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# TELEVISION SIGNAL AND VOLTAGE PICTURE-TUBE CIRCUITS\*

In the previous installments, the basic characteristics of tv receiver signal and voltage circuits were analyzed. This month, four typical circuits, used by RCA, G. E., Farnsworth, and Du-Mont are detailed.

## RCA 641

In Fig. 1 appears the picture tube circuit used in the RCA 641 10" model. This schematic shows the many operating voltages and signals required to properly present the picture on the tv screen. To the grid of the picture tube is applied the negative-going composite tv signal from the video amplifier output tube. This negative-going single-polarity signal is augmented with two d-c voltages. One of these voltages is contributed by the d-c restorer circuit which maintains a steady charge on capacitor  $C_1$  because of the diode current drawn through resistor  $R_2$ . A d-c component of grid bias is also taken off the brightness control,  $R_3$ , which is variable to properly set the negative voltage applied to the grid of the picture tube. The correct d-c potential for the accelerating grid of the picture tube is obtained from the low-voltage power-supply.

## Anode Voltages

The anode voltage for the picture tube of 9,000 volts is obtained from a transient fly-back high voltage supply. The negative transient developed across the horizontal deflection coil during the horizontal retrace is stepped up in

amplitude by transformer action and inverted to apply a short interval high-voltage positive pulse to the plate of the 8016 high-voltage rectifier. This rectifier, which only requires approximately a 50-ma current for the heater, obtains it from the same horizontal output transformer by means of a few turn pickup, coupled near to the high voltage windings. The high-voltage pulse itself is rectified and filtered, and serves as the second anode potential of the picture tube.

## Current Flow Control

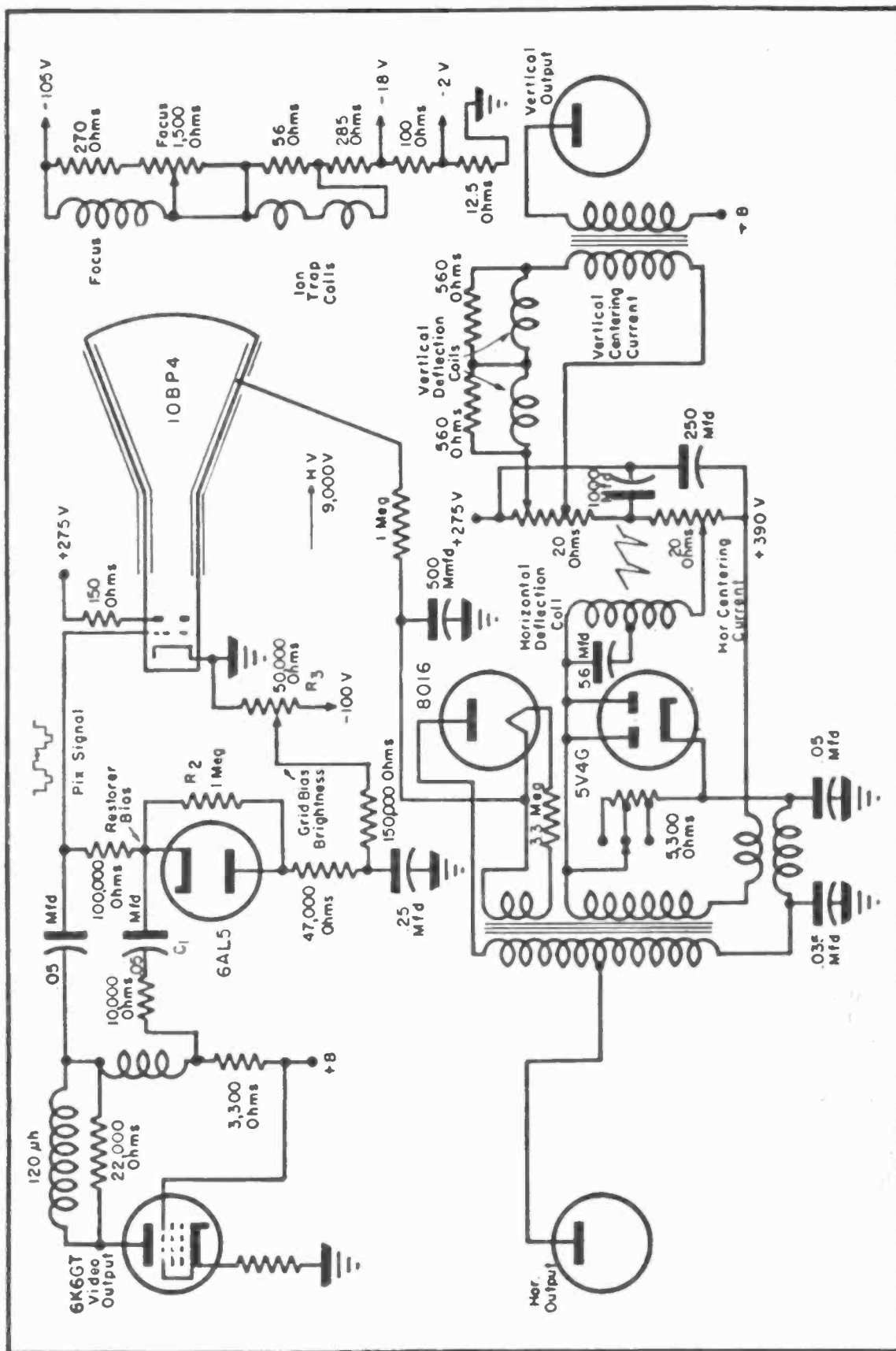
A sawtooth of current is present in the horizontal deflection coil as developed by the horizontal output tube. Likewise, a vertical sawtooth of current is developed in the vertical deflection coil by the vertical output tube. In addition to the horizontal and vertical sawtooth voltages a d-c component of current must be passed through each set of coils to properly center the picture as a whole on the fluorescent screen. These d-c components of current are taken off two 20-ohm potentiometers which are in series with the B-supply voltage between the 300 and 275-volt points. By controlling the amount and direction of current flow with the centering controls the picture can be properly centered horizontally and vertically.

## Ion Trap

It is also necessary to pass the proper d-c through the ion trap coil

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\*By Edward M. Noll in "Service," from a forthcoming book, "Television for Radiomen," to be published by Macmillan.



and the focus coil. These currents are obtained off a series of bleeder resistors across the —105 negative-voltage supply. The current through the focusing coil is controlled by means of a focusing potentiometer so it can be adjusted to obtain the sharpest picture. The two ion-trap coils also obtain their current from the same bleeder network. It is evident that the proper operation of the picture tube is dependent on a number of signals and voltages, and what is more, troubles can, in most cases, be isolated by observation of the picture on the screen.

### G. E. 801

The G. E. 801 picture tube signal and voltage circuit is shown in Fig. 2. In this receiver, the actual composite tv signal is applied to the cathode of the picture tube with positive polarity to properly excite the grid of the tube. A d-c component of grid bias is contributed by the average plate voltage of the video output tube, and a second d-c component is applied to the grid from a bleeder network across the low voltage supply. This latter component can be adjusted for correct brightness.

### Focusing Control

Correct focusing is obtained by regulating the current which passes through the focusing coil by means of a bleeder network connected across the low-voltage B supply. In this receiver the magnetic field for the ion trap circuit is generated by two permanent magnets, and no ion trap coils are used. Likewise, there is no d-c component of current passing through the deflection coils from an external current source. Proper centering of the scanning raster is obtained with correct adjustment of sawtooth amplitude and linearity, plus correct positioning of the deflection yoke. Proper deflection currents are obtained from the respective horizontal and vertical

output tubes and transformers. In this receiver the transient voltage developed in the horizontal deflection coils during retrace is again used to generate the high voltage for the picture tube.

### Farnsworth GV 240

The picture tube circuit of the Farnsworth tv receiver is shown in Fig. 3. In this circuit a negative-going tv signal is applied to the grid of the picture tube, while d-c components of grid bias are contributed by the capacitor  $C_1$  of the restorer circuit, and by the positive voltage applied to the cathode of the picture tube by way of the brightness control and the bleeder network connected across the low-voltage power supply. The accelerating grid potential is also obtained from the low voltage power supply.

### Low-Voltage Supplies

Focusing coil current is obtained from the second of two low-voltage power supplies. No ion trap circuits are necessary in this receiver because it uses the aluminum-back fluorescent screen of the 10FP4 picture tube to remove ions. The vertical centering current for the picture-tube vertical deflection coils is obtained from the low-voltage power supply; the horizontal centering current is obtained from the cathode circuit of the beam relaxor horizontal scanning generator. By changing the position of the arm on the potentiometer in the cathode circuit with respect to the tap, the direction and amplitude of the current passed through the horizontal deflection coils can be adjusted for proper centering.

### Beam Relaxor Circuit

A conventional vertical sawtooth output circuit is used to supply a sawtooth of current to the vertical deflection coils. The horizontal deflection

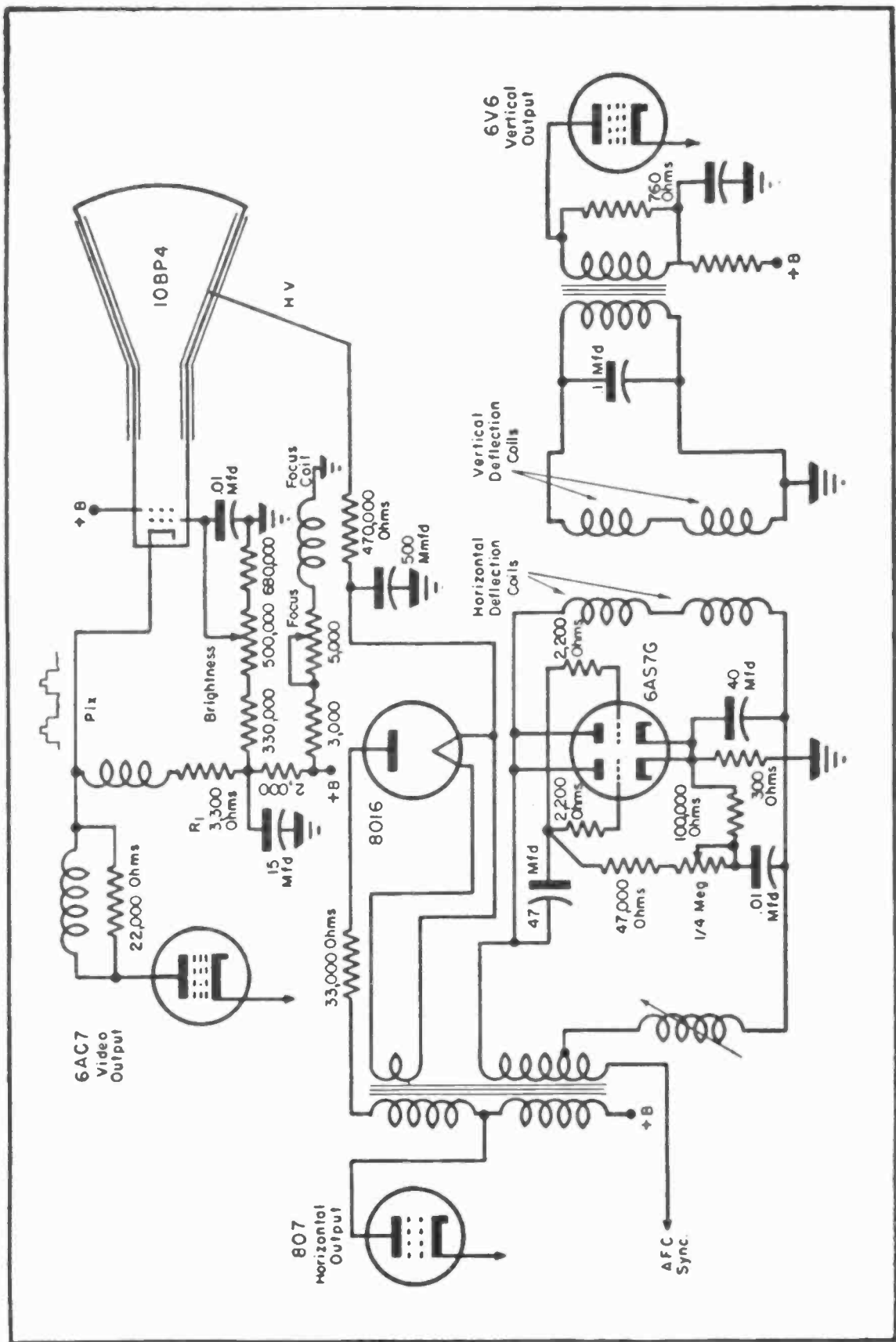


Fig. 2.

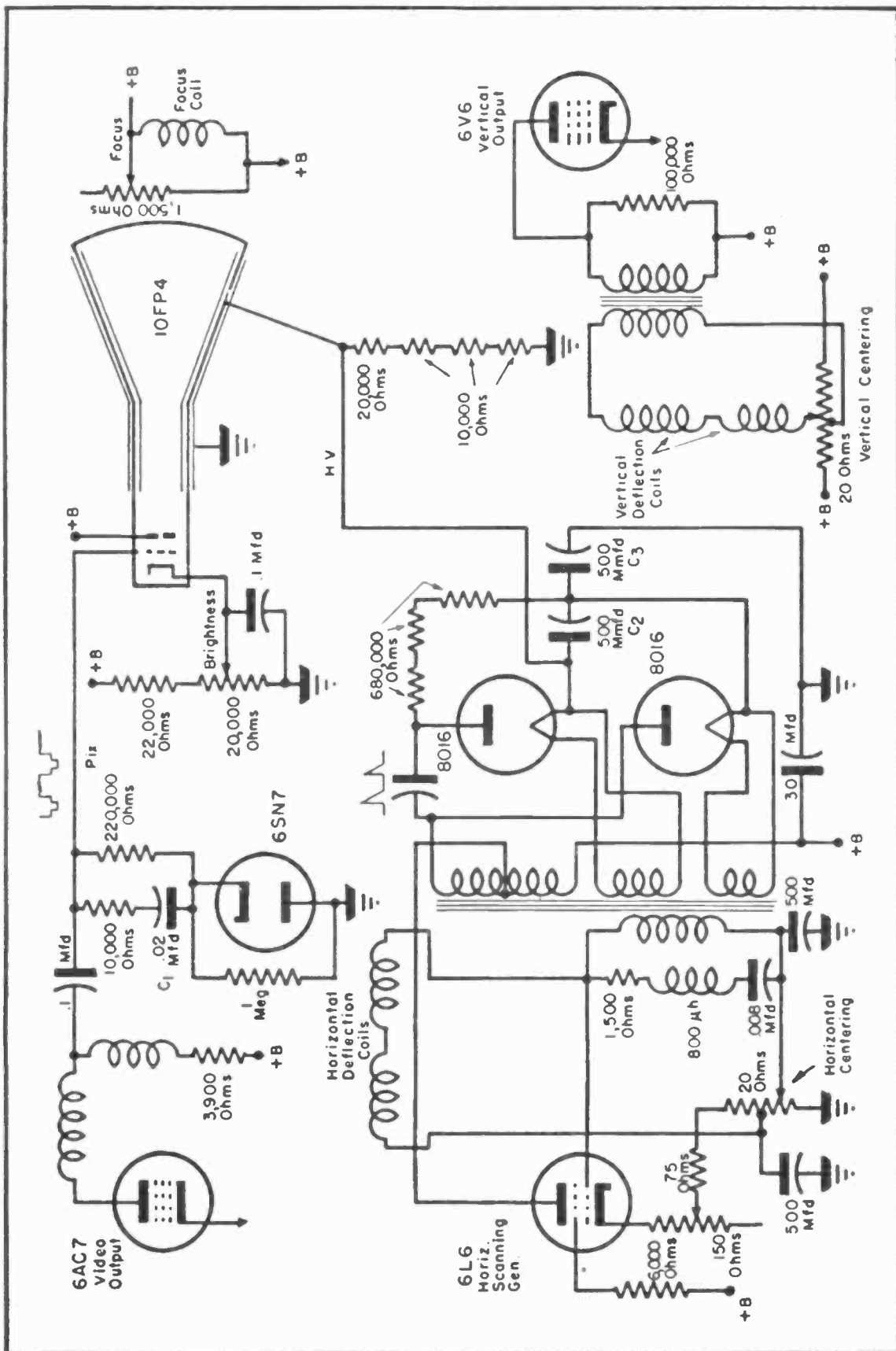


Fig. 3.

coils are excited by a sawtooth current generated by the Farnsworth beam relaxor circuit. The high voltage for the picture tube is also derived from the same circuit and is obtained by stepping up the sharp positive voltage developed in the plate circuit with auto-transformer action. This sharp positive pulse is applied to two 8016 high-voltage rectifiers connected in a voltage-doubler circuit. The current for both of these rectifiers is obtained by means of pick-up loops which are a part of the horizontal deflection transformer.  $C_1$  and  $C_2$  are charged simultaneously by the sharp transient pulse across the secondary.

### DuMont RA-101

The DuMont RA-101 television chassis (Fig. 4) has a number of unusual features. A cathode-follower video output tube is used in conjunction with a d-c restorer. A negative-going tv signal is applied to the grid of the picture tube which can be one of three sizes . . . 10", 15", or 20" direct viewing.

### Restorer Circuit

A d-c component of grid bias is contributed by the restorer circuit and by a positive potential applied to the cathode of the picture tube which can be properly set for correct brightness. The potential applied to the accelerating grid of the picture tube is also adjustable by means of a sensitivity control. This control is set once for the individual tube used in the circuit and insures the proper control grid-signal range between beam cut-off and the most brilliantly illuminated point.

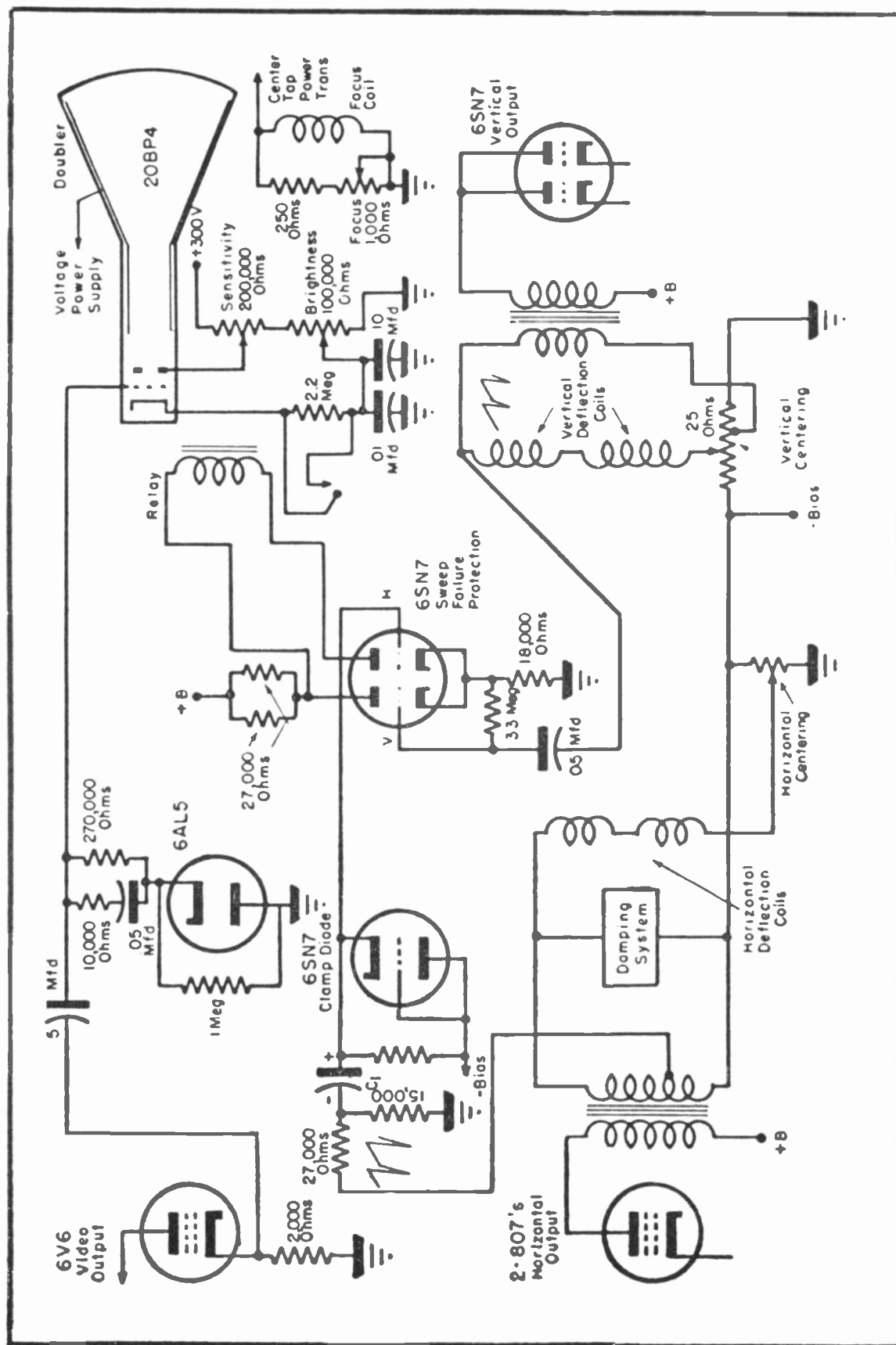
### Voltage Doubler

The second anode voltage is obtained from a voltage-doubling power supply using a transformer excited by the 60-cycle line. A special beam-protection circuit is used in case the

deflection system fails and the second anode voltage continues to be applied to the picture tube. Actually when current ceases to flow in the protective relay, the relay contacts open up and insert a 2-megohm resistor in series with the cathode lead holding a positive voltage on the cathode which cuts off the beam. The relay winding is in series with the second section of the sweep-failure tube, which is held normally conducting by the positive voltage developed when the clamping diode is driven by a negative pulse of the horizontal-output transformer, the diode clamp keeping a positive charge on capacitors  $C_1$  in the same manner as a d-c restorer functions. The first section of the sweep-failure tube is normally cut off because of the current pulled through the common cathode resistor and the two parallel plate resistors by the second section. In addition, the grid is held at an average negative bias because of the grid current flowing during the peak of the vertical sawtooth. If the horizontal sweep were to fail, the second section would be cut off, because of the absence of the position change on  $C_1$  and the negative bias applied to its grid from the negative portion of the low-voltage power supply. If the vertical sweep were to fail, the first section of the tube would conduct and the current drawn by it through the large cathode resistor would again cut off the second section and open the relay contact.

### Sawtooth Currents

The horizontal and vertical sawtooth current are again obtained from the respective horizontal and vertical-output tubes. Centering current is obtained by means of potentiometers connected in the negative line of the low-voltage power supply. Focusing current for the focusing coil of the picture tube is also obtained from the low-voltage power supply.







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

**FOR SALE**—Triplett tube tester, model 1615. Good condition, \$35. The Goldak Co., 1544 West Glenoaks Blvd., Glendale 1, Calif.

**FOR SALE**—120 assorted radio tubes, \$80; one sig. gen., tube tester and multimeter, \$100. James H. Shallenberger, 1338 Winston Rd., Baltimore 12, Md.

**FOR SALE**—Radio and appliance shop and living quarters under one roof. Reasonable rent for building. You buy only inventory of stock and test equipment. Write for full details. L. A. Shirts, Box 492, Fessenden, N. Dak.

**FOR SALE**—Quitting radio, everything to be sold. Tube tester, tubes, condensers, resistors, books, nuts bolts, etc. Let me know your needs, all inquiries answered. Bill Hagara, Box 224, Slickville, Pa.

**SWAP OR SELL**—I-56-C Triplett tester set. Perfect condition, \$85. Or trade for good 16mm projector. Case Electronics, Box 1145, Pasadena 20, Calif.

**SELL OR SWAP**—Resistance Bridge, model RN-1, like new, cost \$125. Want oscilloscope, Meissner 9-1040 analyst or similar instrument. Paul Brassard, 16 Cumberland St., Brunswick, Maine.

**FOR SALE**—Precision sig. gen., model E-200C, practically new \$50. Or will trade for 8x60 Zeiss binoculars. M. E. Gaines, PO Box 125, Fort Madison, Iowa.

**FOR SALE**—Supreme sig. gen., \$60; Speco sig. tracer, \$40; Silver model 905S sig. tracer, \$40; Radio City tube tester, volt ohm milliammeter, \$50; Riders Manuals, 1 to 5, 7, 9, 11, 12, 14, \$100; 12" Transvision television set, \$350. Paul Melton, 164 W. Penn. Ave., Sebring, Ohio.

**SELL OR TRADE**—Man's bicycle and 3hp outboard motor in good condition. Trade for sig. gen., tube tester, scope, Riders Manuals, or sell. Must be modern, reliable instruments. James E. Munson, Box 186, Pembroke, Maine.

**FOR SALE**—Model CA-10 sig. tracer, with complete instructions, never used, \$5. Max Matko, 960 Graham Ave., Monessen, Pa.

**FOR SALE**—One ATR inverter, 12V DC input 110V AC output at 50-60 AC, brand new, \$20. Also new and used DeVry 16mm sound projectors. Southern Radio and Electric Service, Perry, Florida.

**WANTED**—Position as Transmitter Engineer. 7 years experience, including 50 K.W. operation and maintenance. Also had studio and remote experience. Age 35, married, best of reference. R. W. Bevenour, 314 E. Detroit Ave., Monmouth, Ill.

**FOR SALE**—1947 Crei radio-television engineering course, complete with slide rule and book of tables. Cost \$200, make offer. Also other books. Write for list. I. L. Lambert, 1037 Oaklawn St., N. E., Grand Rapids 5, Michigan.

**WANTED**—Rider's Manual, vol. 3. Must be in good condition. State price. Standard Radio Service, 111 W. Reel Ave, Vincennes, Indiana.

**FOR SALE**—BC 314, broadcast band rec., in excellent condition and complete with dynamotor. Runs from two 6V storage batteries. \$40 without batteries and charger. David T. Armstrong, 221 Angeli-que St., Weehawken, N. J.

**FOR SALE**—Brand new Motorola television rec. in orig. box. \$169.95 shipped express COD. George Cooper, Orland Park, Ill.

**FOR SALE**—Music store and radio shop, handling only nationally advertised franchise merchandise on radios, pianos, records and accessories. Can give 5 yr. lease on building. Only music store in county. Est. 1936. F. B. Cauble, Orleans, Indiana.

**FOR SALE**—Howard 430 communications rec. 550kc to 40mc, good condition, \$27.50. G. D. Johnson, Pleasantville, Iowa.

**FOR SALE**—Fifty Weston meters, 4 3/8" round, model 643, center, blank scale, 750 micro-amp. each side of center, and in good condition, \$3 each. William H. Davis, 555 East, 3065 South, Salt Lake City 6, Utah.

**FOR SALE**—Crystalliner sig. gen., used 1 month, \$55; Hallicrafter S20R rec., very good condition, \$45. Sig Hryn, 3334 Hammond, Fresno, Calif.

**FOR SALE**—Super DX8 SW set, Gen-Ral coils, 4 band, crystal filter; Gross radio Stanley set, 6J5G detector 6J7 RF stage 12 A7 audio amp rectifier; QST magazines, '35-'41; Ghirardi's Modern Radio Servicing. First \$20 money order takes all. H. F. Schafer, 1135 W. College Ave., Appleton, Wisconsin.

**FOR SALE**—Extra heavy duty phonograph motors, operate on 110 or 220V, \$4.50. Also used RCA record changer, \$10; Admiral changer, \$12; new elec. portable phonograph, \$15.50. Will trade phonograph and changers for Rider's Manuals. Lefferson Radio, 344 S. Walnut St., Bloomington, Indiana.

**FOR SALE**—S-40 in perfect condition, no reasonable offer refused. Troy S. Starr, 29 Rosedale Drive, Binghamton, N. Y.

**FOR SALE**—Radio service shop in Arkansas Ozarks, only exclusive radio service shop in county. All late model test equip. and all Riders Manuals except 3, 4, and 5. Also have new 6 room white clapboard house on 20 acres. Sell all for \$3,500. Joe Holt Radio Service, Box 293, Clinton, Ark.

**WANTED**—Recent grad. from Radio Tech. School desires position. Holds Radio-Telephone 2nd License, ambitious and willing to learn, will travel. State particulars. Irving M. Cohen, 881 Fox St., N. Y. 59, N. Y.

**FOR SALE**—Talk Pix slide projector, amplifier and 33 RPM turntable in carrying case, A1 condition. Sell cheap. Robison Radio, 350 S. Walnut St., Bloomington, Indiana.

**TRADE**—One S20R Hallicrafters Sky Champion in perfect condition with matched PM-23 10" speaker. Want tube checker, volt-ohmmeter, capacitor checker, or what have you? Neil Morton, 1215 Windsor Ave., Bristol, Tenn.

**SWAP**—Condenser tester, radio course, battery charger, electric clock, new soldering iron, DC VOM, "A" battery eliminator, desk lamp, PA system, tool box, low resistance ohmmeter. Want movie camera and projector, or what have you? Stanley J. Zuchora, 2748 Meade St., Detroit 12, Mich.

**FOR SALE**—RCA Rider Chanalyst, in new condition, \$110; Riders Manuals, 2 thru 14, \$110. Both for \$200. Joe Tucker, Stone Mountain, Ga.

**WANTED**—A cartridge clip for a Mauser 7.65mm automatic pistol. G. A. Winter, 1206 Marlowe Ave., Lakewood 7, Ohio.

**FOR SALE**—Fol-Bot—9 1/2' folding kayak, with back rest and silver-flex finished hull. Bargain for person interested in a portable boat. Arthur Messing, 211 E. 11 St., New York 3, N. Y.

**WANTED**—RF sig. gen., also AF oscillator radio maintainer. E. R. Peltier, CB & Q Railroad Telegraph Office, McCook, Nebraska.

**FOR SALE**—G.E. 3 way portable radio, self charging unit, good condition, reasonable. Also late table model 6 tube Crosley, nice appearance, AM, overseas, and police band. J. Fox, 1823 N. Franklin St., Philadelphia 22, Pa.

**FOR SALE**—Recording equip., like new, Presto K-8, Wilcox-Gay, 3 microphones, and 10 and 13 $\frac{1}{4}$ " blanks. Make offer. H. Dramen, 3945 Boundary St., San Diego, Calif.

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**FOR SALE**—Records, albums, and accessories, all types and all numbers. Special discounts to churches, schools, lodges, and other organizations. Send for catalog and record buyers guide. Penman Electric, Hudson, Wisconsin.

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**WANTED**—Type 25D8 tube. John J. Belko, 404 S. Newport Ave., Tampa, Fla.

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**FOR SALE**—RCA No. 151-2 oscilloscope, \$35; Thordarson No. 913-2 oscilloscope, \$30. J. M. Schildz 7059 Pernod Ave., St. Louis 19, Mo.

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**FOR SALE**—Model 127 Clough Brengle "scope"; Model 680 Jackson tube tester and analyzer; Model 125 Hickok VTVM; Audio osc. 20cy., 60kc.; 15 tube sig. tracer; Electro 7-14V car radio supply; Standard auto xformer 5 amps. Gar Fought, 4,200 O St., Lincoln, Nebr.

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**FOR SALE**—Radio books, practically new. Send for list. Murray Held, 12 E. 55th St., Brooklyn 3, N. Y.

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**SWAP**—Headliner AC-DC audio amplifier, complete with tubes and 2 speakers. Cost \$90 new. Want multimeter and tube tester, or what have you? Jack's Radio Service, Box 43, Rt. No. 1, Mooresville, N. C.

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**FOR SALE**—Coyne's Applied Practical Electricity, 7 volumes, \$15. Excellent condition. Stanley March, 1019 N. Liberty St., New Castle, Pa.

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**FOR SALE**—Hallicrafter S38, practically new, schematic diagram, \$30. Louis T. Pignatello, 2015 Bergen St., Brooklyn 33, N. Y.

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**FOR SALE**—A complete radio shop, including test equip., tubes stock, etc. Write for price list. W. R. O'Neal, 246 Wine St., Mullins, S. C.

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**FOR SALE**—Mixed lots of new resistors and capacitors, 144 for \$2; Aluminum chassis and panels made to order, finished in black crackle; Any British type valves obtained and supplied at list prices. James S. Kendall, 133 Osmaaston Rd., Harborne, Birmingham 17, England.

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**WANTED**—Records for Edison Victorola. State price each. Donat A. Duquet, 10 Monument St., Waterville, Maine.

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**FOR SALE**—Tubes, vibrators, transformers, IRC resistor and volume control kits and other parts. Send for list. Davidson Gas and Electric, Osage, Iowa.

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**SELL OR SWAP**—5" television set, complete with tubes and cabinet, best offer over \$50. Also 3" television set, best offer over \$28. Both in working condition. Can use 8mm projector or film. L. Freedman, 2064 Ocean Parkway, Brooklyn, N. Y.

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**FOR SALE**—Converted BC-348R, repaneled, built in power supply and S meter. Best offer takes it. Ralph Moorhouse, 915 Park Ave., Pekin, Ill.

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**SELL OR TRADE**—Cinemaster II 8mm camera, f3.5 lens, lens shade, six filters, \$40 cash. Or take mixer changer phono. or good used typewriter. All letters answered. Marvin Sussman, 1611 Park Rd. N. W., Washington, D. C.

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**FOR SALE**—Stancor 20 watt phone-cw-xmitter, with built in power supply, modulator, coils, and xtals for 80-20 and 10 meters, \$25. Also several Simpson model 230 VOM at \$10 each. C. L. Pflueger, 2305 Thayer St., Evanston, Ill.

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**SELL OR SWAP**—50 watt cw xmitter, coils and xtals for 80 and 40, less power supply, \$50. Also National SW3 rec, 6 sets coils and power supply, \$30. C. C. Erhardt, 84-53 Dana Court, Rego Park, N. Y.

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**FOR SALE**—Simpson model 390 volt-amp-wattmeter, brand new, for testing all electrical and radio equip.. List \$39., my price \$30. Leatherette case, \$3.75. Philip More, 4,800 N. Lawndale Ave., Chicago 25, Ill.

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**FOR SALE**—Precision tube tester, model 912, practically new; McMurdo Silver "905 Sparx" sig. tracer; Philco 077 sig. gen.; CA 10 Superior sig. tracer. Butler C. Clave, Route No. 2 Box 80B, Petoskey, Mich.

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**SALE OR TRADE**—Precision model 80, VOM, new; Jackson model 634 tube tester; Philco model 088 sig. gen.; Sprayberry Academy of Radio course; Condenser-resistor, substitution box; condenser-voltage tester. John Palencak, 302 E. Genesee St., Flint 5, Mich.

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**FOR SALE**—BC-348-M rec. converted to 110V. Like new condition. Make offer. Greg Maurer, 221 Dahill Rd., Brooklyn, N. Y.

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**FOR SALE OR SWAP**—Kirsten automatic pilot for small yacht, demonstrator model, never used, value \$400. Will trade for full set Riders manuals and good test equip of equal value, or what have you? C. R. Maduell, Jr., 5650 Ada Pl, New Orleans, La.

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**FOR SALE**—Pressure Queen air compressor, with 15' hose, spray gun, 1/2hp motor, guaranteed, \$109.95. FOB. N. Nichols, Box 582, Ithaca, N. Y.

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**WANTED**—Copy of Army or Navy Radar Electronic Fundamentals. Will pay cash or swap you radio parts and T.M.'s Geo. M. Underberger, 2086 W. 20th St., Long Beach 10, Calif.

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**FOR SALE OR TRADE**—Philco home recorder unit, model HR-1, complete with crystal microphone, hardware, connecting cables, and instructions. New in orig. carton, \$15. Or what have you? P. E. Henninger, 700 Stockton Circle, Ridley Park, Pa.

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**FOR SALE**—Test-Rite model B-45 sig. gen., good condition, \$20; O.K. "60" model gasoline engine, \$10. D. H. Ebert, 5525 N. Parkside Ave., Chicago 30, Ill.

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**FOR SALE**—Brand new U. S. Army BC-454 rec., 3-6mc., complete with 110V AC power supply, \$12. Also Jensen 8" speaker, P8-S, \$5. Robert Flory, 29 Harold Ave., Princeton, N. J.

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**SALE OR TRADE**—90 watt amplifier; power and output transformers; radio tubes; parts and magazines; German camera; American watch, 21 jewel. Want phono. radio combination, Lionel and A. F. O and HO gauge equip. Wm. A. Wal-lenbecker, 28 Washington St., La Grange, Ill.

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**SWAP**—V-M "400" record changer and Weston "695" DB meter. Want Halli-crafter's "S-20-R" rec. in fair condition. E. E. Gooch, Brilliant, Ohio.

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**FOR SALE**—Over 1,000 radio tubes, re-sistors, condensers, and new stock. Clos-ing out radio parts and service shop. Very reasonable. Send for list. H. Hat-field, Jr., 3 Continental Place, Glen Cove, L. I., N. Y.

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**SWAP**—3-A Autographic Kodak Jr., uses 122 roll film; 5 x 7 print frame; 5 x 7 trays; print tongs; Elwood 227 and 35mm enlargers. Want good meter and AC generator. Thomas Rohland, Martins-ville, Ind.

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**FOR SALE OR TRADE**—I.C.S. Electrical course, twelve divisions. Covers funda-mental electrical instruction, wiring buildings, signals, motor repair, etc. Also have I.C.S. Principles of Account-ing, two large volumes. Mary Holman Grimes, Route 4, Leban, Mo.

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**FOR SALE**—Modern Radio Servicing and Radio Trouble Shooters Handbook by Ghirardi, \$4 ea.; 1926-1938 Diagrams by Supreme Publishing Co., \$2; Rider's Servicing Rec. by Resistance Measure-ments, \$1.50. Also Meters at Work, \$1.50. Better Radio Service, 1601 Williams St., McKeesport, Pa.

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**SELL OR SWAP**—Vol 1 and 2 of Sam's Photofacts in bound volumes, \$25 COD. Or swap for Rider 1, 2, 3. Cleo Zarella, 2 No. Quincy St., Brockton 11, Mass.

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**FOR SALE**—Model 203 Hickok electronic volt-ohm-capacity tester. Practically new, perfect, guaranteed, orig. carton, with instruction book and test leads, \$65 express collect. Benny's Radio Shop, 411 Arcadia Ave., Arcadia, Florida.

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**SELL OR TRADE**—BC-375 100 watt G.E. xmitter complete with all tuning units and dynamotor, \$30. RCA Junior Veloc-ity Microphone with floor stand. All chrome plated, \$23.50. R. S. Bond, 2637 Westminister Ave., Dallas 5, Texas.

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**FOR SALE**—Amateur station: Rec. 111-15,000kc., \$27.50; Spare set of tubes, \$10; Xmitter 150 watts complete, \$45; Xmitter-rec. with 110V power supply, \$40; Spare tubes set only \$18. Not war surplus. C. Karlson, 3150 S. Atlanta Rd. Camden 4, N. J.

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**WANTED**—Veteran with three years service with the Air Forces, (Now holds first class radio telephone and restricted telegraph licenses) desires interesting well paying position anywhere in the world. Jack A. Johnson, Johnson Electronic Service, Delton, Mich.

**TRADE**—Motorola push button Golden Voice auto radio, 1938 model in excell. condition. Want test equip., meters, or what have you? Mike Bernat, 1254 E. 59th St., Cleveland 3, Ohio.

**WANTED**—Diagrams for aircraft xmitter BC-458-A5 .3-7MC to work on 110-125V AC 60 cycles. Will pay price wanted. C. Y. Edwards, McKenzie, Dem. River, British Guiana, So. America.

**SELL OR TRADE**—Two Spalding Tennis racquets, new condition, with presses, \$19 each, or trade one or both for complete low power ham xmitter, or other test equip. C. J. Schlegel, Ward 110, U.S.N.H., St. Albans, L. I., N. Y.

**FOR SALE**—Model 70 Motorola, universal fit auto radio in A-1 condition, \$35. Paul Capito, 637 W. 21st, Erie, Pa.

**FOR SALE**—Up to 600 pieces 100 watt Hexicon Soldering Irons, made for 12V AC or DC. A bargain at \$1.30 each. Blan, 64 Dey St., New York City.

**FOR SALE**—Presto K-8 portable recorder, playback, P.A. system, dual speed, new condition. Also Nelson automatic record changer, Philco 026 VOM, Solar QCA, Brush microphone. Send for equip. list and prices. James Hill, Box 298, Hudson, Ohio.

**FOR SALE**—120 watt 6 stage amplifier in deluxe steel cabinet, Thordarson "CHT" components, inputs—3 mike 1 phono. Best offer takes. Also U.T.C. LVM13 Varimatch line transformer, \$15, and 4 Rola G12 25W speakers, 2,500 ohm fields, \$30. E. B. Leibe Sound Service, Pleasant Valley, New York.

**FOR SALE**—Radio test instruments, tools Rider Manuals, tubes and parts. M. Wales, Box 311, RFD No. 1, Virginia Beach, Va.

**FOR SALE**—NC-57 National amateur SW rec. Coverage from 540kc. to 55mc., with tubes, pair surplus phones with Mallory phone plug, radio amateur call book. Everything brand new. All for \$81.50. Paul William Sabo, 1631 North 47 Street, E. St. Louis, Ill.

**FOR SALE**—12B8 and 25B8 tubes, brand new, \$2.49 each, 10 for \$22.50. Tubes and parts 60 to 80% off. Write for free bargain catalog. Commercial Radio, 36 Brattle St., Boston 8, Mass.

**WANTED**—Late model tube checker. Have for trade: Latest Deforest 120 lesson course with questions and answers; RCP model 705 sig. gen.; 1 to 10 Sam's Photofacts; Supreme 1941-42 books. G. H. Swiska, 109 E. School St., Woonsocket, R. I.

**FOR SALE**—McGraw Hill's Standard Handbook For Electrical Engineers, 6th edition, 2,800 pages, well bound, and in excellent condition. F. Miller, 24 Bonsall Ave., Aldan, Pa.

**SALE OR TRADE**—Brush PL-20 pickup, \$23; Brush spare cartridge, \$5; Langevin 300A output transformer, \$25; G.E. FM tuner 50mc Armstrong, \$30; Miller tuner, \$55; Western Elec. "Saltshaker" mike, \$60. Want AM-FM tuner. A. J. Avis, 312 Stowell Ave., Sunnyvale, California.

**FOR SALE**—ATR type 6 inverter. Input 6V DC, output 115 volts 60 cycles AC, 85W., \$16 plus postage. Sent COD. Also several used radios, need repairs. Richard N. South, Revere, Mo.

**FOR SALE**—Nine volumes (1922-1930) of the Transactions of the American Institute of Electrical Engineers. Make offer. J. E. Sunderlin, P.O. Box 1721, Phoenix, Arizona.

**SELL OR TRADE**—Set of Low-Pass, Band-Pass, and High-Pass audio filters in shielded cases comprising A. C. Shanley's Audio Spectrum Control System. Used for full range tone control in audio amplifiers. Circuit furnished. Paul Shultz, 525 Wilson, Manchester, N. H.

**FOR SALE**—Set of Dietzgen Commander drawing instruments, accessories. Also Radio Theory Books. K. M. Crow, 800 Arcadia Ave., Winston-Salem 6, N. C.

**FOR SALE**—Used radio tubes, test perfect. 1 ea. 1A4, 1B5, 1E5, 1E7, 32, 33, 34. 2 ea. 1C6, 1H6, 19. 4 ea. 1C7, 1J6. 5 1D5's. 6 ea. 1H4, 15. 7 30's. 25c each. MacRabie's Radio, Franklin, N. Y.

**FOR SALE**—ICA Deluxe Signatone, perfect condition, complete with tube and self contained speaker, \$8 postpaid in original carton. Richard Winkelman, RFD No. 1, Box 36-A, Placerville, Calif.

**FOR SALE**—Radios: G.E. table model, \$24; Fada, \$23; Fada portable with batteries, \$45; 1948 Philco portable phonograph, \$45. Ernest Cook, So. Fallsburg, N. Y.

**FOR SALE**—Hammarlund condensers, transformers, and Jefferson grid transformer, 50c each. United LS-50 output transformer, \$1.50. D. Pommiss, 401 Schenectady Ave., Brooklyn, N. Y.

**FOR SALE**—Hewlett Packard laboratory type Audio oscillator, 20 to 200,000 cycles, model 200C, \$75; RCA 3" oscilloscope, model 155, \$60. Both for \$125. Will ship express prepaid within 100 miles of Wash. D. C., otherwise collect. Richard F. Settle, 2946 Carlton Ave. N. E. Washington 18, D. C.

**FOR SALE**—Sound system. 7 tube high fidelity amplifier, complete. Record changer, floor mike, recorder, etc. Reasonable. Community Radio Service, Washington Block, Aitkin, Minn.

**SALE OR TRADE**—One 7P6 power unit for model 70 Majestic, in perfect condition. Write Gray's Radio Service, 1111 South St., Vicksburg, Miss.

**FOR SALE**—5STN Philcophone 4 tubes, 10 STN Belfone Master unit, new; \$15 ea. both for \$25. Want 2 ea. of following tubes: 1SA6, 1SB6, 25B8 and 12B8. Fisher Radio and Appliance Service, 1385 H St., N. E. Washington 2, D. C.

**FOR SALE**—Used television rec. and FM rec., 5" or 7" tube can be used. 2,200V power supply, 24 tubes, 2 new 5" tubes supplied, with schematic, less cabinet. Best offer takes. M. S. Dippel, 74 Sussex Rd., Tenafly, N. J.

**FOR SALE**—Used radio parts for sets dating back to 1924. Speakers, var. condensers, power packs, good used tubes, etc. Very cheap. Dan's Radio Service, 623½ Wallis Ave., Farrell, Pa.

**WANTED**—Sonora phono record No. H7034A. State condition and price. Also have Nilson Radio course for sale. 13 volumes, perfect, cost \$100. Make offer. R. Bost, Poplar Bluff, Mo.

**WANTED**—Rider Manuals, Vol 10 to 14. Have Sam's Photofacts sets 1 to 8 at \$1 per set; Audel's Radioman's Guide, \$4; Audel's Refrigeration Guide, \$4. Both new. Fred M. Merrill, Callicoon, N. Y.

**FOR SALE**—Proceedings of I.R.E., paper bound, complete Jan. 1918 to date, 75c per issue as an entirety. J. W. Schmied, 463 West St., New York 14, N. Y.

**FOR SALE**—50L6, 12SA7, 35Z5, 12SK7 and 3S4 radio tubes, all new first quality, 95c each post paid. Jones Radio Co., Box 93, Douglassville, Pa.

**SELL OR TRADE**—Graphic Instrument, 45 to 55 cycles, by Esterline-Angus; National 100, A.S.D. rec. and spare parts kit; Espez tube and set tester; G.R. UHF Laboratory sig. gen., 8 to 330mcs. Want motor scooter or cycle. Ben Mueller, 736 Rittenhouse St., N. W. Washington 11, D. C.

**WANTED**—Tape puller. Reasonable replies will be given consideration. Please specify power supply. Lester Block, 317 Pulaski St., Brooklyn 6, N. Y.

**FOR SALE**—Command set xmitters, tubes, crystals, 3-4 and 7-9.1 megacycles, new or used; Rec. 190-550kc, tubes dynamotor, used; BC221 freq. meter, metal case; Gross ultraphone UHP-2 two meter xmitter rec., complete. Howard Severeid, 2924 Station St., Indianapolis 18, Ind.

**FOR SALE**—Six University Industrial paging speakers, model 1B8, 12 watts, directional reflex horns with mounts. Practically new. Harvey E. Bair, R.D. No. 1 Coplay, Pa.

**WANTED**—One or more Viewtone 7" television sets, with or without cabinets, at a fair price. Princess Pat Radio, 241-B 18th Lane, Brooklyn 12, N. Y.

**FOR SALE**—Presto model J portable recorder. 78 rpm, outside in cut, crystal astatic playback arm, Sure 705A mike and floor stand included, \$140. Reese Thompson, 709 Jackson, Pueblo, Col.

**FOR SALE**—Aluminum tubing. 15/16" OD, 7/8" ID, excellent for antennas, 6 to 10' lengths. New BC458A 5-7.3mc VFO, remote tuner with pushbuttons, works on any make broadcast set. I. Zambakian, 349 Belleville Ave., Bloomfield, N. J.

**FOR SALE**—New Mark II B-19 tank set. Rec. and 25 watt phone cw/mcw xmitter 2-8mc. In same unit, 235mc transceiver, complete with dynamotor in cabinet, ant. tuner, mike, phones, ant. for hi-freq, and cables. Want concrete block maker. Eddie Howell, Gen. Delivery, Gastonia, N. C.

**FOR SALE**—One 35 watt reflex speaker, used only very short time, 8 ohm voice coil. \$25. E. D. Blackorby, Novinger, Mo.

**TRADE**—Millen 5" oscilloscope Bezel assembly (complete) and a 5BP1 for the Millen 3" Bezel and a 3BP1 plus \$1. Lary Klein, 141-28 70th Ave., Flushing, N. Y.

**WANTED**—Vertical phono reproducer. Have a Audak lateral L17 with arm set for 16" disks, also a Brush Plao. Martin Malitsch, 707 Fulton St., Brooklyn 17, N. Y.

**WANTED**—BC-412-A or B oscilloscope complete, in good operating condition, and at lowest fair price. State price and condition. D. B. MacGregor, 2576 Kemper Rd., Box 20, Shaker Hts. 20, Ohio.

**WANTED**—1847 iconoscope, state condition and price. Have RCA 810's, 24TG's, 5" green trace cathode ray tubes, or what do you need? B. W. Southwell, Box 861, Dixon, California.

**FOR SALE**—Radio repair business, within 5 minutes walk of Miami University. Ideal setup for part time business. Present owner making living and college expenses. \$2,500. A. Donn Cobb, 9 West High, Oxford, Ohio.

**FOR SALE**—Complete Radio course and magazines. Also a set of technical books. List on request. Charles W. Schrubbs, 1128 So. Cottage St., Meadville, Pa.

**FOR SALE**—Radio tubes, \$1 each. Send for list. Greene Radio Shop, 116 West North St., Kinston, N. C.

**FOR SALE**—Hallicrafter Dual Diversity, 25 tube rec., model DD-1, complete. A deluxe all-band custom built professional rec., guaranteed perfect. Cost \$750., best offer. A. L. Stratton, 443 Saratoga Rd., Schenectady, N. Y.

**FOR SALE**—S-20-R rec., post war, including extra 10" PM speaker and new headphones. In excellent condition, used very little, \$60. Philip K. White, 943 Jones Dr. Salem, Ohio.

**SALE OR TRADE**—Hewlett-Packard audio oscillator, model 200-B. Best cash offer, or what will you swap. A Vlassek, 2611 Clinton Ave., Berwyn, Ill.

**SELL OR TRADE**—Sears Roebuck motor, 1/4hp, 1750rpm, 110V, \$15. Cash or the C.A. 11 sig. tracer. Need not have batteries but must be in good working condition. Bill Selley, 340 Main St., Keansburg, N. J.

**FOR SALE**—Complete ribbon recorder, with mike, 6 ribbons, and all attachments, \$225. Like new. Peter F. Kopp, 228-6th Ave., S. W., Mandan, N. D.

**FOR SALE**—Supreme Publications Manuals and Books; Rosenbergs Electric Motor Repair book; Atwater Kent, model 82, just overhauled. All items cheap. Milan Rafayko, 355 N. Limestone, Lexington, Ky.

**FOR SALE**—BC412B oscilloscope, complete with tubes and cathode ray tube, \$38. Edward C. Dobson, Oliver St., Central Park, N. J.

**FOR SALE**—Capehart audio amplifier, 20 watt, two 12" Capehart speakers, dual tone control, new tubes, new filter condensers, \$130. David Craig, 12 Vine St., Rochester, N. Y.

**FOR SALE**—Supreme 599-A tube and set tester in A-1 condition, 100 assorted new tubes, resistors, condensers, and transformers. All for \$100, or will sell separately. All letters answered with list. N. A. Contos, 237 Water St., Newburyport, Mass.

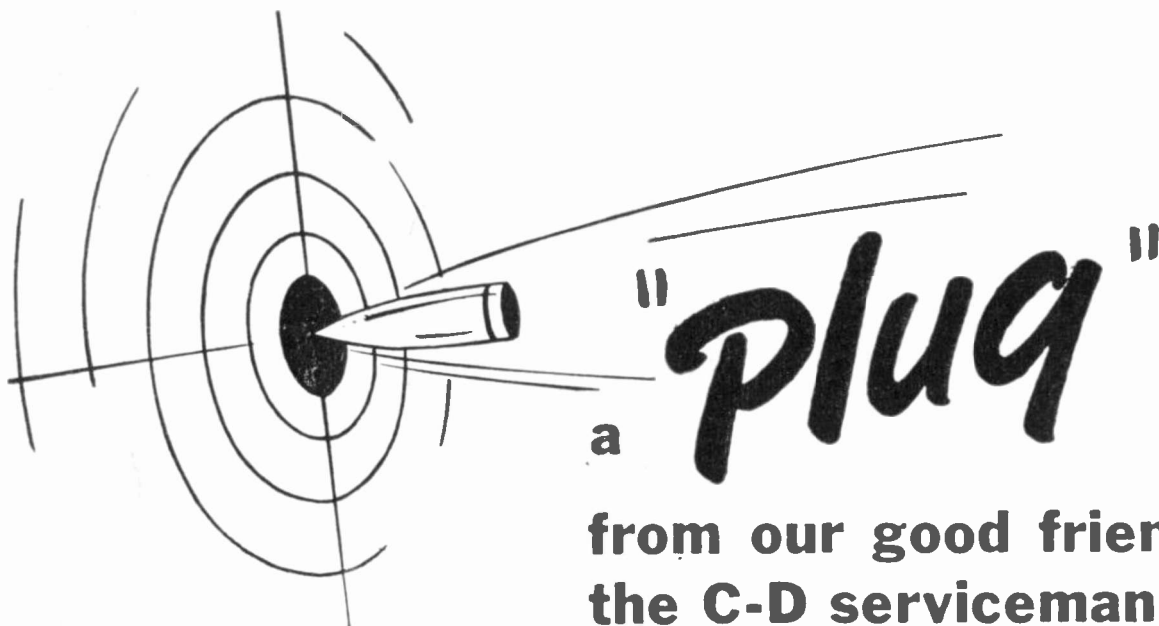
**SELL OR TRADE**—15 watt PA system. Consisting of amplifier, 12" dynamic speaker in portable case, crystal mike, mike floor stand, prewar V.M. 2 post changer, \$50. Or what have you? Mac Kellman, 304 Garfield Pl., Brooklyn 15, N. Y.

**WANTED**—Antenna coupler, part No. 00-14759 for Arvin car radio model 29. Also Phantom Filter, part No. 00-16989 for Arvin car radio model 520. Edmund Griglak, 1221 Washington St., Farrell, Pa.

**SELL OR TRADE**—RCA tube tester, modernized No. 156, \$20; Rider's Manual No. 1. Want all Rider's Manuals above No. 4, and Hickok No. 203 or 209. H. Love, 20108 Detroit Rd., Rocky River 16, Ohio.

**TRADE**—Entire amateur radio station, including RME 69 rec., Meissner sig. shifter, 250 watt 20 meter fone rig, 40 CW rig 70 watts, SCR522 converted 8 element beam. Want good television rec. Ted Trummess, 53 S. Bedford Rd., Mt. Kisco, N. Y.

**FOR SALE**—Precision tube and set tester 654P, Jackson oscillator 640, Electronic Volt-Ohmmeter 29, Solar Capacitor Analyzer CE 1-60, all in perfect condition and subject to your inspection. Also Supreme Manuals 1926 thru 1942. Joseph Truce, Aurora, Ohio.



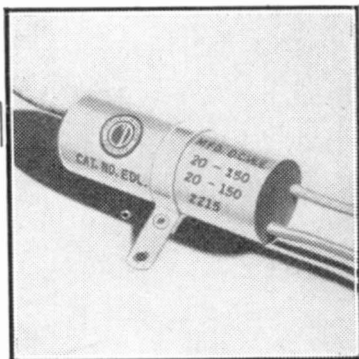
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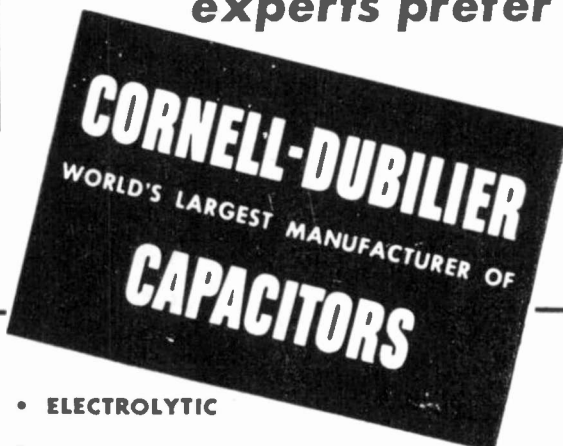


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