, 4686 St. Paul Blvd., Rochester 17, N. Y.

WANTED — 2-two meter rcvrs. AC. operated. Must have squelch control, also need 2-two meter xmitters. E. L. Felder, Tylertown, Miss.

URGENTLY NEEDED — Navy Selsyns or Synchros sizes 1 and 3. Advise price, cond., and manufacturer. Electro Sales Co., Inc., 50-58 Eastern Ave., Boston 13, Mass.

FOR SALE — Miscellaneous issues of QST, CQ, and Radio, 193C to date, 20 cents each; unused AN/APS-13 420 mc. transceiver less tubes, \$7; 3' meters, \$3 each. Art Johnson, 29 Boone St., Bethpage, N. Y.

WANTED — Mobile xmitter 50 w., crystal-controlled, 75 meters with dynamotor, state price and cond. Edward Daley, Peterson Rd., Rockville-Vernon Center, Conn.

FOR SALE — Executone inter-com equip., l. n.; 3 Masters, 2 slaves, power supply, 3 junction boxes. Sacrifice at \$250. William Murray, 247 W. 46th St., New York 36, N. Y.

SELL OR SWAP — Plate xformer UTC Type S49, fil. xformers, variacs. Cash or swap for test equip., table and portable radios. G. F. Magraw, Box 43, Norfolk, Mass.

WANTED — Experienced radio servicemen that can engineer and design circuits and understand radiation instruments. Send references and qualifications to White's Electronics, c/o K. White, 1218 M Street, Sweet Home, Ore.

WANTED — Tape recorder; quick capacitor checker; scope; in trade for l. n. Hamilton, Longines, or Bulova watches. R. G. Browning, Box 268, Moylan, Pa.

WANTED — Amateur radia equip. in trade for B and L professional microscope, and turret lens mount with lenses, including flourite oil immersion. Dr. Frank W. Nelson, 360 W. California St., Memphis 6, Tenn.

SWAP — Television set, table model, also Elco TV testing scope, both hardly used, for Navy spy glass telescope, high power or battery operated 16 mm camera. E. McEvoy, 715 So. 7th St., Lindenhurst, L. I., N. Y.

FOR SALE — Riders manuals 9 thru 14, \$5 each, or 6 for \$25; Wallace's Telaidies; Philco 47-53 & Motorola 46-53, \$1 ea.; RCA Pict-O-Guides Vol. II and III, \$1 ea. John F. Mitchell Rt. 2, Ozark, Ark.

FOR SALE — Riders 1 to 14, excellent, \$50 FOB. H. J. Ferris, 5604 Nottingham, St. Louis 9, Mo.

FOR SALE — Motorola FM Station Monitor, 1. n.; modulation-frequency-carrier indication for 152-174 mc. range, with instruction manual. Complete setup for maintaining 2-way Motorola equip. Joseph Britto, 96 Ruth Ave., Rumford 16, R. I.

SELL OR TRADE — Precision E-200 sig. gen., \$35 FOB; back issues radio mag., 5 cents each, plus postage; Sams' Photo-facts; Rider manuals. Want auto license plates and threaded hubcaps. Harold Garrett, 711 South N. Y., Sedalia, Mo.

FOR SALE — Thordarson choke, T-19C44, 12 Hy., 400 mil., 4,000 v.; 110 v. relays DPDT antenna change-over, etc. Connecting cables, BC654 to PE 103 dynamotor; Riders 1-10, 1. n. Harlan Dewitz, Wisner, Neb.

FOR SALE — Sylvania 139 tube tester, modernized, good cond., \$30. Allen Sweigert, 44 N. 4th St., Cressona, Pa.

FOR SALE — Back issues: CD Capacitors, Radio-Electronics, Service, Radio and TV Service Dealer and News, Successful Servicing, Technician, Electronics. Write for list of issues. S. E. Fellerman, 228 Englewood Ave., Englewood, N. J.

SWAP — Unused Webster-Chicago wire-recorder foundation unit, for exc, Colt or S&W handgun, 2" barrel preferred. Don Lindemann, Enderlin, N. D.

WANTED — Oscillator coil for Motorola 301 car radio. Will pay good price or exchange for radio parts. Frank Bou, 47 Oswego Ave., Audubon 6, N. J.

FOR SALE — Pair Pickering diamond cartridges, D-120 and D-140 with Garard shells. Checked, adjusted and certified by Pickering to be in "new Cond." Both for \$30. H. M. Lester, 101 Park Ave., New York 17, N. Y.

SWAP — Early radio and electrical books, QST's for 1926 complete, in two vols., 1927 and 1930 complete in four vols., for QST's earlier than June 1924 and for January 1925. Wesley Brogan, 306 Bethlehem Pike, Ambler, Pa.

FOR SALE — KW, CW xmitter, in Par metal cabinet; B&W coils — 3 bands, xtals for 6 positions, switch-controlled; 3-stage driver; final pair 4-250 tubes air-cooled in final. Value \$800. Make offer. Oscar W. Lummis, 3009 Magee Ave., Philadelphia 49, Pa.

FOR SALE — Sams vols. 1 thru 6, 1. n., \$75 prepaid; BC-454 rcvr., dynamotor, special tuning knob, \$10; Weston 301, 0-30 mills., \$4; 110 v. pri. — 12 v. sec. trans., \$3. J. Weaver, 14609 Harvard Ave., Cleveland 28, O.

SWAP — Motorola model 500, 1. n., for good used radio and TV tube tester. George G. Moll, Sr., 1118 Music St., New Orleans 17, La.

JOB AVAILABLE — Radio-TV serviceman, 22-30. Must have technical radio and TV training with 1-2 years' experience. Start \$60 a week. Live in sunny, fast-growing Arizona community. Del-en-baw's, 109 East First St., Casa Grande, Ariz.

SELL OR TRADE — 7 sets of organ pipes, blower, shades, etc. Want tape recorder, electronic equipment. T. C. Souder 7th and Pine Sts., Millville, N. J.

FOR SALE — CREI Practical Engineering course, with most of the tests, \$22.50 or swap for 45 rpm record player. Lynn O. McDowell, 536 North Pine St., Florence, Ala.

WANTED — Iconoscope, suitable for ham or experimental use, with or without rest of camera unit. State price. Robert J. Bormann, 2015 East 38th St., Brooklyn 34, N. Y.

FOR SALE — Simpson VOMA 240 ham meter, 1. n., \$18, incl. instruction, schematic and leads; Genometer model TV-50 complete with instructions and output cable, \$30. G. Dalamango, 160-26 26 Ave., Flushing 58, N. Y.

FOR SALE — Reconditioned 1939-1953 auto radios, custom built, Delco, Ford, GM, Mopar, \$10 and up. Will buy locally any make auto radios. Best Radio, 3349 Fulton Rd., Cleveland 9, Ohio.

WANT — One or two 3GP1 cathode ray tubes, cartoned. Will trade other tubes, replacement parts, motor, xformers, or? G. Samkolsky, 264 Division Ave., Brooklyn 11, N. Y.

FOR SALE — Electronic training kit complete with instructions for performing over 130 experiments and projects, \$10, FOB. H. Denison, 1212 Central Ave., Columbia, Pa.

FOR SALE — Argus C-3 camera, f3.5 coated lens, case, type A filter and holder, B-C flash gun, A-1 cond., \$65. Charles R. Beckwith, 112 E. College St., Alliance, Ohio.

WANTED — QST, May and June, 1916; also C-D Capacitor for Apr., May, June, 1937, vol. 1 # 2; Oct., Nov., Dec., 1937, vol. 1 # 4; June to Dec., 1939, vol. 2 and 3. J. J. Simpson, 85-39 152nd St., Jamaica 32, N. Y.

SELL OR TRADE — Globe Scout 40A; Heath VFO, exc. cond.; VFO power supply, good cond., \$100; Riders 6-14, exc., \$70 money order, or trade for good Viking Ranger, or DX-100. Don Jensen, 3529 Dunn Ave., Cheyenne, Wyo.

SELL — RCA 3" scope, exc., \$15; HD filter choke from BC-610, \$10; Ward-Leonard HD antenna changeover relay, \$10; unused UTC-LS-40, \$5. Macy, 2346 Dundee Rd., Louisville, Ky.

FOR SALE — NRI sig. tracer and RC checker, 1. n., with instruction books, \$50. A. Remer, 1175 Gerard Ave., Bronx 52, N. Y.

FOR SALE — SX-28-A rcvr., good cond., \$110; Concertone tape recorder, used very little, \$205; 2 car radios, old but working, \$8 each; large choke, 500 ma., \$3. C. Anderson, 15 Midwood Ave., Allendale, N. J.

FOR SALE — Two-element close-spaced beam (20 meters), 12' mast and brackets, tackle to raise, all exc. cond., cash and carry, \$25. Anthony Ardite, 29 S. 11th Ave., Mount Vernon, N. Y.

SWAP — One Kodaslide table viewer, model A, for viewing 35 mm slides, 1. n., for sig. gen., or what have you? E. E. Marriott, 1502 Liano St., Port Neches, Texas.

SELL OR TRADE — 3 Westinghouse tubes, No. 5736 and 2 No. 4J34 tubes, 1. n.; 2 facsimile transceivers, TT-1B/TXC-1. J. W. Phillips, 909A East Main, Belleville, Ill.

FOR SALE — Vols. 3-21 Riders; Nos. 1-75 Sams, best offer, or swap for photographic equip., wood or metal working tools. E. S. Priem, 520 Center St., Shawano, Wis.

WANT — Long-wave receivers of small size with ranges from 15 kc. to 75 kc., to around 600 kc. Send complete information. Charles W. Leigh, 162 Passaic St., Trenton 8, N. J.

FOR SALE — Garrard automatic record changer with GE reluctance sapphire stylus, 78 rpm, 1. n., \$25. V. Pellettieri, 5523 31st Ave., Woodside 77, L. I., N. Y.

FOR SALE — Hickok 620 Pattern Gen., 1. n., make offer or will trade for good typewriter. A-1 Television and Radio Service, 1198 Haddon Ave., Camden 3, N. J.

WANT — 50 or 75 w. amplifier and driver units, in trade for 120 bass piano accordion, with case, four automatic switches, in jet black, chrome trimmed, never used, cost \$350. John Arnold, Box 84, Bluffs, Ill.

SELL — Precision UHF sig. gen., freq. range 520-1300 mc., CW or pulse output, pulse rate 60-2500 cps., length 2-30 microseconds, accuracy within one percent, \$145 or best offer. S. Consalvo, 4905 Roanne Dr., Washington 21, D. C.

TRADE OR SWAP — Full set lefthanded golf clubs and disc type recorder, playback and cutting head, no amp. Emory Corron, 4096 Redonda La., Dayton 6, Ohio.

FOR SALE — Bud FCC-90, 100 kc., freq. standard, with 117L7 and new type crystal, \$12; Bendix TA-12D, partially converted, \$22. Herbert Greenberg, 821 Rutgers Rd., Franklin Square, N. Y.

WANTED — Radio and technical books and courses. Have lots to trade. John Skane, Halifax 1, Pa.

FOR SALE — Ham equip. and parts, oil-filled capacitor, milliamp meter, transformers, etc., books and manuals. What do you need? James McDaniel, 1013 LaFayette St., Elizabeth, N. J.

SWAP — CREI radio eng. course, complete with practical TV eng. folders in perf. cond., for good camera. N. Charbonneau, 397 Oakland St., Springfield, Mass.

FOR SALE — RCA 3" scope, model 155A, including instr., oper., and maintenance manual, and replacement cathode ray tube, hardly used, perf. oper. cond., \$40 plus shipping. William Levine, 216-69 68th Ave., Bayside, L. I. 64, N. Y.

FOR SALE — About 50 1. n. radio tubes, in orig factory cartons: RCA National Union, Tung-Sol, GE, Sylvania. Best cash offer accepted. Henry Kolk, R. 2, Goshen, N. Y.

SELL OR TRADE — Like new custom radio for '54-'55 Oldsmobile, and RCA model BK-6A mike. Cash or trade for Hi-Fi gear, Gonset converter, or tape recorder. Bernard Loebe, Palm Beach, Fla.

FOR SALE — Juke-box amp., Wurlitzer, \$15, with speaker, \$25; Voice amplifier with trigger grip, SCT-PM-4 complete less batteries, \$425; Speech amplifier, pair 6B4s, \$15; CREI 66 lessons in 12 hard blue binders, perf., \$39. A. C. Livingstone, 12-01 Ellis Ave., Fair Lawn, N. J.

FOR SALE — Heathkit variable regulated power supply, model PS-1, 160-475 v. DC. Prefer cash or trade for audio gen. Frank Leslie, 26 Valleyview Dr., Dayton 5, Ohio.

SELL OR TRADE — '47 Oldsmobile radio for TV parts or what have you. Local only. Want '51 Ford radio in repairable cond. Fred Levitt, 133-30 Laurelton Pkwy., Laurelton 22, N. Y.

TRADE — 10 meter xm'tter for a 6. Antique radio gear available, old radio and wireless books, tubes. Charles T. Fernandez, 81 Warren St., Roxbury 19, Mass.

SELL OR TRADE — "Elements of Radio" by Abraham and William Marcus and "Mathematics for Electricians and Radiomen" by Nelson M. Cooke. Alexander Podstepny, 1009 N. 2nd St., 2nd Fl., Philadelphia 23, Pa.

SELL OR TRADE — Model 900 VTVM Silver Vomax; 1. n., 0-50 DB range, RF probe, high resistance input, etc. No reasonable offer refused. Albert Lampe, Box 195, Johnson, Neb.

SELL OR SWAP — 350 w. final, power supply, 5' open relay rack, PP812A, grid and plate meters, coils, metered bias supply, extras, \$100 or swap for two meter or all-band mobile gear. V. J. Luciani, 1132 E. Pine, Mahanoy City, Pa.

SELL OR SWAP — Langevin Hi-Fi amp., 50 w., high and low impedance inputs. Want good comm. rcvr., or \$125. Also swap Roleiflex I3.5 with all accessories for HRO 60. George Tate, Artillery Rd., RD 4, Taylors, S. C.

SELL OR TRADE — Perco FM tuner (14F8, 35W4, built from kit); 2-GL211's from BC-375. Trade for small grid dip meter or ham parts. Make offer. Rev. H. Francis Berkshire, Lanark, Ill.

FOR SALE — Riders vol. 10, \$13; Radio Eng. by Terman, \$5; Heath bar gen., \$12; Superior's gen., \$30; Hallicrafters S-38, \$28. Robert P. Loftus, 4227 Baring Ave., East Chicago, Ind.

WANTED — Lampkin or Measurement Corp. equip., 30-50 mc. rcvrs., FM type. R. Phillips, Box 8136, Kansas City, Mo.

WANTED — Will buy six 304TL tubes. E. L. Felder, Tylertown, Miss.

SELL OR SWAP — Acousticon hearing-aid No. A-150, \$10. Needs battery-phone. R. D. Smith, 420 E. 105th St., New York 29, N. Y.

WANTED — Hallicrafters S-95 Civic Patrol rcvr., range 150-173 mc., or PR-9 Police-Alarm rcvr., range 152-174 mc., in good operating cond., home-made or surplus rcvr., same range, operate 115 v. AC. James Dilworth, 5 Washington Pkwy., Bayonne, N. J.

FOR SALE — RCA 9-lesson color course, \$10 collect. Raymond McKay, 32052 Brush, Royal Oak 4, Mich.

FOR SALE — Hickok 640 scope, exc. cond., \$275 cash. H. P. Weiss, 1126 Dayton, Kalamazoo, Mich.

SELL OR TRADE — 3-month-old National 125; extra clean 50 w. McElroy Fu-40 xm'tter; 80, 40, 20 m. Electravoice TV; Tenna Top preamp., model 3010. Need BC-221, Lampkin deviation meter, good scope. B. R. Rinn, Yuma, Colo.

SELL OR SWAP — Oxford Tartak Corp. capacitor analyzer model CT400 meter indicator AC-DC v. and 5 and 50 ma., power factor. Cash or communications rcvr. No dealers. Ralph M. Peck, 2538 South Robinson St., Philadelphia 42, Pa.

WANTED — To contact anyone with tape recorder who would like to exchange conversation by means of recorded tape. John O. Hehn, 18 South Jardin St., Shenandoah, Pa.

FOR SALE — BC-348-Q rcvr., converted for 120 v. AC 60 cy. operation with built-in power supply and S meter, good working order, \$85 FOB. F. J. Green, Box 22, 505 North Washington St., Dixon, Calif.

FOR SALE — Tubes: VT25, 807, 832, \$12; books on TV servicing, \$2; BC-455A rcvr., \$12. Miss Thelma Wilson, 4450 Edgewood Pl., Riverside, Calif.

FOR SALE — Complete radio and TV course, TV books and parts all sold together, \$30. Harold Ruhna, 701 Ball St., Midland, Mich.

FOR SALE — QST for July, Sept., Nov., 1922; Sept., Nov., Dec., 1924; March, April, May, 1925; Feb., 1927; April, May, June, Dec., 1929; 1930, 1931, 1932 complete. \$10 plus shipping charge. Hartwell Hughes, 649 Athens Blvd., Los Angeles 44, Calif.

TRADE — Pentron wire recorder and GE self-charging portable radio in excellent cond., for good dual speed tape recorder or what have you. Arnold Martin, 114-04 204th St., St. Albans 12, N. Y.

SELL OR TRADE — Unused C-D BF-60 condenser tester, \$35; used Solar CB-160 condenser tester, \$25, or trade for old guns. Ellison Radio-TV Service, 211 West Main St., Sedalia, Mo.

WANTED — Radio and TV servicing equipment. Ernest Swafford, 2315 Cypress, Kansas City, Mo.

FOR SALE — Emerson 19" TV console, \$55; Muntz 17" TV console, \$65; Dumont Chatham, table model, \$35; RCA 21" console, converted 630 chassis, \$65; Motorola 17" console, \$35; 2 Philco 2500 projection consoles, \$50 ea. All in good working cond. Emil Grauer, 218 North Wood Ave., Linden, N. J.

FREE — Precision tube checker, model 612. Write for details. White's Radio Service, Winona, Miss.

FOR SALE — Riders Radio manuals with indexes, perf. shape, 12, 16, 18, 19 and 20, 1/2 net price FOB. B. Cohen, 3042 Br. 6th St., Brooklyn 35, N. Y.

SELL OR SWAP — RCA Jr. voltohmmyst WV77A; Precision E-200-C sig. gen.; Heath TS-4 sweep gen.; Sams Photofacts 90 cents each; Riders Vol. 14 \$6. Want Heath BE-4, Heath AO-1. H. Lejuez, 20-31 18th St., Astoria, L. I., N. Y.

SWAP — Tubes, electric motors, radio parts, guns, for camera, musical instruments. Thomas Rohland, Rural Route 3, Martinsville, Ind.

TRADE — Dual variable 50 mmfd. 6000 v. rating transmitting condenser, National TMA-50DA, unused, for magnetic pickup for guitar, or sell for \$4. R. Levy, J-41 Leverett House, Cambridge 38, Mass.

FOR SALE — TBS 50C with APS 50 power supply and complete change of tubes, and S38C. FOB, best offer, both in exc. cond. Carl Porter, 19 Penniman Terr., Braintree 84, Mass.

WANTED — Old phono records, dance records 1928-1940 such as Banner, Perfect, Melotone, Brunswick, Vocalion, Columbia, etc. Cash paid. William H. Wesley, 6411 Central Ave., SE, Washington 27, D. C.

FOR SALE — Dumont CRO, model 224, like new mechanically and electrically, manual and new 3GP1, \$75. Write for information. Mike Peterhans, General Delivery. Stanford, Calif.

FOR SALE — Chevrolet car radio, model 985695, push button and manual tuning, speaker and radio one unit for dashboard, chrome, perf. cond., \$5. Thomas Byrne, 331 Calhoun Ave., Bronx 65, N. Y.

FOR SALE — Presto J5 Jr. recorder (disc 78 rpm), \$30; Webster model 80 wire recorder, \$25; Pentron 7 1/2 IPS tape deck, \$20; 2-speed GI recording unit: turntable, playback and rec. head, \$15. Louis S. Venturelli, 224 1/2 21st St., Brooklyn 32, N. Y.

TRADE — Chemical lab. inventory approx. \$400, Becher balances, centrifuge, etc., for Gud transmitter or cash. Hobson Arnold, 783 Essie Ave., Atlanta 16, Ga.

WANTED — Conversion data for BC-929 or 729 scope. Will pay reasonable price. O. B. Millar, Box 192, Coalinga, Calif.

TRADE — Seven copies Technician, 80 copies Radio Electronics, Radio Television News, from 51-55 for any make booster or UHF converter, or what have you? Clarence Kelly, 214 West Market St., Blairsville, Pa.

SELL — Delta 11" lathe, 46-230, stand, jack shaft, all accessories and metal spinning tools, new cond., \$120 cash or swap for NO-129X, NC-125, etc. M. Marshall, 455 Washington Ave., Dumont, N. J.

FOR SALE — Like new Philco 8-tube model 46-1209 radio-automatic phono combination with short wave band and push button tuning, \$50; Montgomery Ward automatic phonograph in good cond., \$15. Prices FOB. Want tape recorder. Robert Gelnett, RD 2, Liverpool, Pa.

SELL OR SWAP — RME-45 and Millen 90700 variarm, BC-459-A, TE-4, Heathkit VTVM, Sky Chief, SX-9, pai-100TH, NRI electronic multimeter, Supreme channel analyzer. Want used Viking VFO, and 15 meter coils for HRO-7. R. J. Diehn, 1170 Higley, Toledo 12, Ohio.

FOR SALE — Like new 40' extension mast, \$19; like new TV field strength meter, \$70; Sprague tel-mike 16, \$30; used BT booster, \$25. R. E. Martin, 2605 Warren Ave., Seattle 9, Wash.

FOR SALE — Heath sig. tracer, model T-3, never used, with probes and instructions. Prefer local. E. H. Ritzmann, 60-19 Madison St., Brooklyn 27, N. Y.

WANTED — Rider's perpetual trouble-shooter's manuals 18 and up. State cond. and price. Francis J. McNulty, 50 A Vernon St., Worcester 4, Mass.

FOR SALE — V-M 935B 3-speed changer with 45 post, used, less cartridge, good cond., \$16 plus shipping; unused RCA 3-speed, less cartridge, \$16 plus shipping. W. H. Robinson, 1543 S. Gramercy Pl., Los Angeles 19, Calif.

SELL OR SWAP — Late DeForest Radio-TV course, with sig. gen., scope and power supply; NRI Radio-TV course with tester. Want PA or Hi-Fi equip. Clyde L. Ford, 316 11th St., NE, Washington 2, D. C.

WANTED — FM 30 to 50 mc. tuner or rcvr. for 6 v. mobile use. State price and condition. John N. Runyon, 1350 Brooklyn Blvd., Bay Shore, L. I., N. Y.

WANTED — Instruction manual for Espey model 104-TC combination tester type SC. Raymond Dodge, 676 Verde Vista Ave., Pomona, Calif.

FOR SALE — Sam's Photofacts, 278 sets in A-1 cond., 11 set in 1 binder, others in orig. envelopes, complete with index and Photofact Reporter, \$275. Mack Stiles, 219 Laurel Ave., Cresson, Pa.

FOR SALE — SCR-522 transceiver; ARC-3 xmitter; GL-6044; nine 2050 and 2051 tubes; five 2X2A. Dick Platt, 213 Terraville Ave., Lead, S. D.

FOR SALE — Riders No. 3 TV manual, new cond. First \$11 takes it. H. Ursillo, 694 N. Broadway, E. Providence, R. I.

FOR SALE — EMC model 204 tube tester; Premier DR-6119 rack cabinet, gray, 135 lbs., with matching RT-1101 rack dolly; C-D model 6BE10 battery eliminator. Prefer local. Richard Ebeling, 33 Randolph Rd., White Plains, N. Y.

WANTED — New location to start a Radio and TV Service Shop. Matt J. Clemens, Easton, Minn.

FOR SALE — Complete Radio and TV course, 66 lessons, in very good cond., \$35 (was \$385), and unused FCC License Preparation course, 30 lessons, \$65, or best offer. Walter P. Ebner, 1813 South Michigan Way, Denver 19, Colo.

FOR SALE — Heath TS-3 sweep gen.; 300 w. slide projector; 3" scope; Heath SG-6 sig. gen.; T-2 signal tracer; lab. power supply; Heinemann circuit breaker; AC-DC portable radio; multimeter. Stanley Bombka, 8107 No Odell Ave., Niles, Ill.

WANTED — Guthman U17 Silver Super receiver. Will pay cash. A. N. Densem, 221 Lawndale Ave., NE, Grand Rapids 3, Mich.

SELL — Tubes: 1A7, 1LA4, 1Q5, 1T5, 6AL5, 6B4, 6C4, 6C6, 6F7, 6F8, 6H6, 6J7, 6L5, 6N7, 6R7, 6T8, 7A5, 7E5, 7E6, 7E7, 7F7, 12Q7, 12K7, 12Q7, 12SG7, 41; also 17LP4 pix tube, \$20. J. Andrews, 740 Maple St., Bethlehem, Pa.

WANTED — BC-603 and BC-923 receivers, 2-meter xmtrs. FM receivers. C. R. Sellwood, 129 Deil St., Syracuse, N. Y.

FOR SALE — Simpson Midgetester, model 355, with case, \$25 postpaid; Sprague Kwick Test capacitor checker, model KT-1, 1. n., \$27.50 FOB. Both \$50, postpaid. Stephen Plauski, 425 3rd St., Brooklyn 15, N. Y.

FOR SALE — Custom auto radios for all cars; '55 Chevy radio \$45; '49-'50 Ford radio, \$20; Webcor model 2110 tape recorder, 1. n., \$150. Joseph Godzisz, 2509 Pine Ave., Niagara Falls, N. Y.

FOR SALE — RCA TC calibrator, model 39A crystal calibrated marker gen., \$85. Leo Lunine, 10007 Memory Park Ave., San Fernando, Calif.

SELL OR SWAP — Never used 500 w. all-band table top 813 transmitter, \$250, or swap for good mobile rig complete. W. R. Hurm, 500 Hudson Ave., Altoona, Pa.

WANTED — TM manual on U. S. Navy "BM" unit or other information; LM calibration book No. 5320. State price. W. R. Lingenbrink, 26096 Jane Ave., Hayward, Calif.

FOR SALE — RCP port. tube checker, mod. 323, exc. cond., oak cover removable for counter model, checks all tubes, hearing aids, pilot lamps, etc., \$20. Prefer local. Nick T. Manos, 2275 East 2nd St., Brooklyn 23, N. Y.

TRADE OR SELL — ATR inverter, 110 DC input, 110 AC output, 250 inter, 150 w. continuous with extra vibrator. Need late model radio tube tester, TV-UHF converter, or Good Geiger counter in good cond. K. L. Sillwell, 2215 Myrtle St., Erie, Pa.

FOR SALE — Riders Tek files, thru 20, plus 30A, 46B, 47B, all \$23 FOB; Ghirardi Radio Physics course, \$3; Modern Radio Servicing, \$3; 50 technical magazines, \$5. ACE TV, 5341 Cordelia Avenue, Baltimore 15, Md.

FOR SALE — 2 Western Electric 109 record reproducers, with arms, heads, equalizers, and repeat coils; 2 RCA Universal record reproducers, with heads, arms, and equalizers. One head on each needs overhauling. Raymond Bohnert, WIGM, Medford, Wis.

FOR SALE — Hallicrafter SX-42, excellent cond., complete, less spkr., \$165 FOB. Jos. Stantley, Jr., 283 Berkeley Ave., Newark, N. J.

SELL OR TRADE — Signal Corps BX-8 wooden transmitter spare tube carrying boxes, 9 $\frac{7}{8}$ " x 8 $\frac{3}{8}$ " x 7 $\frac{1}{8}$ ", packed for overseas shipment, plywood, mahogany. \$1.50 each plus postage, or swap. T. P. Smith, 305 E. Pierson, Decatur, Ill.

FOR SALE — Scott comm. rcvr., \$125; pair 250THs, \$25; 100THs, \$15; VTVM, \$27.50; 130 Sams \$125; 12 and 15,000 kva transformers \$15. Need cash, 5'-7" scope, 209A meter. John Pellock, Washington St., Bunker Hill, Ill.

WANTED — Back copies of British radio and TV magazines. Pat Blaney, New Straitsville, Ohio.

WANTED — Riders TV manuals for cash. Atomic Radio-TV, 137 North Park Ave., Rockville Centre, N. Y.

SELL OR TRADE — National CRR rack mounting scope; Waterman S10A scope; Hallicrafter S-29 portable comm. rcvr.; disc recorder mech. GI R-70 mag. cutter; L&W xtal conv. 2-mtrs.; GE TC-3 portable tube and bat tester. E. S. Bednar, 81 Lincoln Ave., Carteret, N. J.

FOR SALE — Heath 5" scope, extra cathode ray tube, manual, \$39; Heath AM-FM-TV alignment sweep generator, absorption marker, manual, \$39; small AM Broadcast tuner, 4 tubes, \$9. All in good cond. William Rolif, 320 Broad St., Carlstadt, N. J.

WANTED — Up-to-date tube tester or electronic meters. Buy or trade electro plating outfit, brush or tank portable, most chemicals furnished, 3" double blower, $\frac{1}{4}$ hp motor. J. A. Saracen's, 1028 E. 212th St., Bronx 69, N. Y.

FOR SALE — Rider Radio manuals, 1 to 5 abridged, and 6 to 18 inclusive. No reasonable offer refused. C. Hill, 1317 North Alden St., Philadelphia 31, Pa.

FOR SALE — Eico: model 630 cathode ray tube checker, \$18; model 950 resistance-capacitance checker, \$20; model 625 tube tester with lid and latest chart, \$40; Regency UHF converter model RC-600, \$20. Roy Throckmorton, 268 $\frac{1}{2}$ Carroll St., Akron 4, Ohio.

FOR SALE — DAK receiver with 23 tubes, including scope, 250 to 1500 kc., in two ranges, 2 MV sensitivity, 2 and 4 kc. bandwidth, BFO AVC and MVC, \$50 FOB. R. A. Kerlin, 3757 Rutherford St., Harrisburg, Pa.

FOR SALE — Working TV chassis with standard coil tuner and 15" tube, \$15 or complete with walnut console, \$30. Local only. C. Gauger, 26-29 212th St., Bayside 60, N. Y.

SELL OR TRADE — HQ-120X receiver; S-40A receiver; PP-812 RF ampl.; two 1500 v. power supplies on one chassis; 7" TV; \$65 worth of fishing tackle. Want tube tester, Lionel train, cash, or what ?? Joe Anderson, 909 West Nevada Ave., St. Paul 13, Minn.

TRADE — Late model tube tester and Simpson volt meter, for 20 w. 6-117 volt amplifier with push-pull output, or Heath kit model A-9B. Thomas E. Champion, 699 Swan St., Terre Haute, Ind.

WANTED — Letters from fellow experimenters, and DXers to exchange ideas. Have for sale Philco 42-380 receiver, broadcast, 2.3-7.0 and 9.0-15.5 mcs., 12" speaker with set. Write for info. Jason Birnholz, 634 High St., Newark 2, N. J.

FOR SALE — Browning FM tuner, model RV-10B, exc. cond., with $\frac{3}{8}$ " plywood cabinet, good buy at \$72.50. S. S. Tohe, 8335 Thouron Ave., Philadelphia 19, Pa.

FOR SALE — Simpson 480 genescope with all leads and cables, 1. n., \$295; Eico 7" scope, model 470, factory wired, 1. n., \$95. Kame Radio & TV, 408 St. John's Pl., Brooklyn 38, N. Y.

SELL OR SWAP — FM Pilotuner, \$20, or for Heath VTVM. C. Witter, 106 North 19th St., East Orange, N. J.

FOR SALE — 2 Radiotron WD-11 tubes and one WD-12. Best cash offer. C. T. Buffington, Box 55, Uniontown, Md.

WANTED — Police alarm in good cond., will pay \$20. Al Budin, 10749 Superior, Cleveland 6, Ohio.

SELL OR SWAP — Bird Termaline 51.5 ohm coax resistor, model 80-5; 2300 w. Variac; 6-position coax switch; GE adjustable 10-30 amps 110 v. AC circuit breaker. Want sig. gen., condenser analyzer, grid dipper. J. Durant, 3268-47th St., Sandia Base, Albuquerque, N. M.

TRADE — Ultra Audio tape transport mechanism, l. n. Want 7" to 12" TV receiver, state make, model, and cond. B. G. Phinney, 1014 5th Ave. North, Lewistown, Mont.

FOR SALE — Lab type regulated power supply 0-300 v. DC 100 ma., exc. cond., \$150. G. Tolc, 853 Broadway, New York 3, N. Y.

SALE — Webcor 210-1C tape recorder, perf., \$135; 40-80 meter CW transmitter, Bud cabinetized with 2 power supplies, 40 w. Your offer? Spencer Dubov, 3100 Brighton 2nd St., Brooklyn 35, N. Y.

FOR SALE — Hallicrafters Sky-Buddy, \$15; Superior Inst. Co. signal tracer, model CA-11, \$15. Both exc. condition. S. Tomasell, 30 Longcroft Rd., Rochester 9, N. Y.

FOR SALE — Dumont scope, model 274-A, l. n., \$30. Howard Buck, 32-15 81st St., Jackson Heights, N. Y.

FOR SALE — UTC transformers, LS-19 and LS-22 \$6, LS-55 \$8. All electrically perfect and new in appearance. Reid G. Smythe, 1760 Kimball St., Brooklyn 34, N. Y.

WANT — 6 ft. metal relay rack, 19" open type, must be ICA, Bud, Par-Metal or comparable brand. John E. Penn, 5241 East 16th St., Indianapolis, Ind.

FOR SALE — RCA voltohmmyst VTVM, \$25; Superior Instru. Co., signal tracer, with batteries, less earphones; Approved Electronics Instru. Co. sig. gen., A-200, \$15, all A-1 cond. Pasqua's TV, 133 Exchange St., Geneva, N. Y.

FOR SALE — Like new NRI professional model 68 tube tester, \$25; Heathkit RF sig. gen., \$10. F. Jenney, Coggeshall Ave., Newport, R. I.

WANTED — TV chassis to fit space 17" square, cash, or swap 1½ hp 115-230 v. motor 3450 rpm, Stevens 12 ga. shotgun with custom stock. Harvey Van Erem, Box 92, Rt. 1, Jamestown, N. D.

WANTED — Tubes: transmitting, receiving, special-purpose, TV. Prefer new, boxed (may be nested), and standard brands. Cash or swap for other tubes or equip. Mack O. Santer, 56 Crosby St., New York 12, N. Y.

SELL OR SWAP — Little used Techno-Craft lathe recording mechanism with two lead screws, for standard and microgroove, and Astatic magnetic head 8 ohms. Want Hi-Fi or ?? Raul Caranza, 2315 Mission Rd., San Antonio, Tex.

SELL OR TRADE — Johnson VFO with FSK keying tube; Elmac A-54 mobile transmitter; 3 General Radio multivibrators 10, 50 and 100 kc. Want 2- and 6-meter Cascode converters, good FM tuner. T. H. Stahl, 2134 Hawthorne Rd., Grosse Pointe Woods 36, Mich.

FOR SALE — 17 C-D invertors, style "Powercon" in lots of 6 or more at \$10 each, slightly used. S. Cohen, 773 South Orange Ave., Newark, N. J.

WANTED — Tubes: transmitting, receiving, special-purpose industrial types such as Klystrons, etc.; Hickok tube checkers, Variacs, etc. Cash or swap for choice equip. and tubes. B. N. Gensler, 330 West 11th St., New York 14, N. Y.

FOR SALE — Hickok 534 tube checker, Riders Radio Vol. 9 thru 14, Sams 1 thru 19. Speco signal tracer, Ballast tubes, vibrators, resistors, assorted 250 radio tubes, 8" test speaker, \$175 for all. Michael Kuzma, 1015 NW 8th St., Gainesville, Fla.

SWAP OR SELL — Skill 587 oscillating sander and 557 ¼" drill, both l. n. Need short-wave receivers, i.e., National 38. Eric B. Olsen, RD 1, Kingsville, Ohio.

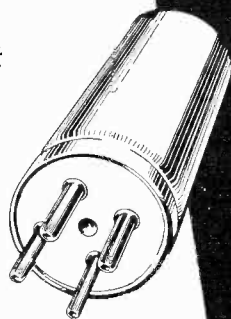
FOR SALE — Eldico TR75TV, exc. cond., with tubes, 160, 80, 40 meter coils, extra set coil forms, all for \$50. Need cash—college. Al Brogdon, 326 S. Walnut, Cookeville, Tenn.

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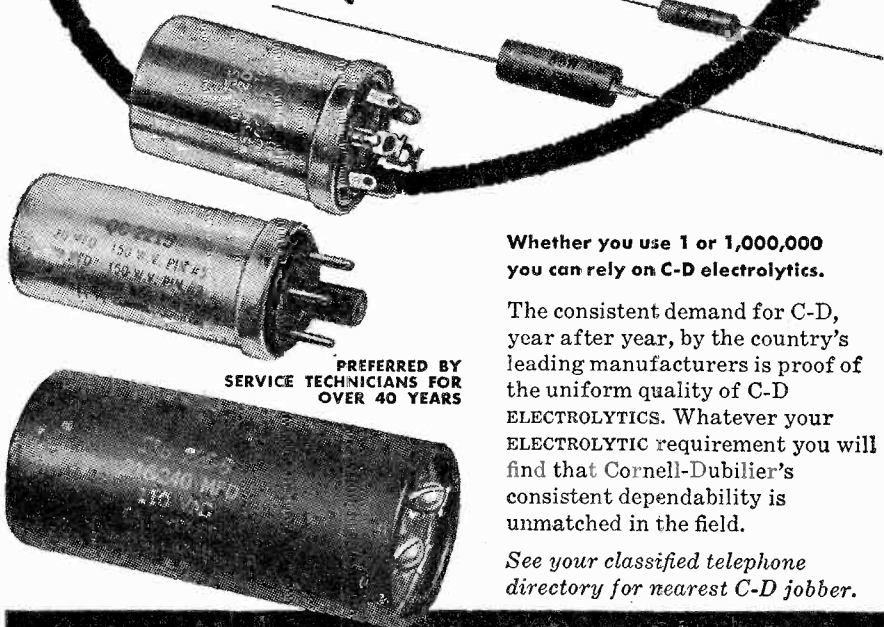
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