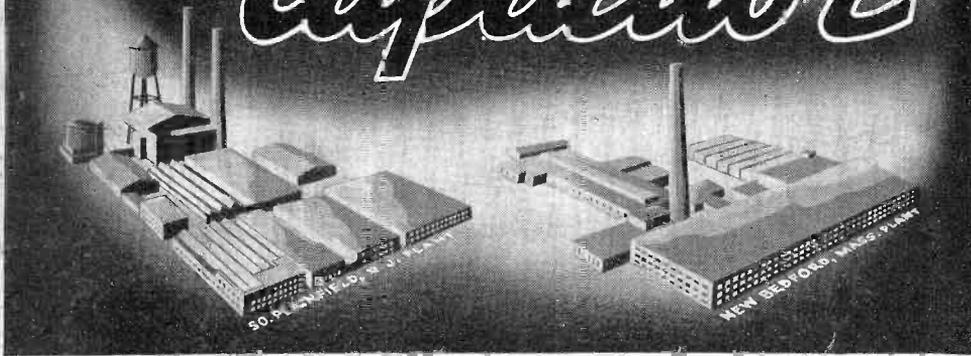


The CORNELL-DUBILIER **CD** *Capacitor*



Vol. 5

DECEMBER, 1941

No. 12

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

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RADIO SERVICE HINTS

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

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

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 Unpublished items will not be returned.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

Arvin Car-Radio Model 510

If "vibrator hash" trouble occurs in this set or similar types of auto radio sets check for poor ground at the gang variable condenser. This proved to be the cause of the trouble in several cases in sets brought into our shop for repair.

A short length of braided wire soldered from the gang condenser to the chassis will reduce the "hash" to a minimum if not completely eliminate it. We have found this trouble more prevalent in the newer models of this set.—*B. Waters, Oneida, Tenn.*

Replacing 12-Volt Tubes

In all sets using 12 volt tubes in series be sure to measure the filament voltage of each individual tube!

Replacing a burnt out 12SK7 tube in an a.c.-d.c. set resulted in the following filament voltages: 12SA7—8.9 volts, 12SK7—16, 12SQ7—8.3, 35-Z5GT—36.6, 50L6GT—51.2. Replacing the 12SA7 brought the filament voltage of that tube up to 9.9 volts; replacing all the 12 volt tubes resulted in normal voltages and better sensitivity.

At our shop this trick has prevented the return of repaired radios for another tube in 2 to 4 weeks time.—*Herbert C. Frosell, Cobleskill, N. Y.*

Slipping Dial Cords

Melt a small piece of artgum, (soft eraser) in a candle flame and apply the liquid to a dial cord while hot. This will permanently cure tendency toward slippage of radio dial cords. Usually, only one wheel of the system offers trouble and the treatment may be limited to that section of the cord which passes over that wheel. Running the pointer over the entire scale several times will completely saturate the desired portion.

Another liquid which can be used on dial cords is rubber cement such as shoe makers employ on heels of shoes to affix new rubber heels. When thoroughly dry this liquid forms a thin coating of rubber on the cord.—*Alan T. Brennan, New York, N. Y.*

RCA Model 46X3

Here is an unusual condition which occurred in this set which took considerable time to locate. This trouble is the set stops playing after a short time and breaks into a steady oscillating signal which changes pitch as the tuning condenser is rotated.

The remedy for this trouble, the writer found in this case, was to replace capacitor C-12, as indicated in R.C.A. circuit data sheet. The capacity of this capacitor is .05 mfd.—*Charles H. Davis, Hartford, Conn.*

GT Tube Shields

The increasing difficulty of obtaining aluminum tube shields for "GT" bantam tubes should in no way affect service requirements of the serviceman who saves his old and discarded can-type electrolytic capacitors in 1 $\frac{3}{8}$ " and 1 $\frac{1}{2}$ " dia. cans.

Shields for these small tubes can easily be made by cutting off the capacitor cans at the terminal end and removing the capacitor unit. The cans should be cleaned thoroughly and a few holes punched at the top for vents. The regular ring-type capacitor mounting hardware can be used to hold the shield on the chassis and fastened by means of the screws of the tube socket. Where the tube to be shielded has a grid cap the top of the can should be drilled in the center to admit it.—*Frederick Breidbart, Brooklyn, N. Y.*

Service Inspection Mirror

Radio servicemen welcome any trouble tracing idea which will aid in the repair of sets. In small midgets and compact auto radios most inspection work is made under the chassis. Service suggestions recommend the use of a dental mirror as visual aid for this work, but dental mirrors are made with the small mirror fixed to the handle at one angle.

The writer, however, obtained a dental mirror at a local drug store which has its small mirror hinged to the handle which permits inspection at any desired angle. Any standard dental mirror can easily be remodeled this way by removing the mirror from the handle and attaching a home made hinge arrangement.—*James R. Limbeck, Glendale, Calif.*

Midwest Model 18-36

If this set becomes inoperative, check the I.F. transformer preceding the second detector. The B+ voltage dropping resistor and by-pass condenser are located inside the I.F. transformer can. The original resistor is a 5,000 ohm $\frac{1}{4}$ watt unit and under some conditions is too small to carry the high voltages encountered in this set.

Replace with a 5,000 ohm $\frac{1}{2}$ or 1 watt resistor and a .05 Mfd. 600 volt tubular paper type capacitor.—*C. R. Hirsckorn, Buffalo, N. Y.*

Noisy Tubes With Signal Generator

When isolating noisy tubes with a signal generator connected to a set on the bench, it is not always necessary to replace them with new tubes, that is if they test good.

In most cases the writer has found these tubes can be made noiseless again by merely resoldering the top of the grid cap of the noisy tubes. Also inspect soldered connections at the end of tube prongs and carefully resolder and clean them with emery cloth. A little extra time and patience in careful repairs of this kind on radio tubes will pay the serviceman dividends.—*Norman E. Nelson, Mayville, N. Dak.*

Reverse Loop Leads

A detail which many servicemen may overlook in super-het type sets of various models is the connections at loop antenna.

After a considerable amount of checking to find the cause of whistling on the high and low frequency ends of the dial of an RCA model K80 set the trouble was finally traced to reversed leads at the plugs. Sets employing plugs are often reversed in error after making inspection or repairs and seldom suspected as the cause of this trouble.—*Chester E. Drzewiecki, Arnold, Pa.*



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

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

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

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

WANTED—Neon sign "Radio Service."
Will pay cash or swap for good used radio tubes. Acme Hardware, 1692 3rd Ave., New York, N. Y.

POSITION WANTED—Expert radio repair man would like position anywhere in the U.S. Good references, 5 years experience. D. L. Thoreson, Baldwin, Wis.

FOR SALE OR TRADE—Radio course, tube tester, C B signal generator, and other testing equipment and radio books and Rider's Manuals 9 and 10. Wesley Kay, 129 N. W. 32nd St., Miami, Fla.

FOR SALE—Rider Manuals 1 to 11 inclusive, Rider chanalyst, Supreme 189 oscillator, Precision 860 v. ohmmeter, Jackson 636 tube tester, Hickock OA5 frequency modulator, and a Solar condenser analyzer. L. T. Boege, 203 Main, Cedar Falls, Iowa.

FOR TRADE—Majestic model 460-A power transformer, R.C.A. model 46 power transformer, I.R.C. resistance indicator—range 0-100,000 ohms, 2 new Sylvania type 26 tubes in original cartons, R.C.A. model 46 speaker cone and field coil, 1 mag. Centralab volume control (new). H. R. Lauffer, R.D. 3, Box 261-B, Greensburg, Pa.

WANTED—Some late test equipment, will pay cash. State condition and price. Jackson or Hickock preferred. Also meters, Radio Parts, 109 S. Second St., Rockford, Ill.

WANTED—Two 12" P.M.—6 ohm voice coil speakers. State price and condition. Henry Hoffman, Jr., 229 Fairmount Ave., Newark, N. J.

FOR TRADE—Complete U.E.I. refrigeration course, Gernsback's Official Air Conditioning Manual, 10 or 15 individual refrigeration manuals. Want Rider's Manuals or radio test instruments. John W. Rains, 1409 E. Greenwood Ave., Nashville, Tenn.

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

FOR SALE OR SWAP—\$95.00 studio type Rembler microphone, condenser type. Heavy 25 ft. cord. Floor stand has two stages, 864, pre-amplifier built in. Can be used on batteries or a.c. supply. Best cash offer or what have you. R. N. Eubank, 1227 Windsor Ave., Richmond, Va.

WANTED—40 meter crystal with holder. Will pay cash or trade. Abe Ringel, 1254 Wheeler Ave., Bronx Boro, N. Y.

FOR SALE—Rider's Manuals 3, 4, 5, and 6 with index. All like new—\$18. Anderson's Radio Service, 431 Garden City Dr., Syracuse, N. Y.

WANTED—Tungar bulb battery charger, for 6 volt batteries. Capable of charging at least 2 batteries at a time. State name, size, and price. Anderson Radio Service, 431 Garden City Dr., Syracuse, N. Y.

WANTED—Set of mechanical drawing instruments. Will pay \$4.50 for A-1 condition. Monroe E. Barto, 1117 Birch St., Reading, Pa.

(Continued on page 9)

SPEEDY SERVICING *

THE ability to go places faster and do things quicker. The keynote of a war-crazed world.

An absolute necessity in the successful management of a modern competitive business.

And—radio servicing is a modern competitive business!

The need for speed in radio servicing has long been recognized by those who have seen a volume of radio business move through the larger shops. Since the debut of the small midgets, a majority of all servicing has been of this type. For years the question has been, "How are we going to make money servicing midgets?" The answer is and always has been—turn out more of them!

How?

This statement brings on the natural question—HOW? And, the answer to this one-word inquiry requires careful attention and consideration.

Looking at the rosy side of the picture, there are several things in favor of the midget. First, it is usually brought in by the customer, thereby eliminating the necessity of making a call. Few servicemen realize what it costs them to make calls. Besides the actual time lost, there is the question of automobile expense. It costs money to sit and wait on a red light, and it is your time that is wasted when you stand in the doorway and listen to a customer jabber about something that doesn't mean a thing to you. It is almost impossible to charge enough for service calls to break even on them.

Second, since the customer brings the set in, he usually returns for it, and it is a well-known fact that customers pay better when they come to the shop for their sets. The more cash business a serviceman can get, the less time he has to spend in book-keeping and collecting. And, it might be mentioned that getting the customer into the store or shop affords the alert serviceman an opportunity to show or sell him additional merchandise.

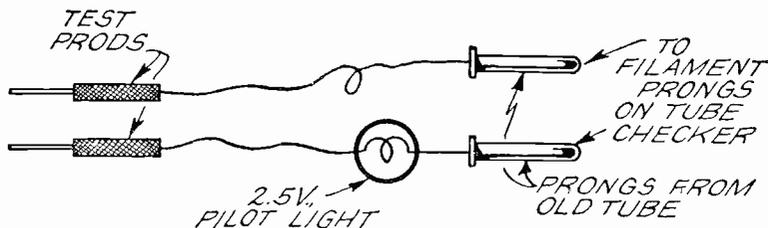
Getting right down to technicalities, the little sets are far easier to service than the big sets—that is, if you know your stuff!

All servicemen will agree, I think, that in the majority of cases defective tubes are the cause of midget set failure. In a majority of these cases, it is the power tube. In approximately half of the power tube cases there is filter condenser trouble.

Accordingly a simple routine for servicing midgets is to first check the tubes. Since tube failure is practically always caused by open filaments, if some simple means is used to check filaments without the necessity of placing each tube in a checker and waiting for it to heat, considerable time can be saved. There are several ways to do this, the simplest being to utilize the ohmmeter. If a low scale is used open filaments can usually be detected without removing the tube from the socket. However, occasionally the circuit will afford a round-about reading that is misleading. A simple gadget for checking filaments quickly can be rigged up with the aid of an old tube-checker. A pair of test leads are rigged with

* By Harold Davis in "Radio-Craft."

tube prongs on one end so that they can be inserted in the filament positions of one of the sockets on the tube checker (Fig. 1). A pilot lamp of the 2.5 volt variety is wired in series. The proper voltage is fed from the tube-checker through the pilot lamp and to the tube as the test prods are touched across the filaments. If the filament of the tube being tested is out, the pilot lamp will not burn or will burn very dimly.



~FIG.1~ ADJUST VOLTAGE TO CORRESPOND TO TUBE BEING TESTED WITH FILAMENT ADJUSTER SWITCH ON TUBE CHECKER.

"Filter Condenser" Troubles

On midget sets, filter condensers are found open more often than shorted! If the power tube is okay but voltage is low or insufficient to read, one or both of the filters are usually open or have lost their capacity. All servicemen are accustomed to placing another filter across the various sections to locate the defective one. This is usually a tedious job, between trying to make connection and keep from getting shocked. However, if a few minutes are given to installing a series of condensers with a switching arrangement in a box which has provisions for plugging in a pair of test leads, not only will this job be speeded up, from the standpoint of locating the proper condenser, but also in determining the proper value to use in the replacement (Fig. 2).

A few precautions are in order here. If one section of the pack only is

replaced, the other should be checked thoroughly for both leakage and capacity. The section replaced should always be removed from the circuit as defective low-capacity condensers are low power factor, and cause an unnecessary drain on the circuit, even if they do not become heated and short.

Some servicemen are of the opinion that the only requirement for the replacement of a filter is to get

enough capacity. This is not always correct, especially in the case of close cathode rectifiers such as the 25Z6 and 6X5. If too high capacity condensers are used immediately following these types, the condensers can pull enough current on quick charges such as occurs when the set is turned off and on rapidly or during line interruptions, to completely melt the cathode. This is what happens when a filter shorts and often happens when the serviceman shorts around in the set with a screwdriver to see if he has any voltage.

However, it is safe to use 16-20 mf. and if this amount eliminates the hum, no increase should be made unless the proper value is known.

Other common defects with the little "midget" sets are the general run of trouble, shorted bi-passes, open fields and output transformers and I-F's. However, these troubles are scattered and easily isolated.

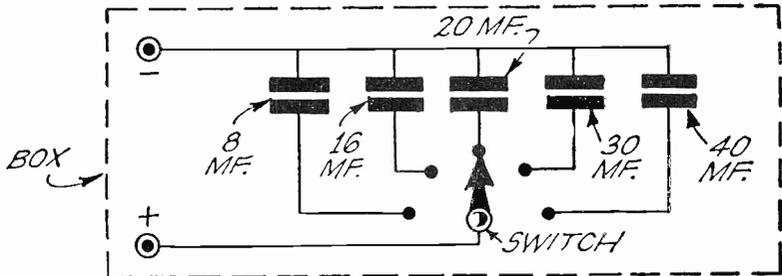
Alignment

Very frequently the serviceman will neglect aligning the "little fellows," because he does not feel justified in wasting the required time to do the job right. Excellent alignment can be obtained in only a few minutes with the following procedure. Connect the oscillator to the antenna and ground connection through a 100,000 ohm resistor or .0001 or .00025 mf.

the set. Such a loop is easily made by winding a few turns of wire on four nails correctly spaced on a piece of plywood, and will serve for testing practically all loop sets.

Speeding Up the Intermittents

Nothing slows up service work more than intermittents. And there is no known system that will solve intermittents consistently. The busy



~FIG. 2~ "QUICK TEST" CONDENSER BOX.

condenser. Feed in an I-F signal and stop the oscillator by placing a finger on the oscillator section of the tuning condenser. This stopping of the oscillator is not always necessary but is advisable. Adjust I-F's to maximum signal with set volume control "wide open" but oscillator turned down to where the signal is barely audible. If a low signal is used, the set can be peaked by ear, without hooking up an output meter.

When the I-F's have been aligned, the R.F. and Oscillator trimmers can be adjusted by switching the signal generator to 1400 kc. or by removing it entirely and tuning in a weak signal in the vicinity of 1400 kc. The latter method is preferred.

Loop Sets: On sets using loops as both antenna and antenna transformer, coupling is best accomplished by feeding the signal generator into a loop of similar size and number of turns, and holding this loop near the one in

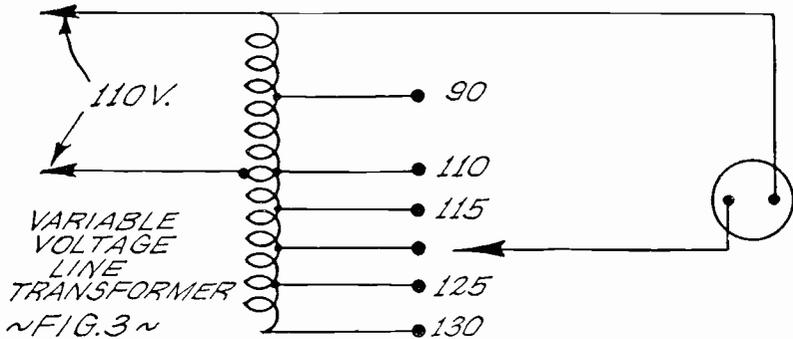
service man can save himself much trouble and time by proceeding cautiously when he is called to service an intermittent receiver. If the set is cutting out only occasionally and if there is nothing that can be done to make it cut out, it can best be left alone. The customer should be told to use the set until it quits for good! Many unprofitable hours can be saved, even though it may seem at the time that business is being lost.

If, however, the intermittent is fairly consistent and of a definite nature, it is up to the serviceman to find this trouble in the least possible time. The most successful way to do this that this writer has found is to break the defective part down. This is done by applying high voltage to the parts suspected of causing the trouble.

The best way to do this is to have a power-supply capable of delivering a flash voltage of 800-1000 volts. This

can be probed across condensers, resistors and coils, and while not high enough to short a good condenser or

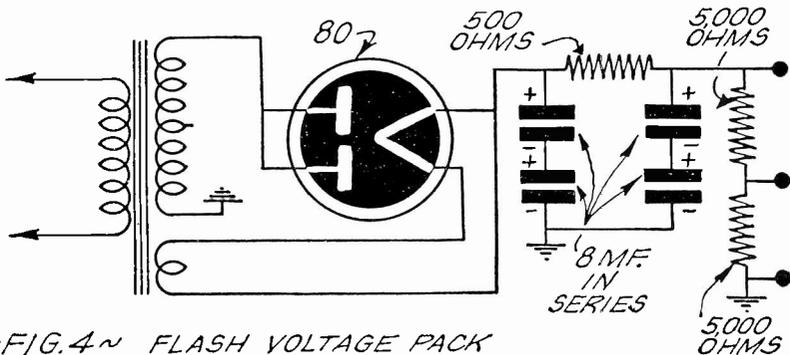
several months have passed it has not returned. No cause for it was ever found.



open a good resistor or winding, will often break down defective parts. In the case of AC-DC sets, the voltage has to be reduced accordingly.

High voltage not only breaks down defective parts, but will also show up loose connections and intermittent grounds. Recently the writer had a Philco 610 that had a scratching noise like a defective output or driver transformer. All ordinary checks revealed nothing. The trouble was isolated

Another case was an RCA that tuned in a station on 850 kc. at 600 on the dial and would pick up nothing on the high frequency end. Hours were spent checking. It was found that the oscillator was far off frequency, but no cause could be established. Finally, the high voltage was applied and an arcing was observed under the tuning condenser. It was found that the bond from the tuning condenser to chassis was



to the plate circuit of the first audio, but a substitute of parts did not clear it up. However, high voltage touched on the plate with the set off, stopped the noise immediately and although

a cold joint. The high voltage arced across, showing it up.

Sets can be operated on the high voltage by removing the power tube and feeding the external high voltage

onto the filament or cathode. When the set becomes good and hot, the intermittent will usually show up.

Some intermittents are allergic to low voltages instead of high. A variable line transformer, Fig. 3, which can be bought for a nominal sum, will serve to vary the line voltage both above and below the normal value. Low voltage will cause a weak oscillator to cut out or it will cause distortion and drifting.

When the set is checked on high voltage it not only raises the D.C. supply, but also increases the filament voltage, causing the tubes to get hotter and thereby breaking down internal shorts, weak filaments and other troubles.

A pack for supplying the high flash voltage is shown in Fig. 4. This is built with parts that can usually be found lying around. The gadget will save many hours, and if used to final check all sets that go through the shop, the number of kick-backs will be reduced to a minimum. The parts lost in the application of the high voltage that might otherwise get by are negligible.

Conserving Skilled Labor

Not only must the modern serviceman apply every known trick to turn out his work faster, but as more and more men are called into the Government service, a conservation of skilled labor is going to be found necessary. This can be done by diverting into the hands of others that part of the service work that does not require technical knowledge. This represents removing sets from cabinets, cleaning, checking tubes, installing parts, etc.

A simple and effective routine is to have the non-skilled man remove the chassis, clean it and check the tubes. He then passes it to the serviceman, who diagnoses the trouble. While the set is being diagnosed, the helper cleans and polishes the cabinet and removes the second chassis. The serviceman passes the diagnosed set

back for the installation of the defective part. While the helper installs the part, the serviceman diagnosis set number 2. He then passes set number 2 to the helper for installation of part, and takes set number 1 for final check. No time is lost and maximum efficiency is obtained from both serviceman and helper.

Careful diagnosis of the job from the standpoint of how long it will take and how much can be realized for it, will save the busy serviceman much time and trouble. Jobs that are not routine should be avoided whenever possible. Or at least they should be on a time plus material basis. The serviceman must get at least \$3.00 per hour for his time and facilities. He should get \$5.00, which is the price charged for work at machine shops, sheet metal shops, etc.

THE RADIO TRADING POST

(Continued from page 4)

WANTED—Set of Rider's Manuals. Have radio parts and apparatus to swap. Please state whether cash or trade. James R. Limbeck, 337 N. Adams St., Glendale, Calif.

WANTED—5,000 ohm per volt a.c.-d.c. volt-ohm milliammeter, also a.c. all wave signal generator. Will pay cash. H. B. Diamond, 1063 E. 8th St., Brooklyn, N. Y.

WANTED—Amplifier, 15 to 30 watts, or turntable, not rim-drive, or what have you in the line of sound system. State price and condition. Bertram P. Beau-
lien, 83 Butler St., Lawrence, Mass.

SALE OR TRADE—Radio parts, test equipment refrigeration tanks and tools, 35 mm. sound and silent projectors, Graphic and Graflex cameras. Want 16 mm. camera and sound projector, microscope, ships bell clock, recorder, and P.M. speakers. Wm. Hansen, R. 3, Niles, Mich.

DRAFTED—Must sell Rider's manuals, 1, 2, 3, and 5, used radio parts, books, and supplies, list on request. Ed's Radio Service, 2868 Woodhill Rd., Cleveland, Ohio.

WANTED—Used signal generator in good condition. State make, model, and price. Earl Russell, Colfax, Ill.

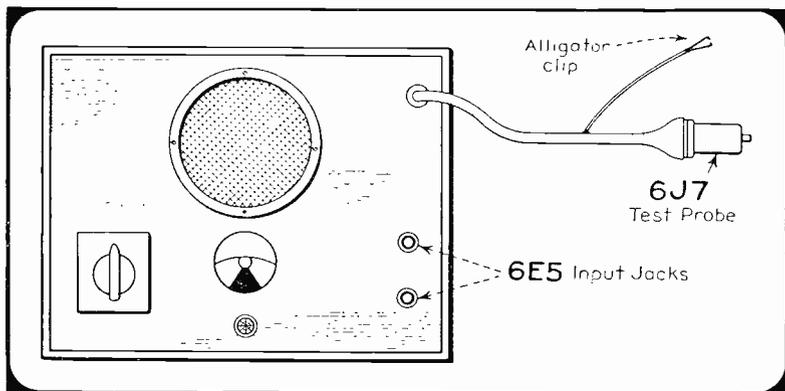
(Continued on page 12)

A-F CIRCUIT TESTER*

THE instrument described in this article is nothing more than an external amplifier arranged so that it may be used conveniently to indicate trouble in audio circuits in radio receivers, amplifiers and electronic equipment. A 6E5 is also provided for checking of the AVC voltages at any point in the receiver without loading the circuit under test.

In spite of the fact that the set operated with the new tube, considerable distortion was present in the signal heard from the loudspeaker. By moving the test probe of the external amplifier to the voice coil of the loudspeaker, the distortion was definitely traced to the speaker itself.

In another instance the trouble in a distorting G. E. GD62 was located in



The 6J7 input tube is used as the test probe for the instrument described in these columns. The device provides a simple, inexpensive testing unit designed to locate trouble in audio stages of receivers and amplifiers.

I have found innumerable uses for the device, on my own bench, and find that it speeds up my work. For example, a G. E. FA80 came in for repairs. The set was inoperative. By connecting the probe to the grid circuits of the 6R7 first audio stage, the receiver's output was heard in the test speaker. This localized the trouble in the audio section of the G. E. receiver. A new 6R7 made the set operate . . . yet this tube checked O. K. in a good tube tester.

the plate to grid coupling condenser, by means of this instrument, in short order.

This checker is particularly useful in tracing the source of hum or distortion throughout receiver or amplifier circuits.

The 6E5 visual indication comes in handy as an output meter (connected to the AVC circuits) during alignment of a receiver's r-f and i-f circuits.

* By Willard Moody in "Service."

THE RADIO TRADING POST

(Continued from page 9)

WANTED—All sorts of telephone equipment—ringer boxes, desk stands, handsets, or what have you? State make, condition, price, model No. and ringer impedance if possible. B. Minnich, 1415 E. River Rd., Minneapolis, Minn.

WANTED—Power or hand operated saw filing machines, saw retoucher and saw setters. Will pay cash or have radio and power plant text books to trade. William E. Barrett, 2828 S. Ninth St., Sheboygan, Wis.

WANTED—Service equipment—3" oscilloscope, tube tester, solar condenser analyzer, chandlyst. Must be in first class condition. State make, model, and price. R. C. Adams, 330 W. 15 St., New York, N. Y.

TRADE OR SELL—420 Triumph tube tester, R.T.L. tube tester, Remington noiseless portable typewriter, 30-30 Winchester, 22 cal. Remington, 2 short wave receivers—30 meters, parts, magazines, etc. Roby's Swapmart, 3569 Cottage Grove Ave., Chicago, Ill.

POSITION WANTED—Young man, 30, citizen, married, high school graduate, 10 years experience in radio service, mechanics, wiring, testing, and assembling radios, transmitters, recording amplifiers, and electronic devices. Desires a permanent connection, willing to start in the layout, assembling, or wiring department and work into the engineering and designing departments. Have a practical knowledge of radio construction, theoretical background. All I ask is a chance to show what I can do. Frederic U. Dillion, 1237 N. Fairfax Ave., Hollywood, Calif.

FOR SALE OR TRADE—240 watt phone 340 watt c-w transmitter using 616-807—pair 812's push-pull with cathode modulation in Parmetal rack—\$125. Also First National Radio and Television Course complete \$89.50. Carl Stello, W31VZ, Beltsville, Md.

WANTED—Instructograph. Will take best offer for cash. C. T. Herndon, Medical Bldg., Gadsden, Ala.

FOR SALE—Model CB-1-60 Solar condenser analyzer—\$12.50, model 85PL Supreme tube checker—\$15., Westinghouse motor 1/6, 1725 R.P.M., single phase, reversible rotation with pulley—\$3.25, neon sign with Hammond electric clock—\$22., Jewell model 579 test panel 7, 5 inch meters—\$40. Anchor Radio Distributing Service, 203 Elm St., Ithaca, N. Y.

WANTED—All issues of QST for 1939 and 1940, and January to August, 1941. New York offers only desired. Ray Vazquez, 20-40 149 St., Whitestone, L. I., N. Y.

FOR SALE OR TRADE—Transmitting, receiving, and vibrator power supplies and parts, A & B eliminators, meters (a.c., d.c., r.f.), neon transformers, P. A. and modulator parts, speakers, x-tals, receiving and transmitting tubes, carbon mike, dry disc rectifiers, Kodak (3A). Write for details. A. Zambakian, 1259 Gaylord, Denver, Colo.

WANTED—Good signal generator for cash. Will sell or trade Wirgin 35 mm. camera, Meyer Goerletz f. 2.9 lens, compur rapid shutter, with case—new. Want other camera. Norman Jacobson, 1117 Gerard Ave., Bronx, N. Y.

SELL OR SWAP—Auto radios, meters, phono turntables, eliminators, S. W. converters, tubes, speakers, Weston thermo couple, R.F. ammeter, radio manuals, parts, etc. Want mechanical drawing or drafting equipment and slide rules or cash. Oliver F. Klein, 2235 N. 39 St., Milwaukee, Wis.

FOR SALE—Rider's Manuals 1 to 7 inclusive, new condition—\$32. Want photographic equipment such as is used by commercial photographers—lens, view cameras, dryers. H. Millen, 40 Wayland St., Boston, Mass.

WANTED—Model T Ford spark coil in working condition. Will pay cash. George Oxhorn, 509 Belmont Ave., Brooklyn, N. Y.

WANTED—Rider's Manuals 1 to 10 inclusive in perfect condition; also neon sign "Radio Service" without transformer preferred. State condition, size, etc. Will pay cash. M. Vavrek, 3005 Chat-ham Ave., Cleveland, Ohio.

WILL SWAP—Simpson 0-1 milliammeter for an ohmmeter, preferably a D'Arsonval type—2½" or less. Dependable tube checker meter will swap for ½ wave copper oxide rectifier. William Halpin, 2753 Fulton St., Brooklyn, N. Y.

WANTED—We pay cash for Rider Manuals and test equipment. National Sound Equipment Co., 625 Main St., Worcester, Mass.

POSITION WANTED—Young man, 25, single, college education, desires position in radio laboratory. Amateur and Restricted Phone licenses. At present employed. Good references, can travel. Carl H. Stello, Beltsville, Md.

WANTED—High voltage transmitting variable condensers, 2,000-3,000 v., 200-250 mfd. and less. Pay cash. Jack Abramowitz, 2237 62 St., Brooklyn, N. Y.

FOR TRADE—Triplet No. 1181A portable lab. and Rola G12 speaker with 1,000 ohm field. Want used record changer. S. Kimbro, 472 10 St., Louisville, Ky.

WANTED—Rider's Manuals 1 to 12, in groups or single, in A-1 condition with index. State lowest cash price. McKinley's Radio Service, Zebulon, Ga.

FOR SALE—Model 830 Triumph oscillograph with built-in Thyron sweep circuit 3" tube like new. Case 14" x 10" x 7 1/2" complete with instructions and cathode ray tube—\$40. R. B. Chase, 9 So. 16, Richmond, Ind.

FOR SALE—Readrite 431 tube tester—\$5.00. Radio-Sound & Television course—complete—\$18.00. Engineering School-built Supreme V.O.M. & output universal trouble tester 5" fan meter, a.c.-d.c. up to 1,250 v. test—\$15.00. Francis J. Pesarchic, Box 462-A Fairfield Ave., Johnstown, Pa.

SWAP—Supreme 333 de luxe analyzer, C-B model O C oscillator, Confidence tube checker, Rider's Manuals 1 and 2, Proceedings I.R.E. for 1932-33. Want Handee or Duro grinder and accessories and tools, guns, or what have you. G. H. Varney, 4627 Enright Ave., St. Louis, Mo.

FOR SALE OR TRADE—Philco home recording attachment model HR-1—\$25.00 value, trade for signal generator in good condition or multimeter of equal value. Want good crystal mike. George Hague, 82 Varley St., Fall River, Mass.

FOR SALE—Clough-Brengle cathode ray oscillograph model CRA with frequency modulated signal generator, model OM-A. All for \$65. cash. Adwin Rusczek, 36 Christian St., Wallingford, Conn.

FOR SALE—Supreme 592-593 analyzer, Readrite Ranger 432-A tube tester, Superior instruments 1130-S, signal generator, Rider's technical books, popular tubes and parts 30% off wholesale, all new and guaranteed. Cash. H. G. Hochanadel, 422 N. St. Francis St., Wichita, Kan.

FOR TRADE—Latest type Astatic pickup, sapphire needles, turntable and rim-drive motor (enclosed flywheel type). Will swap for flash camera—Brownie or Agfa cadet type or make offer. Harry Gush, 66 Herzl St., Brooklyn, N. Y.

WANTED—Supreme model 551 free point tester or any good free point testers. Must be in good condition, and price reasonable, with instructions for use. George J. Smith, 132 S. 7 St., Steubenville, Ohio.

SELL OR SWAP—Complete set of welding and burning torches, auto radios, professional R.C.A. broadcast studio turntable, tubes, transformers, meters, sets, parts, radio magazines, and manuals. Want mechanical drawing or drafting sets, slide rule, art books, good short wave receiver, tungar bulb battery charger, field glasses or binoculars. O. F. Klein, 2235 N. 39 St., Milwaukee, Wis.

FOR SALE—Rider's Manuals 1, 2, 4, 5, 6—\$25., Readrite model 350 oscillograph with output meter—\$5., phonograph electric motor and turn table—\$5., Jewel d.c. voltmeter—0-6 volt—\$1.50. Homer Sims, 108 S. Line St., Malden, Mo.

WANTED—Oscilloscope E.F.O., and precision test equipment. State condition and price. Have R.C.A. TR5 television set in perfect condition for swap. L. De Zube, 3900 N. Franklin St., Phila, Pa.

WANTED—1941 model 912P portable Precision tester in A-1 condition. Capitol Radio Service, 637 W. 21 St., Erie, Pa.

WANTED—Rider's Manuals—will pay cash. Al Eudin, 11203 Superior Ave., Cleveland, Ohio.

FOR SALE OR SWAP—Complete issues of QST from September, 1933, through June, 1940, all copies in A-1 condition. What am I offered in cash or trade for service manuals. Walter A. Seibert, 3 Madison Rd., Scarsdale, N. Y.

FOR SALE—Rider's Manuals 1 through 5—\$3.50 each. 5025 Supreme tube tester includes multimeter and condenser tester—\$20. Write before sending money. Virgil E. Oliver, 620 N. 20 St., Mattoon, Ill.

WANTED—Transmitting tubes, modulation transformers, radio books, compact low or medium power transmitter for phone and C. W. Seymore Hammer, 2090 Morris Ave., Bronx, N. Y.

POSITION WANTED—Serviceman, graduate of Radio School, 14 years experience, prefer location in the west. R. G. Golden, Holly, Colo.

WANTED—"Rider's Practical Radio Repairing Hints" and "Radio Service Questions and Answers." Stancor auto radio demonstration pack model 132, modern test equipment; and radio course. State condition and price. H. R. Cheesman, 720 Front St., Freeland, Pa.

WANTED—2 mike floor stands, 72" high, base weighted to support moderate size velocity mikes without flopping. Prefer chrome or chrome and black, adjustable. Mike thread, 3/8"-27. Can use suspension yoke. Give details and price. R. H. Coddington, Mapleton, Ia.

SELL OR TRADE—A.c. light plant, Harvard Classics, test equipment, Rider's Manuals 1, 2, 3, speakers, parts, Dodge generator G.A. rewound into welder. Want typewriter, wireless phono, camera, drill press. A. R. Kreuzer, Leroy, Mich.

WANTED—Rider's Manuals, any number or group of numbers if in good condition and reasonable. Will answer all letters. Century Radio Service, 10008½ S. Main St., Los Angeles, Calif.

SALE OR TRADE—1/80 H.P. Ohio, H.D.R., mtd. electric motors, (not toy type). Cost \$5. For fans, aerial rotators, phono, experimental, etc. Swap for? Prepaid in zone 3. A. Penquite, Marshalltown, Iowa.

WANTED—R.C.A. signalist in new condition. State price. Capitol Radio Service, 637 W. 21 St., Erie, Pa.

WANTED—Superior signal tracer and high imp. mike crystal or velocity. State condition and price. Lovett's Radio Shop, Box 143, Newland, N. C.

WANTED—Rider's Manuals 4, 6, 7, 8, 9, and 10. Also signal tracer and vacuum tube volt meter. Please state make and price. Have one new Simpson model 27 0-1 milliammeter, d.c., \$4.50 takes it. Andrew A. Hoip, 219 E. 32nd St., Lorain, Ohio.

WANTED—Rider's Manuals 8, 9, or 10. Reasonably priced, or will trade Astatic crystal pickup model 0-7 for part, or used motor and turntable. Royce Saxton, Pontiac, Ill., Rt. 1.

FOR SALE OR TRADE—New Philco 026 analyzer. Need vacuum tube voltmeter, condenser analyzer, and Rider's No. 6, 7, 8, 9, 10. M. P. Vincent, Box 4192, South Richmond, Va.

FOR SALE OR SWAP—Portable 4 tube record player (new), Kadette Tunemaster (new), Weston 0-20 d.c. mil meter, Weston combination 0-7½ 0-150 d.c. voltmeter, complete genemotor power supply. Want good bicycle, boxing gloves, car radio, or what have you. Taylor's Radio Service, Wellman, Iowa.

FOR SALE OR TRADE—Rider's Manuals 4, 5, 6, with index, in excellent condition. \$15. takes them, or will trade for a shortwave receiver. C. W. King, Union City, Mich.

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

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

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

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

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

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

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

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

WANTED—Modern test equipment. State condition, make, price, etc. J. Levine, 625 Main St., Worcester, Mass.

WANTED—Model gasoline airplane engines. R. Blaskow, 4161 Blaine, St. Louis, Mo.

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

WANTED—R.C.A. Review, all issues; Proceedings IRE, 1939, 1940, 1941; 0-1 mil and micro ammeters, all ranges, 3 and 4 inch, round, square, or fan type; type A & N National dials; 1 and 2 inch cathode ray tubes. W. Cox, 1915, Newton St., Columbus, Indiana.

WANTED—Rider R.C.A. signalyst, chanalyst, and CE Solar condenser tester, must be in new condition and reasonable. Capitol Radio Service, 637 W. 21 St., Erie, Pa.

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

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

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

WANTED—Hickock 177-188 signal generator with or without crystal. Also oscilloscope. Have Contax camera with f2 lens, foremanship course, radio supplies. Huntress Radio, 418½ West Spring, Freeport, Ill.

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

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

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

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

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

FOR SALE—Weston 772-2 analyzer also model 666-1B socket selector, in A-1 condition, priced low. Jack Levine, 625 Main St., Worcester, Mass.

WANTED—All Rider Manuals except 1 and 2. For sale Hickock set analyzer. Make an offer. The Electric Shop, 60 N. Sandusky St., Delaware, Ohio.

WANTED—A Velocity Electro-Voice microphone that is not in working condition. To be used in photo studio. State price wanted in first letter. John f. Antonio, R.F.D. 1, Eikland, Pa.

WANTED—Rider's Manuals No. 4 to 12. Any or all. A. H. Alderson, Spring Hill, W. Va.

FOR SALE—R.C.A. Television receiver, table model TT5 complete with 17 tubes (uses RCA Kinescope No. 1802-P4). Purchased Dec. 14, 1940, first class condition. Covered by RCA guarantee to make any changes free of charge to correspond with future changes in television standards. Sell—\$58. Will reply to all inquiries. Harold J. Clark, 362 Rock Ave., N. Plainfield, N. J.

FOR SALE—2 Wright DeCoster 12" dyn., 6 v. field with matching transformers; 1 Rola "G-12" 1000 ohm field; 1 Electro-Voice velocity mike V-3 HIZ; 1 Hickock electronic vibrator tester. All like new, make us an offer. Want 110 v. a.c. power plant, 1200 or 1500 watt; Rider's Manual No. 10. Cash or Trade. Radio Doctors, 641 Pierce St., Sandusky, Ohio.

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

FOR SWAP—6-110 v. 30 watt amplifier, 2 PM speakers, 30 watt 110 v. amplifier, L. C. Smith and Royal portable typewriters, auto radios, Zenith portable. Want manuals, radio and electrical books and magazines, drafting set, miniature speed graphic or other photographic equipment. Dee Umberson, Dimmitt, Texas.

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

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

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

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