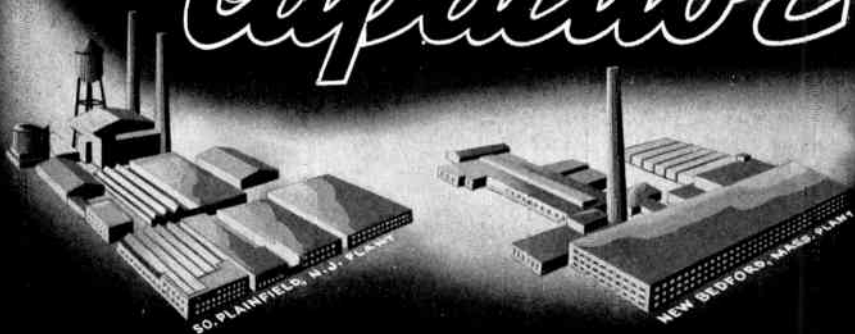


The
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CD
Capacitor



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RADIO SERVICE HINTS

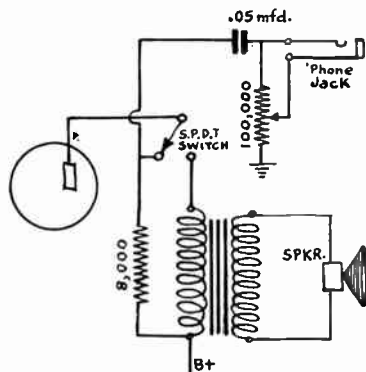
Practical Suggestions on Solution of Radio Servicing Problems Encountered in Actual Experience by Servicemen Everywhere

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 Unpublished items will not be returned.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.

Headphone Connections

We at our shop have had numerous calls to install headphone connections for the sick and others who want interchangeable headphone and loud speaker operation. The circuit which we found to be the best is shown herewith. While a single pole double throw toggle-type switch is shown, an equivalent type phone jack switch which automatically disconnects the speaker to phone circuit and vice versa, can be used.



The parts required are: one 8,000 ohm 2-watt carbon resistor; one .05 mfd 600 volt tubular type capacitor; one 100,000 ohm potentiometer, one

S.P.D.T. toggle switch, and a single circuit jack. The potentiometer controls the volume in the headphones and can be mounted in an accessible place on the rear of the chassis with the jack and toggle switch.—*Robert Javelin, Brooklyn, N. Y.*

A Homemade Capacity or Resistance Box

The writer built a very handy capacity substitution box by employing a push button switch assembly from an old set. The switch assembly consists of a gang of six double-circuit switches each of which is connected to a standard size mica or paper capacitor.

All units are mounted in a neat wood box with pin-jacks provided for clip leads. One pin jack is common to all capacitors and another connects to a switch for each capacity.

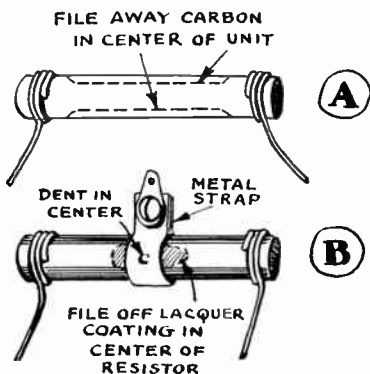
This arrangement can also be constructed with resistors instead of capacitors for resistance substitution, since the use of push-button switches enables units to be changed quickly.—*Jack Darr, Mena, Arkansas.*



Making Improved Resistor Alterations

Since it often happens that servicemen do not always have the exact value of resistor for replacement on hand during these times of parts shortage, the writer offers these few simple suggestions for altering carbon resistors which have given satisfactory results in numerous sets repaired at his shop.

If a carbon resistor lacks a few hundred ohms of a desired value, it can easily be increased in resistance



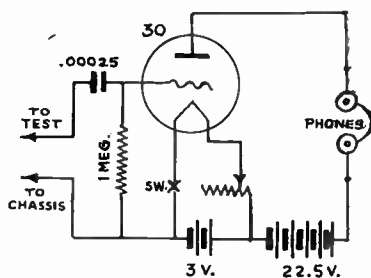
by filing a little of the carbon off one or both sides between the two leads as shown in the accompanying illustration "A" herewith. However, it must be remembered that this operation causes a decrease in the current carrying capacity of the unit. The unit may be cleaned and relacquered, if desired, for protection against moisture absorption.

A resistor of 1,500 or 2,000 ohms can thus be increased to 2,500 ohms or more as tested on a direct reading ohmmeter. Other values can be figured making resistor replacements a small problem. However, with resistors having an outside insulating jacket this idea is not practical.

Another suggestion for dividing voltage in low-voltage circuits for screen-grid tubes is to center tap a 2-watt type carbon resistor as shown in the accompanying sketch "B." Here a small metal strap is made to fit tightly around the center of the unit with a dent in the center to make contact with the carbon unit. Test should, of course, be made with an ohmmeter between the center tap and each lead in order to ascertain correct resistance between terminals. —James R. Limbeck, Glendale, Calif.

Signal Test Unit

By constructing the simple tube circuit as shown in the sketch herewith this unit will prove to be exceptionally useful for locating weak stages, sources of excessive hum and distortion, open or shorted antenna coils, tuning condensers, I.F. trimmers, open by-pass capacitors, etc.



The parts required are 1 bakelite panel; 4 tip jacks; 1 toggle switch; 1 type 30 tube and socket; 1 meg. grid leak; 1 .00025 mfd. mfd. mica capacitor; headphones and test prods; 1 3 volt "A" battery and 1 22½ volt "B" battery. The rheostat for controlling the "A" supply is optional.—H. J. Sundmeyer, London, Ark.



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—Microphone, in good condition. Set testing equipment, oscilloscope portable typewriter, any photography equipment or cameras. Will pay cash. Also R.C.A. Chanalyst. Chatham Radio Service, 16 E. Victory Dr., Savannah, Ga.

WANTED—2", 3", or 4" cathode ray tubes, audio signal generator; have 12,000v.-350va., polarized relays (work on 1 MA), neon tubes, photo cells, many kinds of showy minerals (goods, etc.), resistors accurate to .1%, over 200 used tubes in good condition. Will trade or buy (send price in first card). F. McClatchie, 1531 Benedict Canyon Dr., Beverly Hills, Calif.

FOR SALE OR TRADE—A Model E-200 series precision signal generator. Has not been used more than four hours at most. \$30.00 takes it, or will trade for good standard typewriter or what have you? Walter S. Hanowell, Box 85, Nooksack, Wash.

FOR SALE OR SWAP—Dietzgen 11 piece drafting set. Also A Manual of Engineering Drawing by T. E. French. Also Elements of Electrical Engineering by Arthur L. Cook. All in A No. 1 condition. Slightly used Royal Canadian ice-skates also for swap or sale. Want good Commercial receiver or what have you. Geo. F. Wojtowicz, 315 Green St., Herkimer, New York.

WANTED—Supreme oscilloscope 546, Supreme signal generator and frequency modulator 582, or R. C. A. No. 150 test oscillator and R. C. A. No. 155 cathode ray oscillograph. State condition and lowest price. Herman Bree, 1218 University Ave., Bronx, New York City.

FOR SALE OR TRADE—Over 3 gro. Microncave watch glasses, sizes 14 8/16 to 20 14/16. Over 2 gro. Geneva watch glasses, sizes 16 4/16 to 20 15/16, heights 6 and 7. All glasses unused and not cracked or chipped. Will sell outright cheap or cash, or what have you. W. E. Collins, Church Point, La.

WANTED — Supreme Vedeolyzer, model 560, or 3" oscilloscope and good chanalyst, preferably riders. Will pay spot cash, or cash and a rare old violin, Stradivarius copy. Philip Padua, 1546 So. Christiana Ave., Chicago, Ill.

FOR SALE OR TRADE—Par-Metal rack cabinet, gray, deluxe like new, 26 1/4" x 19". Want used PA system, PM speakers or what have you. All mail answered. W8UQM, 272 E. Poplar St., Plymouth, Pa.

FOR SALE OR SWAP—RCA 10 and 12 record changer, 32-110 vac converter tubes, 03-A's 2-6vdc-180v 40 ma generators, 1/4 hp motor, single phase, 0-50 micro-ammeter, 20 other meters. Bolt action 22 rifle, Univex 8mm camera with 3.5 lens and leather carrying case, 6 2000 volt conds., auto radio transformers, 300 watt Class B metal rack and panel audio system, 5 meters on it. Write for complete list. N. K. Stover, 128 Jefferson Ave., York, Pa.

WANTED — Mechanical drawing or drafting set, slide rule, art books, field glasses or binoculars, describe fully and state best cash price. I also have a large selection of radio equipment to sell or swap. Oliver F. Klein, c/o OK Radio Service, 2235 N. 39th St., Milwaukee, Wis.

(Continued on page 10)

SOLVING SHORTAGE PROBLEMS IN OSCILLATOR CIRCUITS*

IN THE superheterodyne receiver the greatest step up in radio-frequency amplification is obtained in the intermediate-frequency amplifier. Great amplification can be realized because of the fact that a relatively low frequency can be used, such as 175 kc or 455 kc, where the radio-frequency losses in coils and tuning condensers are much less than at high frequencies. To convert the incoming radio signal to the frequency of the intermediate-frequency amplifier it is necessary to use a local oscillator within the receiver. This oscillator is tuned to a frequency above or below (usually above) the incoming radio signal by an amount equal to the frequency at which the i-f amplifier performs. In most receivers today the first detector or mixer tube is of a type which combines the functions of mixer and oscillator in one bulb. It will be noted in the diagram that the oscillation circuit has two coils designated L_2 and A_2 . A_2 is the tickler coil in the plate of the oscillator section and is fixed in position with respect to the secondary coil, L_2 . L_2 is tuned to the proper frequency by condenser C_1 . It will be noted in Figs. 1, 3, and 5 that in series with coil L_2 and condenser C_1 is a variable condenser designated C_{pad} . The purpose of condenser C_{pad} is to help make the combination of L_2 and C_1 tune to a higher frequency than the signal circuit of the r-f stage. Without the use of the series padding condenser shown the oscillator circuits would not track properly with the r-f circuits.

The capacity of this padding condenser depends largely upon frequency used for intermediate-frequency amplifier. For example, 175 kc i-f would require a capacity between 0.0001 and

0.0014 mfd, whereas 455 kc would require 0.00025 to 0.0005 mfd.

If the oscillator section is made to operate at a frequency 175 kc or 455 kc higher than the signal frequency, the signal produced by the local oscillator will beat against the signal being received from the antenna and a new signal which is the difference of the two will be fed into the primary of the first intermediate-frequency transformer from the plate of the converter tube. In this way the intermediate frequency is generated or produced. In magazines and text books oscillograms are used to illustrate the kind of signal which is produced by the converter. It consists of a carrier having a frequency which will be passed and amplified by the i-f amplifier and it will be found that the audio modulation present on the original signal delivered from the antenna is present on the i-f signal.

The remaining elements which go to make up the converter stage are the voltage-dropping resistors for the screen grids, which grids are tied together within the tube, and the oscillator-plate section, and also by-pass condensers and the elements which go to make up the oscillator grid circuit. The control grid of the oscillator section of the mixing tube is usually connected with the cathode through a grid leak (R_{lk}) and to the tuning coil and condenser through a blocking condenser C_{br} . This blocking condenser has a low value of capacity generally never above 0.0001 mfd. In receivers using heater type tubes the grid leak has a resistance of 25,000 to 50,000 ohms, depending upon the particular type of tube used. In dry-battery operated receivers values from 100,000 to 200,000 ohms can be found.

* By Robert G. Herzog in "Service" magazine.

Individual Variation

Figs. 1 to 6 illustrate oscillator circuits in use in present day radio receivers. The types of tubes employed in these circuits (V_2) were discussed in

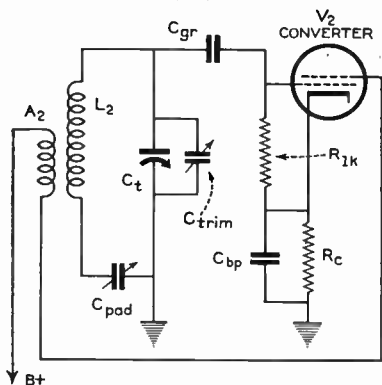


Fig. 1. In this simple tickler feedback oscillator the padding capacitor helps maintain the frequency difference between the oscillator and r-f stages.

last month's article. The cathode resistor (R_c) and its by-pass capacitor (C_{bp}) were likewise discussed and the information presented is equally applicable to the circuits shown herewith.

As was mentioned above, Figs. 1, 3, and 5 use a padding capacitor (C_{pad})

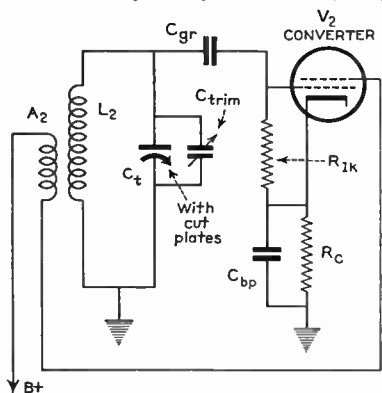


Fig. 2. In many receivers specially cut oscillator plates are employed instead of a padding capacitor to track the oscillator with the r-f stages.

in series with the tuning condenser (C_t) and the tuning coil (L_2) to maintain the fixed frequency difference between the oscillator and tuned r-f circuits. In Figs. 2 and 4, on the other hand, this fixed frequency difference is maintained by employing specially shaped plates for the oscillator section of the tuning gang. Such plates are readily distinguishable from the r-f sections of the gang tuning condenser.

Except for this difference in tuning condenser plates the circuits in Figs. 1 and 2 are identical. An oscillator circuit of this type is commonly called a "tickler feedback" circuit.

Fig. 3 employs a circuit known as a "modified Hartley." In such circuits the padding condenser (C_{pad}) acts as a

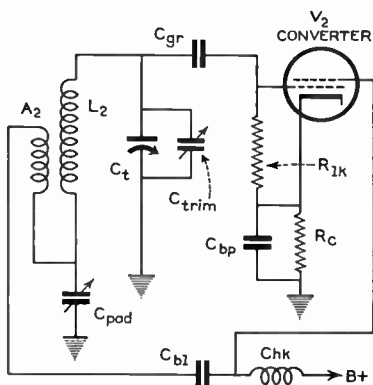


Fig. 3. In modified Hartley oscillator circuit shown, padding condenser is a common impedance in both tuning and tickler circuits. This arrangement balances voltage output over the frequency range and makes for better conversion.

common impedance in both the tuning (L_2) and tickler (A_2) circuits. This connection thus provides additional capacitive coupling between the two circuits. An r-f choke (or a resistor) is used to feed the B plus to the oscillator anode grid. An additional condenser (C_{h1}) is used to block this voltage from the tickler and tuning circuits.

A circuit that is quite popular in recent model receivers is shown in Fig.

4A. In this circuit the cathode of the converter tube is returned to a tap, about $\frac{1}{4}$ to $\frac{1}{3}$ from the low end, on the tuning coil (L_2). In such circuits

dividual button circuits of push-button tuned receivers.

Two adjustable trimmer condensers are used in tandem across the iron-

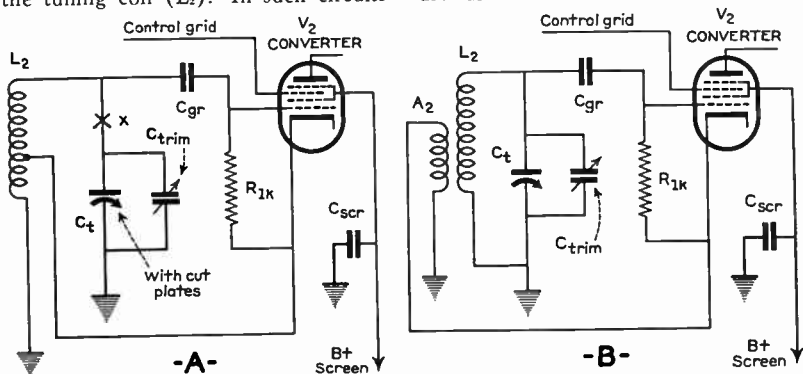


Fig. 4 A and B. The advent of the 6SA7 has made the Hartley circuit shown more popular. In the two versions presented, section of the gang. A paddler would be connected at "X" if used in Fig. 4A.

the oscillator anode grid, which would be the screen in the case of the 6SA7, is connected directly to the B plus circuits. This type of circuit is known as a "Hartley oscillator." Fig. 4B is a similar circuit using a tickler winding, instead of a section of the tuning coil, in the cathode circuit. Here again the oscillator anode grid is connected directly to the B plus circuits.

A tickler feedback circuit using a separate tube for the oscillator is shown in Fig. 5. An additional coupling winding (L_{cu}), wound on the same form with the tuning and tickler coils, is shown connected in series with the cathode of the first detector tube. This winding feeds the oscillator signal to the detector tube where it mixes with the incoming signal to produce the intermediate frequency.

Although a tickler feedback oscillator is pictured for the separate oscillator of Fig. 5, this need not be the case. Anyone of the circuits illustrated or any other oscillator circuit could be employed with a separate oscillator tube.

Fig. 6 shows a Colpitts oscillator that has found considerable use in the in-

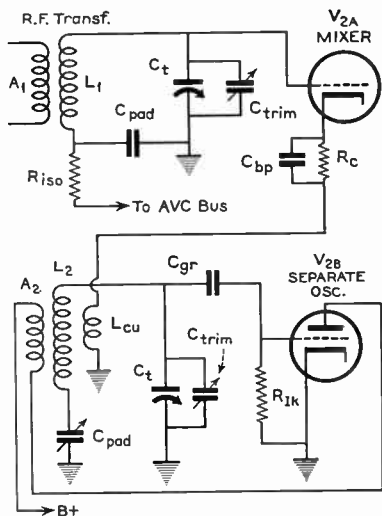


Fig. 5. Some larger receivers employ a separate oscillator tube. Such circuits often have an additional winding on the oscillator coil to couple the output of the oscillator to the mixer tube.

cored tuning coil. These trimmers are ganged and can be adjusted simultaneously. Their capacity range

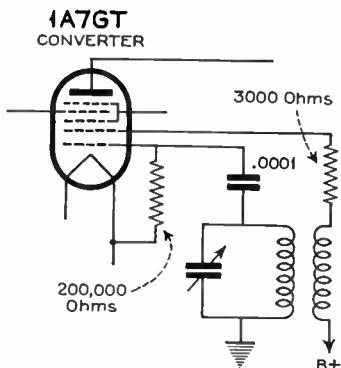
depends upon the frequency limits desired for the particular push button that connects them to the receiver's circuits. The various coils employed in the push-button tuning assembly also differ in inductance, depending upon the range they are required to cover, so as to provide the most suitable L/C ratio for maximum efficiency.

Alternate Values and Repairs

The following suggestions are given only as possible alternatives in the event that you should find difficulty in obtaining the exact parts required for a particular repair. It cannot be over-emphasized that, at best, any alterations will produce only a makeshift. More than one of the changes mentioned will certainly produce noticeable effects in the receiver's performance. In every case the exact value prescribed by the set manufacturer's specifications should be used if it is at all available.

In previous issues we have mentioned that breaks in coils could generally be repaired. In r-f coils, on the

The inductance of the oscillator tuning coil (L_2), however, is much more critical because it governs the dial calibration of the receiver. Breaks in



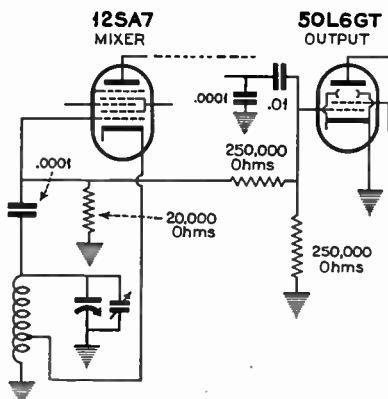
Airline 14BR573A is a battery portable that employs a novel tickler feedback circuit with a 3,000-ohm resistor in the anode circuit.

these windings should be repaired by patching rather than by the removal of turns. In individual push-button circuits this does not apply. A small percentage of turns may be removed in these latter circuits if necessary to effect repairs. If the number of turns removed are few, receiver performance will not be affected noticeably but the range of the button will be shifted slightly. Because receiver manufacturers provide suitable overlap between buttons, the shift makes little difference.

In the large majority of cases breaks in coils occur either at the soldering lug or at the point where the coil wire passes through the coil form. Repairs at these points are not difficult.

Because of the heavier wire used on short-wave tuning coils, breaks are not common. Should such breaks occur, however, they are generally simple to repair.

Since the position of the oscillator coil with respect to the other components of the receiver has an effect upon its inductance due to absorption, and since this inductance is critical in that it affects the dial calibration, the loca-



DeWald 563 employs a Hartley oscillator and taps off a portion of the voltage generated by the oscillator to furnish bias for the 50L6GT output stage.

broadcast band, one or even two turns more or less will not noticeably affect receiver performance. In tickler windings, too, a single turn may be removed if necessary to effect a repair.

tion of the oscillator coil on the receiver chassis is important. Replacement of this coil should always be made in its original position. The parts surrounding the oscillator should also be replaced in their original positions should their be cause for such replacement.

As mentioned in previous issues, a change of value up to 25% is permissible in cathode and screen dropping resistors. A decrease in value up to 20% is permissible in the accompanying by-pass condensers as well as in the blocking condenser C_{b1} . Any larger size may be used in these same circuits.

Similarly, an alteration of 20% either plus or minus is permissible in the grid leak (R_{1k}) and in the grid condenser (C_{gr}). Occasionally, how-

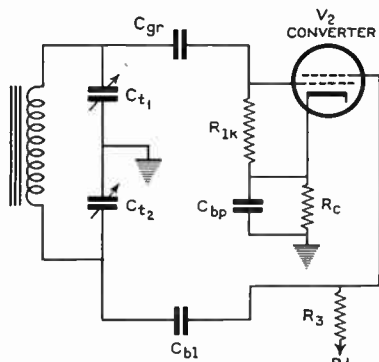


Fig. 6. A Colpitts oscillator is employed for this push-button circuit. Any one of the other types of oscillator circuits may be employed in such circuits, however.

ever, short-wave oscillator circuits are more critical and such wide changes may cause dead spots at the low-frequency end of the short-wave band.

In replacing fixed padders it is advisable, in any case, to use exact duplicate values with close tolerance. This is especially true in band-spread circuits. Variable padders on the other hand may be employed with any unit or combination of units that will cover the required capacity. Thus, a fixed or adjustable padder with a maximum

capacity of 1,350-mmfd can usually be replaced with a 0.001-mfd fixed condenser and 350-mmfd adjustable padder connected in parallel. 0.00025-mfd fixed condenser and 250-mmfd adjustable padder can be used as an alternate replacement for a 500-mmfd padder.

A resistance of 10,000-ohms may be employed instead of the r-f choke shown in Fig. 3.

Variable Tuning Condensers

One of the chief difficulties encountered in variable tuning condensers, in the field, is noise during tuning. A thorough cleaning with carbon tetrachloride will go far toward reducing such noise, and a pigtail connection from the rotor wipers to ground will completely eliminate it.

It has been the practice in many shops in the past, to replace tuning condensers that developed bent plates and other slight mechanical defects. In the light of present conditions, however, it is advisable to repair such defects.

Metal particles lodging between plates can be burned out by "flashing" the condenser. A simple method of flashing employs the receiver's own B power. After grid leads are disconnected from the gang the receiver's B plus can be connected to each rotor in turn. If the condenser frame is not connected to ground a temporary connection will be required to complete the B circuit. It is preferable to take the B voltage after the first filter so as to prevent any possible damage to the rectifier during the flashing process.

Where condensers do not turn freely lubrication of the bearings is indicated. Any number of specially prepared lubricants may be used for this purpose.

Summary

In the oscillator circuits pictured in the accompanying illustrations some of the components shown were discussed in previous articles of this series. The

same considerations apply to the respective parts in the circuits shown herewith.

Oscillator circuits are used in super-heterodyne receivers to provide a local signal which beats with the incoming station signal to produce the intermediate frequency. Because the period of the oscillator circuits sets the calibration of the receiver's dial, values of the coil (L_2) and tuning condenser (C_t) are somewhat more critical than those of the r-f circuits discussed previously.

Increasing the values of by-pass condensers in the screen and cathode circuits generally improves the stability of the circuit in question. A decrease in value up to 20% is often permissible in these circuits. Resistor values in these same circuits may be altered as much as 25% either way without noticeable effects in the receiver's performance; 25% variation either way is permissible in either R_{ik} or C_{gr} . Short-wave oscillator circuits may be somewhat more critical in respect to replacements, however.

Fixed padders should be replaced with exact duplicates, especially in band-spread circuits. Variable padders may be improvised by means of combinations of fixed and adjustable condensers.

Whereas in the past variable tuning condensers were replaced when defects developed, repairs are called for today. Cleaning and pigtailed will help noise and flashing with the receiver's own B supply will burn out loose particles between plates.

THE RADIO TRADING POST

(Continued from page 4)

SELL OR TRADE—1 R.C.A. No. 809 radio tube, brand new, for cash or what have you? Edwin Belscher, 56 Putnam St., Somerville, Mass.

FOR SALE—Shure model 76 lapel crystal microphone, a Brush single crystal headphone with head band, Triplett model 321 volt ohm meter (1,000 ohm) in wooden case with batteries and leads, Volumes I, II and III Coyne Electrical Books. Edwin T. Larason, Martinsburg, O.

FOR SALE OR SWAP—Complete copies in excellent shape of, Radio News—February 1930 through July 1935. Radio Retailing—June 1931 through January 1940; Electrical Merchandising—October 1931 through March 1933. Radio Craft—December 1931 through July 1932 and January 1933 through December 1933. Make offer F.O.B. or what have you? L. D. Brown, 83 Mills St., Morristown, N. J.

WANTED — Late model tube tester and other test equipment, also all Rider's manuals, radio magazines and books. Have I.C.S. Diesel Engines course and slide rule to exchange, or will pay cash if price is right. F. L. Revie, Keyes, California.

TO TRADE — 6" and 8" Perm. Magnet speakers. 2 300 v. power supplies, home made condenser tester, has meter and neon tube. 50 watt transmitting tubes and other radio parts. Want Shick or other Dry Shaver or what have you. Elgin Radio Supply, Elgin, Kansas.

WANTED—Used chanalyst good condition, Solar or C-D capacitor analyzer, also Rider's Manuals, all in good shape. Martin S. Toth, 1667 Charles Ave., St. Paul, Minn.

WANT Filterol tube checker adapter for Weston model 771, etc. Also, for sale RCA 136 communications receiver, best offer in cash desired, or trade take it. Arnold Halper, Tudor Radio Service, 119 Tudor Place, Apt. A, Bronx, N. Y.

FOR SWAP OR SALE—Supreme 85 tube tester, Dayrad voltmeter, duplicating machine, uses standard stencils, new 866s, T20, 825, 3/4 h.p. gas motor A1, bug, radio electronic key, tubes, 4 tube receiver. Want: multitester, good typewriter, National receiver. R. D. Dawson, 1308 F Street, The Dalles, Oregon.

WANTED—Complete set of Rider Manuals, have to trade both 8 mm. and 16 mm. movie equipment, sound films, or will pay cash for good books. Chas. Crank, 865 N.W. 29th Ter., Miami, Fla.

FOR SALE—Used experimental television receiver and transmitter with correspondence course and slide projector; \$207 new, make offers. Have K-20 Electro-Voice velocity microphone, like new. Also metal tube cabinet. Mrs. Warren Rudd, Paxton, Nebraska.

WANTED—Supreme Model 546 oscilloscope in good condition. Will pay a reasonable cash price. Clyde Haligus, Rural Radio Service, Clark Lake, Michigan.

(Continued on page 13)

SERVICING AC-DC COMPACTS*

GENERAL principles that apply in the testing of straight ac receivers also apply when servicing ac-dc models. However, the actual troubles that are encountered are usually a bit different from those found in their big brothers due to space limitations.

Heat generated within such sets is confined to a small space and parts often have a short life due to the "baking" action. Still another trouble may be traced to the high surge or peak voltage when the set is turned on and some models now use a small resistance in series with the plate or cathode circuit of the rectifier to limit the flow of current under these conditions.

Filter condensers that have dried out may be located by the use of bridging or shunt capacitors to locate open circuited units. One precaution must be observed in addition to watching polarity of connection, and that is the realization the defective condenser in the set may be "healed" temporarily by the action of the bridging unit. When this happens it is often necessary to repeatedly let the set cool and try again in an effort to duplicate the breakdown condition.

Parts Change Values

Other parts may warm up and change value. In time, carbon resistors may shift too far out of line and have to be replaced. A resistance check therefore should be made as a matter of routine. The grid resistance for the 25L6, for instance, should not exceed 1 megohm. A high resistance voltmeter may be used to check grid voltage. The grid should not be positive with the receiver tuned off the station (no signal input).

If the grid resistance is normal, but distortion results, the coupling condenser may be suspected. Intermittent or faulty reception after the set has warmed up may be caused by these units. All coupling condensers should have a d.c. leakage resistance of not less than 18 megohms.

Distortion After Operation

If the receiver distorts after about ten minutes operation, the trouble is probably in the output tube. Tubes of the 43, 25L6, 35L6 and 50L6 varieties often evidence this fault. A check in a tube tester will not disclose the trouble since the tube must first heat up under operating conditions. Very often, this failure will be due to a leak between cathode and heater.

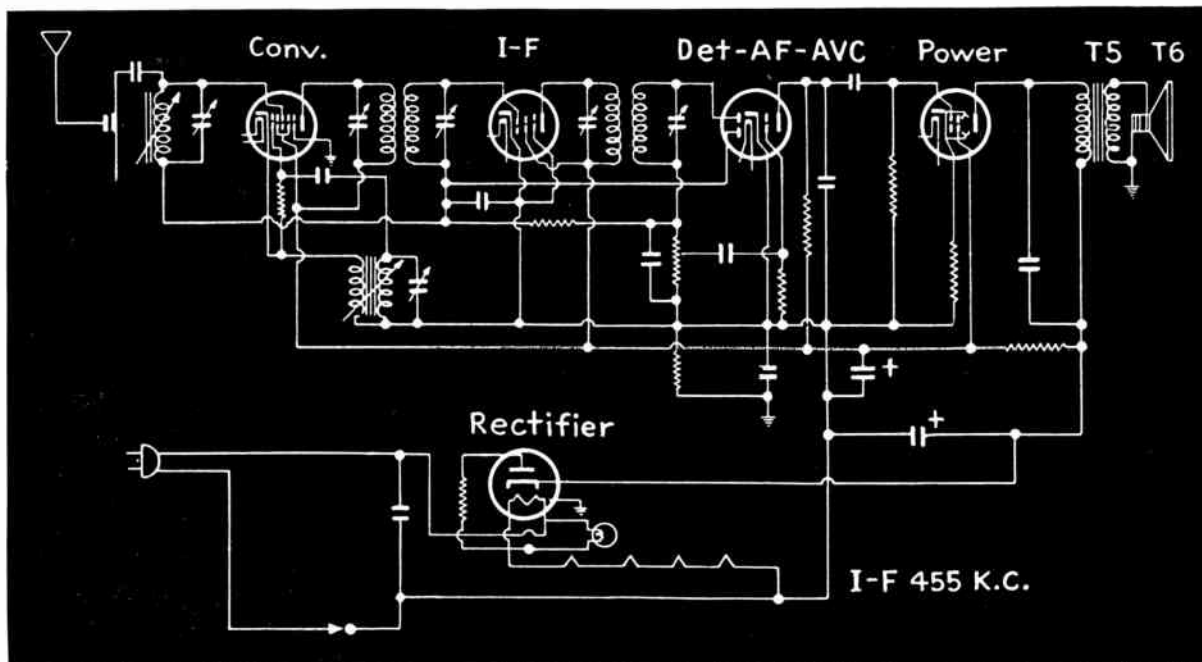
If the line voltage is abnormally high, too much filament or heater voltage will be applied, and the line resistor may have to be increased to some slightly higher value. A series resistor of 5 or 10 ohms rated at 2 to 5 watts will do.

A sometimes puzzling trouble will be lack of voltage across the cathode resistance, with the plate, screen and grid voltages and resistance apparently normal. If the cathode current is not normal, with a drop of about 7.5 volts across the 150 ohm resistor, there is no electron current within the tube from cathode to plate and the sole remaining cause would be the heater voltage.

When the heater voltage drops to too low a value, such as 10 volts instead of the normal 25, plate current or cathode current will similarly drop.

If the set is on the service bench, a

*By Willard Moody in "Radio and Television Retailing."



Circuit of a typical compact receiver of current design

quick check of field current in the speaker may be made by taking a small screw driver and holding it near the pole piece where the voice coil slides in and out. If field current is normal, the screw driver will be attracted by the magnetic strength of the field. An open field coil in the circuit shown would have the effect of cutting out voltage on the plate or screen of the power tube and would make the voltage from the cathode of the rectifier to ground or chassis become very high; for when current is reduced, voltage rises. This high voltage would puncture the insulation of the condenser at the input of the filtering system, if the set were left on for any length of time.

A common cause of trouble is the small condenser used as an r-f filter shunted from the diode return plates to ground or chassis. If these condensers open up, the circuits may become unstable. R.F. voltage will appear and be fed back into preceding stages. Moving the antenna near the tube may be enough to send the set into oscillation and screeching. Feed-back may extend through the detector plate to output tube grid, thence into the loudspeaker wiring and back to the antenna, providing a feed-back path circuit.

Oscillation may also originate in other circuits through lack of proper shielding of tubes or location of grid circuit wiring. In the case of metal tubes, oscillation will be occasionally caused by a bad weld on the steel casing of the tube. A jumperwire fixes this.

In many sets glass tubes are used with no shielding. A tube shield may be installed easily enough and reaction cut down. Stability will be increased and better tuning will usually result, although care should be taken if the effect of regeneration is depended upon to achieve a sharp selectivity curve.

THE RADIO TRADING POST

(Continued from page 10)

WANTED — Will pay cash for a volt-ohm milliammeter, also signal generator and a Cornell Capacitor Analyzer. State name, model, and lowest price. Frank Swetlech. RD 1, Sharon, Pa.

WANTED—Portable Jackson or Simpson tube tester. Will pay cash or trade Aerovox L-C checker. M. E. Gaines, 2099 Ave. G, Fort Madison, Iowa.

FOR SALE — Two W. E. camp telephone sets, Signal Corp. 1917, suitable for private party line use. Consists of Hand-Set, crank type ringing magnet and self contained battery cell compartment in 8" x 10" x 5" Oak carrying cases. Operates up to 1,000 yds. on flash cells or more on external battery. Both sets \$10. Joseph Block, 230 East 51st St., Brooklyn, N. Y.

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

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.

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.

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 TRADE — Violin and case worth \$40 will trade for good A.C. amateur receiver, C.W. transmitter, or recorder. Also have Lincoln De Luxe S.W. 10 chassis less two volt battery tubes and batteries, will trade for code teaching equipment. Charles Keinath, 38 Prospect St., Newark, Ohio.

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—One Model "B" Rockola coin phonograph in excellent condition. Would make swell record-changing public address system with addition of one speech amplifier tube to take care of mike. \$35. F.O.B. here. Chas. L. Culley, Melville, La.

WANTED — 1½ V. Farm Battery Sets, less batteries. State make, model number, and condition. Will pay cash. Big Sandy Maytag Co., Pikeville, Ky.

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

unit. Want General Radio Co. laboratory equipment, like decade boxes, bridges, etc. Tony Owsiany, 735 Mills St., Kalamazoo, Mich.

FOR SALE — Brand new Sx-28 Hallcrafters communications receiver. Want Channel analyzer, Supreme, Rimco, or Simpson. Forrest Burnham, Richvale Calif.

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.

WANTED — Communications Receiver. Have A. F. Transformers, headphones, speakers, power supply, 5-tube receiver less tubes, many other radio parts also stamp collection, catalog price \$10. Will also pay \$3 besides. Robert Edwards, P. O. Box 91, Wendover, Utah.

WANTED — 1 RMS Electric Clock; 1 Model 070 Philco Signal Generator; 1 Stinson or Tripplett Load Type Battery Tester and Voltmeter; 1 Late Model Westinghouse Battery Charger. F. E. Flint, P. O. Box 86, Elizabeth, W. Va.

CASH for Supreme 561 Signal Generator, Medical Microscope, back issues of Electrical Experimenter before 1918, Aerovox Research Worker Jan., Feb., Mar., 1928, General Radio Experimenter, Successful Servicing, C-D Capacitor and IRC Servicer. John T. Lipani, 157 Leve-rett St., Boston, Mass.

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.

WILL TRADE — Brand new Superior Model 1230 Signal Generator for any two Rider's Service Manuals. Roy H. Bender, P. O. Box 53, Manheim, Pa.

TRADE — Owner Kladag Radio Laboratories, Established 1920, oldest Ohio parts jobber, will trade new parts, books, etc., for U. S. or foreign stamps, collections, etc. What have you? What do you want? Submit for estimate. Major Fred Kline, Kent, Ohio.

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 from 8 to 12. Kindly state lowest cash price. Howard W. Hepler, 1706 Piedmont Road, Charleston, W. Va.

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—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—HCR or RCH Communication Receiver 7 tube superhet in perfect condition. Will trade for instruments or cash. Desire a signal generator. Arnold Halpen, 119 Tudor Pl., Bronx, N. Y.

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 — 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 — 20 watt amplifier, 2 12-inch speakers in case, 1 Philco record player, 1 Amperite CHAK mike and stand, cost complete \$167.50, cash price \$75. Will consider 3-inch scope in trade. Ayres Radio Service, 121 Rosemont Dr. Syracuse, N. Y.

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 — Rider's Manuals, Vol. 7 to 12 inclusive. Metzinger Radio Service, 3018 Avenue B, Council Bluffs, Iowa.

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, W3IVZ, Beltsville, Md.

FOR SALE—Crosley Xervac Hair Growing Machine complete in perfect condition. Best offer takes it. The French Radio Electric Store, 476 Main St., Stamford, Conn.

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.

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

WANTED — Wattmeter, range approx. 40 watts to 250. Please give information regard make, condition, and price. Rudolph N. Feil, 2860 24th St., San Francisco, Calif.

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.

FOR SALE — 1940 NRI Radio Television Course. Complete and like new. \$15. John Broderick, 159 High St., Dalton, Mass.

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

WANTED — Rider's Manuals and Portable Typewriter. Please state condition and lowest price asked for same. Willard Spaulding, 324 Western, Connerville, Indiana.

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.

FOR SALE—Model 830 Triumph oscillograph with built-in Thyron sweep circuit 3" tube like new. Case 14" x 10" x 7½" complete with instructions and cathode ray tube—\$40. R. B. Chase, 9 So. 16, Richmond, Ind.

WANTED—Power or hand operated saw filing machines, saw retoothing 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.

FOR SALE — 1 Clough Bringle 82 Signal Generator; 1 Supreme 85 PL Tube Tester; 1 Jewel 199 Analyzer. F. E. Flint, P. O. Box 86, Elizabeth, W. Va.

WANTED — Welding outfit complete with cutting torch and tips. Have heavy duty sewing machine motor will trade. Electronics Radio Service, Warfield, Ky.

WANTED — Rider's 10, 11, 12, also 1 to 4, and late model signal Generator. Advise best cash price and condition. J. Jewel Mosley, 1426 North 24th St., Birmingham, Ala.

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

FOR SALE — Supreme 599 tube-tester/analyzer new. Supreme 530 2" oscilloscope, Supreme 189 oscillator, Solor CB Condenser Analyzer, and Superior Dynamotor (V.T.V.M.) all OK but Superior (using 5" motor). Lots of manuals. All for \$100 cash plus transportation and other costs. What is offered for Radio Craft from 1934 to 1941? W. G. Eslick, 2825 E. 13th, Wichita, Kan.

WANTED — Good S.W. receiver, slide rule, drafting or mechanical drawing sets. Describe fully stating best cash price. Will swap or sell radio manuals, magazines, new tubes, resistor, meters, auto radios, parts, eliminators, receivers, etc. Oliver F. Klein, 2235 N 39th St. Milwaukee, Wis.

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 — Photo equipment (particularly a 2" lens), a movie projector (16 mm), enlarger, etc. Also radio equipment as V.T.V.M. late model tube checker, Rider's Manuals 8, 9, 10, 11, and 12. Will buy for cold cash or have other equipment in trade. All mail answered. Edward Connor, 907 Brown St. Wilmington, Del.

WANTED — Used portable recorder, any make. Will pay around \$25. Vernon Abrigg, RD 1, Meyer Lake, Canton, O.

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