

*Radio*  
**SERVICE  
DEALER**

to which is added-

**ELECTRICAL  
APPLIANCE**

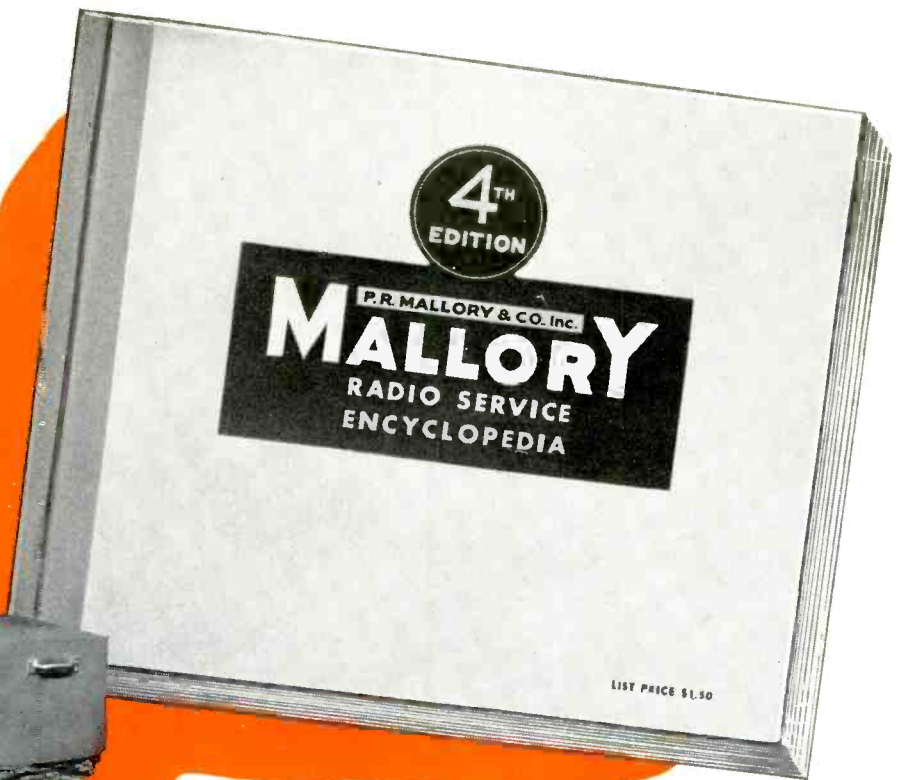
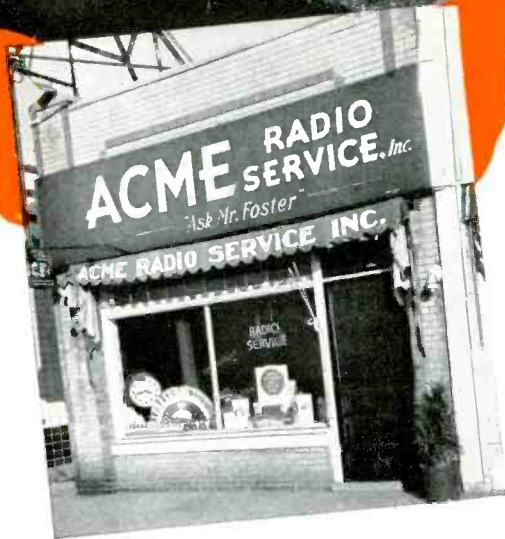
*Retailing*

*january 1944*  
*25¢*

**In this issue:**

**ALMOST A MILLION RECORDS ★ SERVICING IS OUR BUSINESS**

**C.A.A. Radio Safety Device**



## Mr. Foster Says—

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*P. R. Foster.*

ACME RADIO SERVICE LAB., INC.  
INDIANAPOLIS, INDIANA

**S**ERVICE men everywhere agree that the 4th edition MYE Encyclopedia is their most useful reference.

They know that it is the one book that tells the replacement part for any make or model receiver, and how each should be installed.

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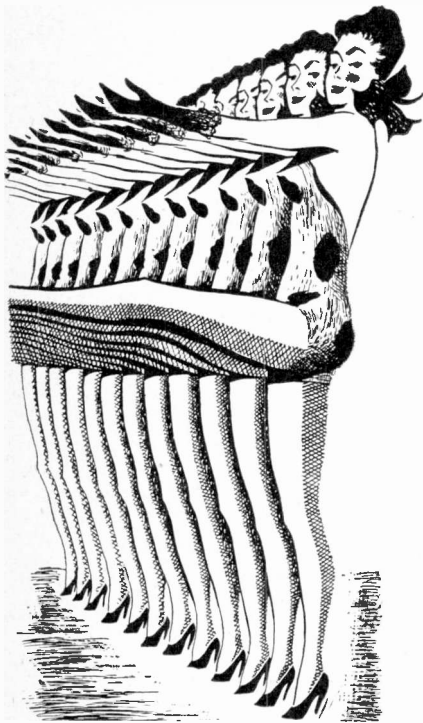
Stick To The Job—Buy War Bonds

P. R. MALLORY & CO. Inc.

# MALLORY

*Approved Precision Products*

# UNFAILING PRECISION

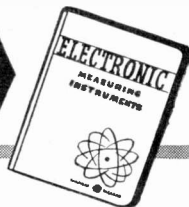


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DEPARTMENT  
GENERAL ELECTRIC CO.  
Schenectady, N. Y.**

Please send, without obligation to me, the General Electric Testing Instrument Catalog D-1 (loose-leaf), for my information and files.

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**GENERAL ELECTRIC**

177-C1

**Electronic Measuring Instruments**

January, 1944

*Radio*

## SERVICE-DEALER

Registered U. S. Patent Office

**Devoted exclusively to the problems of  
Dealers, Soundmen, Servicemen & Jobbers.**

**VOL. 5, NO. 1**

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Picture by Henry F. Kroeger, Jr.

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SANFORD R. COWAN . *Editor & Publisher*      KARL A. KOPETZKY . . . *Managing Editor*  
JOHN H. POTTS . . . . . *Contributing Editor*      HENRY F. KROEGER, JR. . . . . *Photography*  
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## SERVICE CHARGES CAN BE UPPED!

OPA's MAXIMUM PRICE REGULATION 165 arbitrarily fixed ceiling prices on service charges at March 1942 levels. The basic intent of the rule was sound, but in actuality it worked a severe hardship on many service-dealers who in March 1942 simply charged too little for the work they did.

On Dec. 27th, 1943, MPR 165 restrictions were eased considerably by *Supplements 21* and *22* which permit radio and electrical appliance service-dealers to increase their rate charges at once. The complete text of the new OPA price-fixing regulations are given on page 7 of this issue. Scan them well!

Some, but not all service-dealers will raise their prices. The great majority will find the regulation a boon, permitting as it does, price advances in line with increased operating costs, consequently allowing it to rectify its rate scales if wrong to begin with. But others will now charge more merely because it is legal to do so, and this despite the fact that they are presently operating on a very profitable basis. Such unjustified price increases lead to inflation which is, if it becomes rampant, an aid to the Axis!

But, speaking for the radio and electrical appliance servicing industry, we congratulate Chester Bowles, OPA Administrator, who had the perspicacity to amend MPR 165 at this time. If WPB officials had the same farsightedness, and actually accomplished something that would alleviate the civilian tube shortage, 1944 would be a happier year for millions of set owners now without radios.

---

## POLITICALLY SPEAKING, WE STICK OUR NECK OUT!

HISTORY IS MADE every minute. Sometimes years pass before the world realizes just who made what part of history. In our book one of the greatest modern history makers is Charles E. Wilson who resigned as president of *General Electric Co.* to become Executive Vice-Chairman of *WPB*, which bureau at that time seemed to be in a hopeless mess.

Under Mr. Wilson's direction, *WPB* about-faced and made tremendous progress in accomplishing the basic goal set for it. We feel that eventually historians will credit Mr. Wilson as being one of the greatest contributors towards our Victory. Names other than Wilson's get into print with more frequency and aplomb but the record shows that he is the doer, and that's what counts.

Rumor has it that Mr. Wilson feels that he has accomplished what he set out to do for *WPB* and the manufacturers of war goods—that he would like to go back to *G.E.* We know nothing of his personal desires—nor about his political leanings and party affiliations. We know that soon this country will have to choose a man to serve as President from 1945 to 1949 (at least). Why not Charles E. Wilson? He probably has greater attributes and a proven record of sheer accomplishment than all the political hacks combined. The era to follow the war will be most complex. We feel that our Country will at that time need the guidance of a practical businessman rather than that of a politician. Read *FORTUNE* Magazine's March 1942, and May 1943 issues for more about C. E. Wilson's background and then consider his still more recent accomplishments. Perhaps you will understand why we advocate Wilson for our Chief Executive.

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## 1½ MILLION TUBES IN 90 DAYS SAYS WPB

A WPB RELEASE DATED DEC. 23rd states, "4½ million radio tubes of critical types are scheduled for production in the 1st quarter of 1944. These

(Continued on page 36)



# V-NEWS

## RADIO INDUSTRY NOW PRODUCES FOR WAR—BUT PLANS FOR PEACE

### UTAH EMPLOYEES BREAK PRODUCTION RECORDS FOR UNCLE SAM

Month by month, production records have been broken as Utah has gone "all out" for Uncle Sam, according to Fred R. Tuerk, President.



FRED R. TUERK

He points out that experience gained during the war period will be ably utilized in efficient peacetime production.

With emphasis on quality, the dependability of Utah parts, long a byword in the radio and sound equipment industries, will be maintained.

### YOU ARE PART OF UTAH'S POSTWAR PLANS



ODEN F. JESTER

"We're working for Victory and planning for peace now," stated Oden F. Jester, Vice-President in Charge of Sales of the Utah Radio Products Company, when queried recently on Utah's postwar plans. "Our experts are hard at work, developing plans for the future—plans that take utmost consideration of the needs of industrial concerns. Better products are on the way. In the Utah laboratory rapid strides have been made in adapting new electronic and radio developments for war uses—and making them available for the requirements of tomorrow."

### THE JOBBER-DEALER POLICY FOR 1944



R. M. KARET

Robert M. Karet, Sales Manager of the Wholesale and Sound Division of Utah Radio Products Company, declared in a recent interview that Utah's traditional Jobber-Dealer Policy of distributing through the recognized channels would be maintained in 1944 and in the postwar period.

In selection of jobbers Mr. Karet stated that Utah would continue to select carefully in order to avoid unfair competition. The trade's merchandising activities would be backed up by Utah advertising in leading publications.

Utah jobbers will be assured of a new and better Utah line, keyed to "tomorrow's" demands—and products that will have maximum profit opportunities.

### WAR DEVELOPMENTS AND THEIR PEACETIME MARKETS



W. A. ELLMORE

The war has speeded discoveries and improvements in many fields, said W. A. Ellmore, Vice-President in Charge of Engineering of the Utah Radio Products Co. "Nowhere," he went on, "has this been more true than in the radio and communications fields. Today, electrical and electronic miracles are enlisted in the armed forces—but tomorrow they will be at the service of peacetime America." Mr. Ellmore further pointed out that because of the wartime research and improvements now going on at Utah, there will be greater enjoyment and convenience in the American home—greater efficiency in the American factory.

UTAH RADIO PRODUCTS CO., 836 Orleans St., Chicago, Ill.

We'll help you  
**MAKE 'EM  
 LAST**



Pincor's number one job right now is to supply fighting men with fighting tools. Our plant is on an all out war production schedule but our service department is pledged to make your present Pincor equipment last for the duration. Bring your service problems to us—but please bring only Pincor problems; there just aren't enough hours in the day to take care of any others.

DYNAMOTORS . . . CONVERTERS . . . GENERATORS . . . D C MOTORS . . . POWER PLANTS . . . GEN-E-MOTORS

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**BUY MORE BONDS!**



## Letters to the Editor

### CATCHES ERROR IN FORMULA

Editor:

I agree with Mr. Davis that formulas for rewinding inductances have little or no use in radio servicing procedure. The type of winding, core material, relation of coil to shield, degree of coupling, and distributed capacity are a few of the factors Mr. Davis probably had in mind when he summed-up his remarks with, "They are carefully engineered with far too many factors involved to permit any simple formula for their calculation."

If a quick examination reveals that rewinding is feasible (usually old type r.f. coils), it is a simple matter to determine the wire size and to count the number of turns removed from the defective coil. Any winding correction would be made by the "cut and try" method with the coil properly connected in the circuit.

Mr. Davis failed to note one of the shortcomings of series-parallel heater operation. An "open" heater in one of the parallel tubes will either "blow-out" or seriously damage the remaining tube, unless the set owner is one of those rare birds who immediately calls a serviceman and does not attempt to use the receiver.

Figure 2, August RSD, page 19, and the text referring to this diagram are incorrect. The text should read, "This will leave 47 volts to be dropped across the line cord (115-68, see Fig. 2). The value of this resistance line cord can be found by formula as above and will be approx. 157 ohms." The value of the line resistor should be changed to this value on Fig. 2.

A + sign should be added to the first impedance formula. The correct formula (series) is  $Z = \sqrt{R^2 + (X_1 - X_2)^2}$ .

George Jehle  
 New Jersey

Thank you Mr. Jehle. For missing the correct formula the Tech. Ed. has a permanently red face.

### WHO IS GETTING MR TUBES?

Editor:

More power to you. . . none of (the other magazines) raised their voices about this unbearable tube situation. I am for nine years at this same address . . . never wrote a letter to congratulate anybody, but in this case I could not stand it (and had to) let you know how I feel about your efforts. As for tubes, I can hardly get more than two dozen tubes in a month. Of course none of the 12-volt and 50-volt or 35-volt (kinds). There is a parts distributor who would sell you a few tubes at standard discount rates providing you buy some partly defective condensers or other substandard parts or unwanted tubes. As for the retailers, I do not patronize them but

(Continued on page 34)

# SPRAGUE TRADING POST



## A FREE Buy-Exchange-Sell Service for Radio Men

**WILL SWAP**—1N5GT and 12SR7GT for 1A7, 1H5, 12SA7, or other tubes in same class. Will buy, sell, or swap test eqpt. and other tubes. Write for list. L. E. Monroe, 111 Shelby St., Kingsport, Tenn.

**WANTED**—Portable or non-portable recorder, 78 rpm, matching mike, disc cutting type with playback head—Presto or what have you? 1st Lt. Wm. J. Koczon, U. S. Signal Corps, Two Rock Ranch, Petaluma, Calif.

**WANTED**—An SX-32, SX-28, SX-23 or other comm. receiver. What have you? Give full details. Sam Schulman, 7115 W. Warren Ave., Detroit 10, Mich.

**FOR SALE OR TRADE**—New Caphart Model 112M-2 in George 11 walnut cabinet. 2-speakers, 20 tubes, covers AM and FM, handles up to 20 records, playing as desired. Factory list is \$775. We need smaller combinations, radios, record players, tubes. Would consider part merchandise, part cash. Tomalino Radio Service, Glendive, Mont.

**WANTED**—Good radio man, preferably draft exempt. \$50 a week guaranteed to good serviceman on commission. We offer for sale or trade, a Zenith wind charger. Want phono motors and pick-ups, 6 or 12 to 110 AC inverter, 110 V. AC gas generator or anything in radio or sound. Monroe Radio & Sound Service, Box 512, Corvallis, Ore.

**FOR SALE OR TRADE**—Philips (English) model 362AX 10-tube 520-60000 kc. in 5 bands. Set is used on 250 AC. Has 12" per. mag. speaker. Will swap for rood comm. receiver such as RME, RCA, PR16, HRO—must have xtal. Value of Philips, approx. \$164. Colin L. Sutton, 248 Cashel St., Christchurch, C. I., New Zealand.

**WANTED**—Hickok #202 V-O-M and #510X tube checker. Cash or will swap Hallicrafter Sky Buddy for what have you? Chas. M. Ibaugh, 7737 Lorain Ave., Cleveland 2, Ohio.

**FOR SALE:** United Motors radio test panel complete radio test set incl. signal gen. output meter, AC meter, DC voltohmmeter, universal speaker with matching field resistances, and vibrator tester. \$150 plus express. Also offer Dayrad #22C tube tester modernized to check up to 117 series tubes, \$35; 90 asstd. late series tubes list \$95, lot for \$65; also several thousand 100M 1/4-watt resistors at \$2 per 100. W. F. Peters, 960 Hendrickson Blvd., Clawson, Mich.

**WANTED FOR CASH**—A good tube tester. Describe fully. Sigmund Salmento, 1 Hood St., Aliquippa, Pa.

**WANTED**—Television set with or without audio output. 5 channels preferred. Describe fully. Sovatsky Radio Service, 284 Willoughby Ave., Brooklyn, N. Y.

**FOR SALE**—Bliley crystal; also RCA intercom. system, 6-station, master station only. Tauber's Radio, 516 S. Cicero Ave., Chicago, Ill.

**WILL TRADE** "Mac" champion hi-speed key for K & E electrical slide rule or equivalent radio rule. James Hightshoe, U.S.C.G., C.R.E.I., Radio Training, 10010 Georgia Ave., Silver Springs, Md.

**WANTED**—Triplet #1232-A signal generator and Triplet #1511 dynamic tester. Arthur Paupaw, 255 Steuben St., Brooklyn 5, N. Y.

**WANTED**—V-O-M, signal generator (battery-operated) and Rider's manuals. Joseph Harter, Box 448, Holcomb, N. Y.

**WANTED**—Green Flyer turntable and Astatic Tru-Ton pick-up arm—or other phono eqpt. suitable for PA work. Warren M. McGrath, 56 Tilton Terrace, San Mateo, Calif.

**WANTED**—Thermometer, thermomilliammeter, or thermogalvanometer with defective thermocouple, but good movement. Describe fully. R. H. Bowerman, 15336 Richmond Place, East Cleveland 12, Ohio.

**WANTED**—Noise level indicator complete. Can supply priority rating. Lakin Radio & Sound Service, Greensburg, Pa.

**FOR SALE**—Many scarce tubes, also 80, 35Z5, 25Z5, 35L6, etc. in limited quantities. Bela Paine, 1186 Lexington Ave., New York 28, N. Y.

**WANTED IMMEDIATELY**—Hallicrafters communication receiver S-20A or similar unit. Cash. Pvt. J. P. Henderson, Jr., A.S.N., 34778364, A.S.T. Unit 1892, Arkansas State College, Jonesboro, Ark.

**WILL SWAP RCA**—Rider chanalyst in excellent condition, complete for 2 1/4 x 3 1/4, or 3 1/4 x 3 1/4 Speed-Graphic camera. Will pay any cash difference. Modern Radio Service, 532 Brady St., Davenport, Iowa.

**WANTED**—RCA Jr. volttohyst #165. B. L. Elfman, 3013 N. Broad St., Philadelphia, Pa.

**WANTED**—Hand vac. cleaner; 8mm. projector; midjet radio. Have many types of tubes, filters, meters, cabinets, etc. G. Samkofsky, 527 Bedford Ave., Brooklyn, N. Y.

**WANTED**—Rider's manuals, vols. 8 to 13. Lt. David Salzman, c/o Union Radio-Television Lab., 2 Chester Court, Brooklyn 25, N. Y.

**WILL SWAP**—Rider manual #8 brand new for new Green Flyer phono motor. Also have new kit of parts for URC Theatre amplifier A-87-C with schematic for same. Will trade for eqpt. What have you. James, P.O. Box 703, Charleston, W. Va.

**WANTED**—Rider's manuals nos. 9, 10, 11, 12, also oscilloscope. Gustave Mondrush, 600 Beechmont, Dearborn, Mich.

**WANTED**—Any public address eqpt.; microphones; PM speakers; record players; amplifiers, etc.—but no junk. Describe fully. B & B Sound Systems Co., Two Rivers, Wisc.

**FOR SALE**—Supreme \$85 tube checker in oak case with neon leakage test and complete factory instructions. Will consider taking good condenser checker in part payment. Miller Radio Service, 433 Magie Ave., Elizabeth, N. J.

**FOR TRADE**—Brand new tubes in factory-sealed cartons, 6SK7GT, 6S-07GT, etc. Need Meissner analst, Supreme vedolyzer, RCA-Rider chanalyst, signal generator, multimeter, etc. M. Okin, 915 Bryant Ave., Bronx, New York, N. Y.

**WANTED**—Simpson Roto Ranger #275 testing meter, or some other good tester. Pete Dolieslager, 710 Dewey Ave., Kewanee, Ill.

**WANTED**—Will pay cash for signal tracing eqpt., preferably Hickok #155 or similar well-known make. Kenneth Young, RFD #2, Beaver Falls, Pa.

**FOR SALE**—6-volt Winchager complete, almost new. Want Howard pre-amplifier #650; Howard #655 loop kit; Howard 610 power pack, and good crystal headphones. Morris Hagemester, Cathay, N. Dak.

**FOR SALE OR TRADE**—Philo all-wave battery-operated signal generator, \$25; Readrite ditto, \$20; 10" dynamic speaker, like new, \$5; Supreme 450 analyser, practically new, paid \$55, will sell for same or swap for Weston 778 or Triplett 1604. Also have Triplett 666H pocket V-O-M, \$15. Will consider swap for alignment tools and socket wrenches. Franklin C. J. Slay, Apt. 5-R, 243 W. 107th St., New York 25, N. Y.

**WANTED**—0-100 microammeter, any make. Frank J. Polinski, Warren, N. Y.

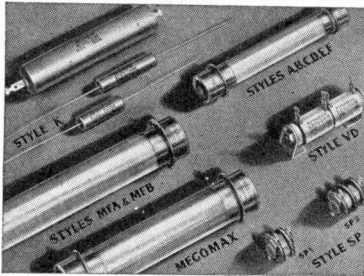
**FOR SALE**—Five 25 amp. 600 V. D.P., S.T. knife switches, slate base; circuit breakers, 30 amp. up to 100 amp. single and double pole; 0-6 amp. and 0-600 V. 7" Norton meters AC or DC; 0-50 amp. 50-0-50 amp., 0-50 V. 5" Jewel meters DC; 34 kw. 32 V. DC generator; 1 kw. 110 V. DC generator; 5 h.p. 3-phase, 60-cy., 220-V. motor; 7 1/2 h.p. 3-ph., 60-cy., 220 V. motor. H. W. Schultz, 1102 Sixth St., Beloit, Wisc.

**WANTED**—Tester for latest type tubes, also Jr. volttohyst or late multitester and other eqpt. M. W. Green, 96 South St., Walpole, Mass.

**WILL TRADE**—Have all kinds of tubes in good condition, also many parts and supplies, such as 0-1 Mil. meters, crystal pickups, phono motors, resistors, capacitors, speakers, books, etc. I want old gold of any type. Will trade or pay cash on basis of \$35 per ounce fine. R. G. Browning, 522-11th Ave., Prospect Park, Pa.

**WANTED**—All-wave sig. generator, tube tester, and set tester—all late models. Cash. E. E. Hurston, 329 Madison St., Brooklyn 16, N. Y.

## SPRAGUE KOOLOHM RESISTORS AT WAR



If you haven't been hearing much about Sprague Koolohm Resistors lately, it's only because there hasn't been much to say from a civilian standpoint. But there's been plenty happening nevertheless—and all of it has been bad news for the enemy. One after another, Koolohm construction with its famous insulation of heat-proof, moisture-

proof flexible ceramic has resulted in higher performance standards for various resistor types—from hermetically-sealed precision meter multipliers, to bobbin-type resistors, and special heavy-duty wirewound types. You'll be pleasantly surprised at the amazing advantages Sprague Koolohms will offer you A.V.D. (after V-Day)!

### YOUR AD RUN FREE

Send us your Sprague Trading Post advertisement today. We'll be glad to run it free as a part of our special wartime advertising service to the radio profession. "Equipment for Sale" and "Wanted" advertisements of an emergency nature will receive first attention. Different Trading Post ads appear regularly in RADIO RETAILING-TODAY, RADIO SERVICE-

DEALER, SERVICE, RADIO NEWS, and RADIO-CRAFT. Please do not specify any particular magazine for your ad. We'll run it in the first available issue that is going to press. Sprague, of course, reserves the right to reject ads which, in our opinion, do not fit in with the spirit of this service.

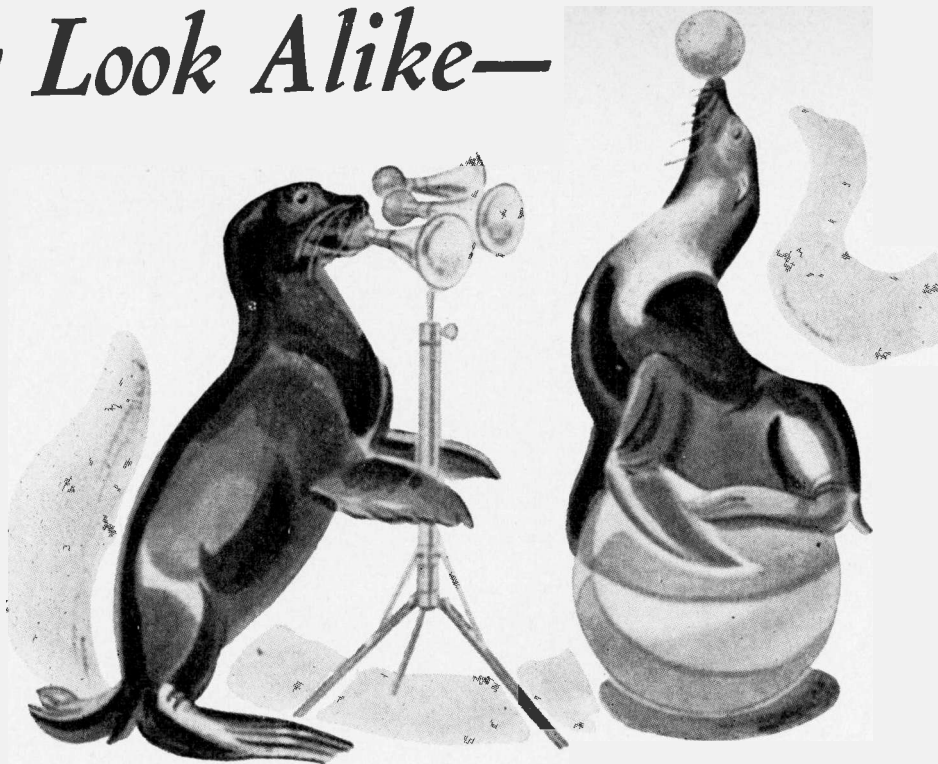
Dept. RSD-41, SPRAGUE PRODUCTS CO., North Adams, Mass.



# SPRAGUE CONDENSERS KOOLOHM RESISTORS

Obviously, Sprague cannot assume any responsibility, or guarantee goods, services, etc., which might be exchanged through the above advertisements

# They Look Alike—

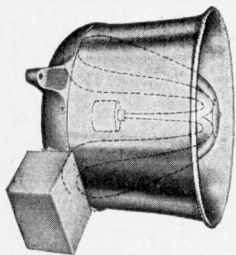


. . . *But What a Difference in Performance!*

★ Many seals, many brands of air-column horns, loud speakers and driving units look alike—but what a difference in performance!

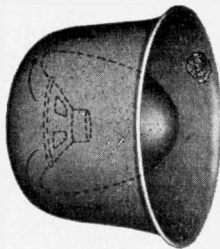
★ RACON won its position as World's Largest Manufacturer of air-column horns, speakers and units because of outstanding product performance. Outwardly some other speakers look quite like RACONS, but that's where the similarity ends. All RACON products contain top-quality materials, assembled by skilled craftsmen. RACONS deliver more output per watt of input. And *only* RACONS can supply patented Stormproof, Weatherproof Acoustic Material which prevent resonant effects while being impervious to any weather condition.

★ *There is a difference in loud speakers so be sure you get the best—get RACONS. A type is available for every conceivable sound distribution requirement.*



**MARINE HORN SPEAKERS**

The MARINE HORN SPEAKER may be used as a loud-speaker or microphone, comes in several sizes; is approved by the Bur. of Marine Inspection, Dep't. of Commerce. MARINE CONE SPEAKERS are the re-entrant type, suitable for indoor or outdoor use. Storm-proofed for all weather conditions. Sizes for 2, 3, 5, 8 and 12 inch speakers.

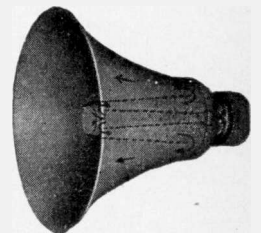


**MARINE CONE SPEAKERS**



**RACON P. M. HORN UNITS**

RE-ENTRANT TRUMPETS are compact, of the double re-entrant type which in a small space affords a long air column enabling them to deliver highly concentrated sound, of great clarity, over extremely long distances. Available in 6', 4½', 3½' and 3' air column sizes. RACON P-M HORN UNITS are available in operating capacities of 5 to 50 watts.



**RE-ENTRANT TRUMPETS**

**RACON ELECTRIC CO. 52 EAST 19th ST. NEW YORK, N. Y.**



**WPB's Wilson Bearish  
on 1944 Radio Production**

Charles E. Wilson, Executive Vice-Chairman of the War Production Board, recently stated that it was the belief of the agency that the signal (radio) equipment 1944 program, which is lumped with ground army ordnance, will be cut back 17% below the peak 1943 annual rate based on the 4th quarter of that year. However, that would still be 67% over the 1942 annual output. The 1942 output was higher than the normal radio output for the industry.

"1943 production will be about 60% higher than 1942. (But) the reason for this drop is that our capital equipment for the Army, as planned, is approaching completion. We are now beginning to reduce production to what is needed for maintenance purposes," Mr. Wilson said.

**Garod Puts Up Swell Sign**

The "extra measure," Garod Radio Corporation's slogan for total war has never been better demonstrated than in its recent presentation of the billboard display just erected in Times Square, New York City.

Seen by over a million people daily, Garod's announcement is on the northeast corner of West 47th Street, opposite Father Duffy's Statue, and commands a vista over one of the most highly-congested areas of New York's war-conscious entertainment world.

**New Upped Service  
Charges Possible By  
New OPA Supplements**

Heeding the rising cost of skilled labor and the additional costs of doing business, the Office of Price Administration on December 27th last made it possible to raise the charges for repair work above the ceiling previously fixed by Maximum Price Regulation (MPR) #165. The actual Supplements #21 and #22 which make this raise possible, are herewith set down. Copies thereof may be obtained from your local OPA office.

**REGULATION**

(Document No. 25663)

**PART 1499—COMMODITIES AND SERVICES  
(MPR 165, Supp. Service Reg. 21)**

**CHARGES FOR OVERTIME WORK**

A statement of the considerations involved in the issuance of Supplementary Service Regulation No. 21 has been filed with the Division of the Federal Register. For the reasons set forth in that statement and under the authority vested in the Price Administrator by the Emergency Price Control Act of 1942, as amended, and Executive Orders Nos. 9250 and 9328, Supplementary Service Regulation No. 21 is hereby issued.

§ 1499.673 *Charges for overtime work.* Persons performing services covered by Maximum Price Regulation No. 165, whose maximum prices are based upon a customer's hourly charge for labor, may increase such hourly charges in accordance with this regulation when their employees directly engaged in performing such services work overtime and are paid for overtime work at overtime rates. The following rules shall apply:

(a) *When customer requests overtime work.* Persons covered by this regulation may make an additional charge for work done at overtime wage rates in overtime hours if the customer actually requests that the work be done in overtime hours and agrees to pay the additional charge. The ratio of the overtime charge to the regular charge shall not exceed the ratio of the overtime wage rate to the regular wage rate; i. e., if overtime wages are one and one-half times regular wages (time and one-half for overtime) the overtime customer's hourly rate may

# In & Around the Trade

Being a condensed digest of some of the happenings in and around the radio trade as compiled by the Editors

be one and one-half times the regular customer's hourly rate. This paragraph shall not apply with respect to charges for work done in any overtime hours which have been taken into account for the purpose of increasing hourly rates in the manner authorized by the next paragraph.

(b) *General rule for 48-hour week including 8 hours overtime.* Persons whose employees directly engaged in performing such services regularly work 40 hours a week at straight-time rates and 8 or more hours at overtime rates may add the following sums to their maximum hourly charges established under Maximum Price Regulation 165:

Where overtime is paid for at 1½ times straight-time rates—5 cents per hour to any hourly charge under \$1.75; 10 cents per hour to any hourly charge from \$1.75 up to but not including \$3.50 per hour; 15 cents per hour to any hourly charge of \$3.50 or over.

Where overtime is paid for at double straight-time rates—10 cents per hour to any hourly charge under \$1.75; 20 cents per hour to any hourly charge from \$1.75 up to but not including \$3.50; 30 cents per hour to any hourly charge of \$3.50 or over.

(c) Except as otherwise provided by this regulation, Maximum Price Regulation No. 165, as amended, remains in force.

This supplementary service regulation shall become effective December 27, 1943. (56 Stat. 23, 765; Pub. Law 151, 78th Cong.; E.O. 9250, 7 F.R. 7871; E.O. 9328, 8 F.R. 4681)

Issued this 20th day of December 1943.

CHESTER BOWLES,  
Administrator.

**REGULATION**

(Document No. 25665)

**PART 1499—COMMODITIES AND SERVICES  
(MPR 165, Supp. Service Reg. 22)**

**REPAIR OF CERTAIN APPLIANCES AND  
EQUIPMENT**

A statement of the considerations involved in the issuance of this Supplementary Service Regulation No. 22, issued simultaneously herewith, has been filed with the Division of the Federal Register. For the reasons set forth in that statement and under the authority vested in the Price Administrator by the Emergency Price Control Act of 1942 as amended, and Executive Orders Nos. 9250 and 9328, Supplementary Service Regulation No. 22 is hereby issued.

§ 1499.674 *Maximum prices for repair of appliances and equipment—(a) General rule.* Any person engaged in the repair or maintenance of appliances and equipment (as defined below), who uses a customer's hourly rate to determine his maximum prices, shall determine his maximum customer's hourly rate for such services by any one of the following methods:

(1) He may charge the highest customer's hourly rate actually charged by him in March 1942 for the same service to a purchaser of the same class; or

(2) He may multiply by 2 the average basic hourly wage rate (as defined below) paid on October 3, 1942, to employees performing the particular type of service; or

(3) He may add 60c to the average basic hourly wage rate (as defined below) paid on October 3, 1942, to employees performing the particular type of service.

(4) He may, if he employs a total of not more than 8 persons and if wage increases paid by him have been exempted from the provisions of Executive Order No. 9250 by the National War Labor Board and do not violate any regulations of that Board, add to a customer's hourly rate determined under subparagraph (2) or (3) an amount equal to the increase since October 3, 1942, in the average basic straight-time hourly rate for mechanics performing each type of service. Adjustments under this subparagraph (4) may not be made more often than once every 30 days.

(5) Where the rates under subparagraph (2), (3), or (4) are not divisible by 5c, they may be adjusted upward to the nearest amount so divisible.

(b) *Rule for persons having no employees.* Any person subject to this regulation who does not employ any mechanics to perform such work may determine his maximum customer's hourly rate for repairing appliances and equip-

ment by either of the following methods:

(1) He may charge the highest hourly rate which he charged in March 1942 for the same service to a purchaser of the same class; or

(2) He may charge the maximum hourly rate of his most closely competitive seller who does employ mechanics to perform the service.

(c) *Minimum charges for service calls, etc.* Minimum charges and mileage rates may not exceed the March 1942 minimum charges and mileage rates to the same class of customer; except that any minimum charge made in March 1942, which was based upon a stated minimum of time, may now be based upon the same minimum time applied to the hourly charge permitted by this regulation.

(d) *Records.* Any person who increases his prices under this regulation shall prepare a statement setting forth:

(1) His maximum customer's hourly rate for each type of service;

(2) The name and address of every employee who was engaged on October 3, 1942, in performing appliance and equipment repairs. (Show what type of service was performed by each employee; do not list clerical, supervisory and non-productive employees.)

(3) The hourly wage rate paid on October 3, 1942 to each employee so listed;

(4) In the case of sellers adjusting their prices under paragraph (a) (4), a statement of the hourly wage rate of each employee, on the date of any price increase made under this regulation.

(5) A reference to the paragraph of this regulation under which he has computed his ceiling prices.

This statement shall be retained in the seller's files and may be inspected by the Office of Price Administration. A signed copy of the statement shall be filed with the seller's local War Price and Rationing Board on or before the date of any price increase effected under this regulation. No price increase hereunder shall be lawful until such statement has been filed.

(e) *Invoice.* Any person subject to this regulation shall, upon request, furnish the customer with an invoice for such service, separately showing the hourly rate for the service rendered to the customer, the number of hours worked and any charges made for parts and materials.

(f) *Posting.* When a price is increased as authorized herein, the seller shall post conspicuously in his place of business a notice setting forth his new maximum customer's hourly rate for each service involved. This notice shall be posted in the following form:

**CEILING PRICES FOR LABOR**

Service	New hourly rate
.....	.....
.....	.....

(g) *Definitions.* (1) "Appliances and equipment" means mechanical, electrical or gas appliances commonly used in homes, hospitals, hotels, institutions, offices, retail establishments or schools, including but not limited to electric fans, lamps, refrigerators and refrigerating equipment (up to 25 h.p.), water coolers, air conditioners (up to 25 tons capacity), sewing machines, vacuum cleaners, washing or ironing machines, commercial or domestic kitchen equipment, radios and phonographs (not primarily designed for commercial, military or police use), and stoves. The term does not include gas unit heaters, furnaces, industrial equipment, water heaters, oil burners, typewriters, adding machines, dictating machines, duplicating equipment or other office machines.

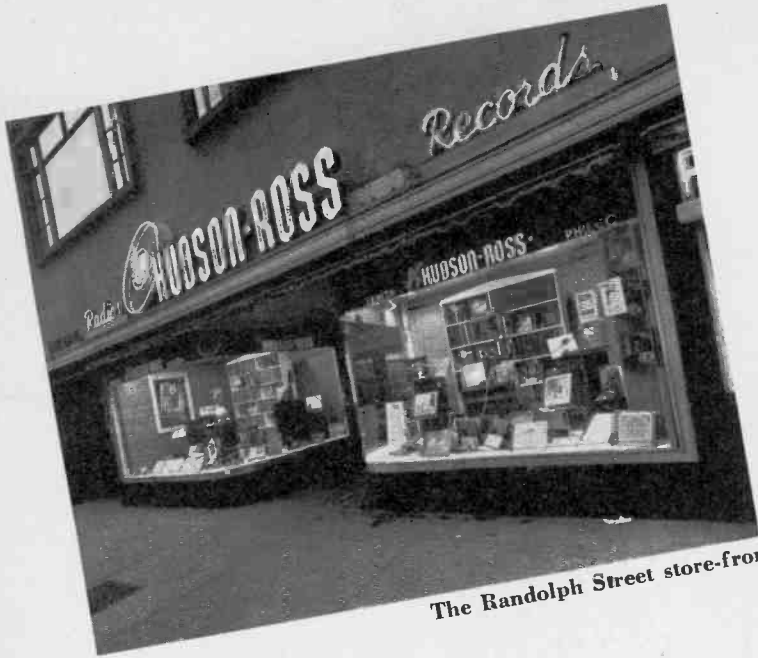
(2) "Average basic hourly wage rate" is a rate determined as follows: Add together the straight-time hourly wage rates of all productive mechanics (excluding supervisory and clerical employees) regularly engaged in performing a particular type of service. Divide the sum of these by the number of such mechanics employed. This will give you the average.

This supplementary service regulation shall become effective December 27, 1943.

NOTE: The reporting and record-keeping requirements of this regulation have been approved by the Bureau of the Budget, in accordance with the Federal Reports Act of 1942.

Issued this 20th day of December 1943.

CHESTER BOWLES,  
Administrator.



The Randolph Street store-front

Almost a  
Million  
Records!

**Editor's Note:** Mr. Aaron Rosenbloom who kindly furnished *RSD* with this article, is no newcomer either to radio or the record field. A full partner of Hudson-Ross, his experience in music goes back 15 years when he traveled the country selling instruments and phonographs. Then later he was proprietor of *Rose Radio* where he sold many different makes of sets and combos. Mr. Rosenbloom's opinions are valuable because they are backed up by a native ability plus actual experience. Many a serviceman, radio or appliance dealer can model his small store on the ideas presented by Mr. Rosenbloom and thereby enhance his income materially. The author's partners, each well-known in the radio and record fields are: Jack Ablin, Merrill Rosenbloom and Mitchell Wolfson.

**T**HE war forced us out of the active radio sales business, and in its place we have been selling about 3/4-million records per year. And now that we are on top—(we believe that we sell more records than any other records-exclusively shop or "chain")—we plan to stay in the record business. Only our growth has not been easy.

Originally the "chain" consisted of one store at 159 West Madison Street in Chicago. Here a brisk and profitable radio set sales business had been conducted for some time before the war. Records had been a secondary thing. After the war, the 159 West Madison Street store absorbed the old "Rose Radio Co." store at the corner of Clark & Jackson Blvd. There too, the mainstay had been radios. With the combining of the resources of both stores, a third

store was established. This is our greatest one, located on East Randolph Street in the heart of the theatrical section of Chicago's Loop and directly across from the world-famous Marshall-Field department store. The conversion of the two radio stores to records-only, as well as the refurbishing of the Randolph Street store was done simultaneously. It took a lot of engineering and a lot of sweat, patience and some frayed tempers. But when it was finished, the *Hudson-Ross* chain was an established reality. As such it has prospered!

At present the sale of radio sets is at an all-time low because of war, the resultant stoppage of new production and the depletion of accumulated stocks. So this article will refer only to recordings. Here are some interesting facts:

Interior of the Jackson Blvd store



Part of the extensive stock of the "chain"



by  
**aaron rosenbloom**

**When the War forced this dealer out of the radio set business, he organized the world's biggest records — exclusively chain of stores**

With some 25 sales persons selling records and 39 booths available— (and we will discuss the booth question a bit later)—in the past year we have:

Sold about 750,000 records, of which

Fifty percent were popular and the balance light-operatic and classical;

Sold over 10,000 semi-permanent needles, (which ought to answer the question of "does that kind of needle sell?")

Found that package business (albums) are selling 50% ahead of last year.

We keep outrageous hours in one of our stores. The Randolph Street unit is open daily from 10 A.M. until 11 P.M. except on Saturday when it is open until midnight. This entails more than one shift of sales personnel. Yet the extra shift has paid us

handsomely. We have found that there are as many people who will come to buy a record after a movie or before going home from a dinner in town, as there are afternoon shoppers.

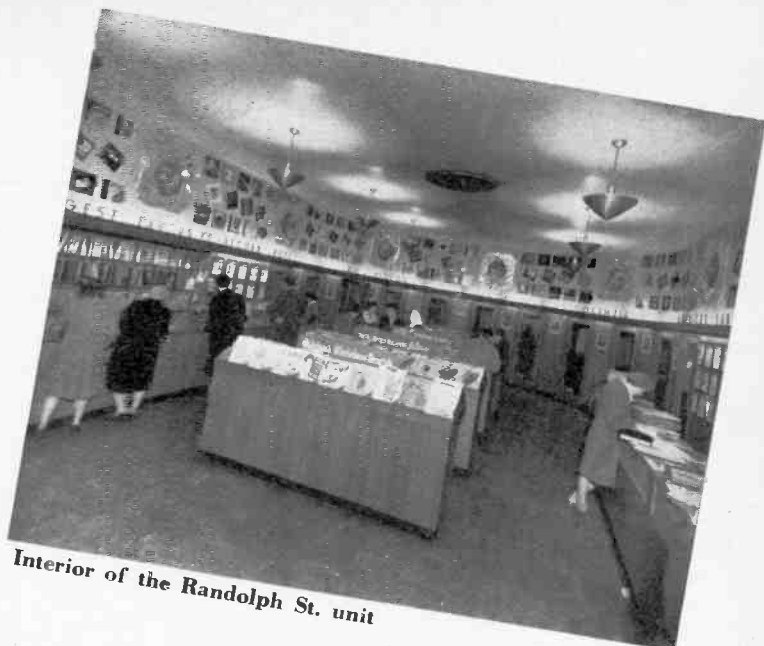
How did we get our "chain" known? We advertised! Most important were our window displays. Here we spent a lot of time, and considerable money. The importance of attractive, crowd-stopping window displays is not to be underestimated. It will pay every reader-dealer to go out right now and look at his own window and say to himself, "*Is this the very best that I can do?*" If there is the slightest doubt, get busy with that window until it is the very finest display you can produce!

But to get back to our own problems. We also used personal mailings. We did publicity stunts such as having movie and radio stars

autograph their records. These stunts we found, brought a lot of new faces into our store; and each sale gave the sales person a new name to add to our growing list. Since the number of records available is now somewhat curtailed, we have more or less discontinued the publicity stunts.

In order to sell  $\frac{3}{4}$ -million records obviously we must have an extensive stock. Literally, ours runs into the tens of thousands of records! In looking back, we realize that we never planned it that way; the stock pile just "grew" like Topsy. It seems that when you start to keep your customers happy, you naturally acquire a big stock. Sometimes we have felt that we had made too big an outlay, but mature hindsight has taught us that our stock, large as it is, will be small when this war is

*(Continued on page 28)*



Interior of the Randolph St. unit

Left-hand side of the Madison St. Store

Right-hand side of the Madison St. store



# MORE ABOUT THE PHILCO MYSTERY CONTROL

**Many Mystery Controls only get out of whack, needing no repairs. This article explains aligning them with receiver**



This is the familiar Mystery Control unit

The Mystery Control receivers are shipped with five (5) different control frequencies which range from 350 to 400 k.c. These are identified by code numbers appearing on the serial number ticket and on the rear of the chassis. These code numbers and frequencies are as follows:

- Code 5—355 k.c.
- Code 6—367 k.c.
- Code 7—375 k.c.
- Code 8—383 k.c.
- Code 9—395 k.c.

The purpose of the different control frequencies is to prevent interaction between two of these remote control receivers which are on the same floor or are exceptionally close together.

If three receivers are to be operated at the same time and are closely situated, it will be advisable to adjust the control frequency of the first set to 355 k.c., the second at 375 k.c. and the third to 395 k.c.

When realigning or changing the control frequency of the circuit, a Philco model 077 Signal generator, or equivalent, with a coil of wire (about 4 or 5 turns—12" in diameter) attached to the output terminals is required. The leads between the coil of wire and Signal Generator should be long enough so that the coil of wire can be placed near the large secondary inductor in the bottom of the receiver cabinet.

With this apparatus, the control frequency is adjusted as follows:

1. With the temporary coil of wire in the center of (or near) the secondary inductor, the control frequency to which the Control Amplifier is tuned can be determined by tuning the signal generator between 350 and 400 kc. When the signal generator is tuned to the control frequency, the 2A4G thyratron tube will glow (blue haze). If this frequency is to be used, leave the signal generator indicator at

this point or turn the indicator to any other frequency desired between 350 and 400 k.c.

2. When the control frequency is selected, turn the sensitivity control (117) in Model 116 and (89) Model 55 located on the left rear of the chassis—towards the position marked "extreme." Using the 2A4G thyratron tube as resonance indicator, adjust padders (103), (115), (119) in Model 116 and (74), (85), (90) in Model 55 for maximum signal. This will be indicated by the brilliance of the glow in the 2A4G thyratron tube. As the padders are adjusted, gradually turn the sensitivity control to the "near" position or reduce the output from the signal generator. When the padders are correctly adjusted to maximum, the thyratron will glow with the sensitivity control (117) at the "near" position and with a very weak signal from the signal generator.
3. Next, adjust the padding condenser (121) in Model 116 and (92) in Model 55 on the secondary in-

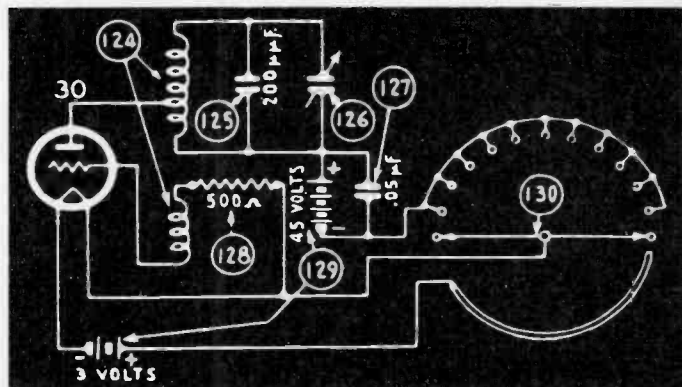
ductor located in the bottom of the receiver. The padding condenser is the cardboard-enclosed unit located in one corner of the secondary inductor. This padding condenser should be carefully adjusted for maximum glow in the 2A4G tube. Use the weakest signal possible from the signal generator that will cause the 2A4G to glow. Also, have the sensitivity control as close as possible to the "near" position. Extreme care should be used in adjusting the padder to the exact point of resonance, as the secondary inductor After adjusting the circuit, re-is a very sharply tuned circuit. move the signal generator and loop from the receiver.

4. The control unit is now adjusted as follows:

A. Dial any one of the stations indicated on the remote unit by pulling the selector to the "Stop" position. Then, as the dial is released at the "Stop," press the "Stop" down and hold it in this position.

(Continued on page 36)

Circuit of "Mystery" Control Set



# Service is Our Only Business



To this long counter come many people who leave as satisfied customers

**W**E repair radio sets and sometimes phonograph combinations or record players. That is our *entire* business. Just that and nothing else! And not including jobs entailing the replacement of a battery or a burned out tube, we have been repairing about 8,000 sets per year since Pearl Harbor.

This work has been done with 1 outside man, 3 inside servicemen, 1 battery man (whose work will be explained later) and 2 part-time servicemen.

To handle so many repair jobs we had to set up a "system." It works so well we believe it warrants consideration, especially by the readers who may wish to copy some of our ideas, some which we are sure will help them, too.

In the first place, and after much thought on the matter, we totally abolished the practice of giving a "free estimate." In its place we have a minimum charge of \$2. This basic fee is charged regardless of what we do with the following exceptions: replacement of batteries or tubes.

We know this fee is legal under OPA regulations and we feel that it is justified, knowing our costs. Our customers evidently agree and

have sufficient confidence in us to be keeping us so busy that sometimes it takes from 10 days to two weeks before we can promise to "get" to a set repair.

Further than that, there is no "suggested" repair price. We mean, that if the cause of trouble is not obvious, we will not estimate the price of a repair, nor do we intimate what we found wrong with the set having repaired it. (We have found that it generally takes *more* time to find out what is wrong with a set than it usually does to fix it! We know that such has also been the experience of other servicemen).

About 2% of our customers kick at this no-guess, no specified-price arrangement, and to them we do go into detailed explanations as to what was wrong with the set, and what was done to repair it; also why it took almost as long to find the trouble as to repair it, with the consequent charge against the customer as it was. Usually this has satisfied the customer, and he withdrew his objections. If the customer seemed unhappy with the charges asked for his job, every effort was made to compromise the amount until he was pleased and satisfied.

In billing the charges we make

*In spite of shortages, this Serviceman keeps a \$50,000-a-year repair business going by customer relations*

**by  
herman s. sacks**

separate entries for parts consumed and the labor time to install. This follows the usual automobile repair policy with which we find most of our customers are familiar. In prices we do no wholesale business; our prices being the same to the "trade" as to the set owner.

If the customer has a large console and requires service at his home, we charge him \$2 for our trip out there and another \$2 if we must bring his set back to our shop. If we don't take the set, we charge only the first \$2. If after having completed a job and returned it to the owner, he may still complain that the set does not work, we make any number of trips necessary to put the set into first class order without further charges except for the extra parts installed; there is no charge for labor in this latter instance.

We do this because all of our repair work is guaranteed for 90 days. That applies to work on big consoles or small midgets. In either event, we make any additional repairs without charges other than for new, or extra parts which may be required.

Other unusual features of our service is that we invite *criticism!* A few days after a repair job has been done, we send out a card reading as follows:

Harrison Radio Service Dept. Jackson Blvd. 2nd Floor	N <sup>o</sup> 5979		D. R.		N <sup>o</sup> 5979		N <sup>o</sup> 5979	
	Address		Phone		Apt.		Phone	
Service man check			Charges			Benchman, Check items on		
Changer <input type="checkbox"/> Chassis <input type="checkbox"/>			Condensers			serviceman's column.		
Tubes <input type="checkbox"/> Speaker <input type="checkbox"/>			By Passes			Repaired by		
Crystal <input type="checkbox"/> It pack <input type="checkbox"/>			Resistors			Final test by		
Set Dead <input type="checkbox"/> Hums <input type="checkbox"/>			Transformer			Remarks		
Weak <input type="checkbox"/> Fades <input type="checkbox"/>			Transformer			Time		
Distorted <input type="checkbox"/> Noisy <input type="checkbox"/>			Other			Date Del'd.		
Special Attention			Total			Date promised		
Vol. Cont. <input type="checkbox"/> P. Bulbs <input type="checkbox"/>			Service Chg			Call cust. a.m. <input type="checkbox"/> p.m. <input type="checkbox"/>		
Tone Con. <input type="checkbox"/> Sensitivity <input type="checkbox"/>			Total			O.K. to repair <input type="checkbox"/>		
Dial <input type="checkbox"/> Batt. <input type="checkbox"/>			Cabinet: good <input type="checkbox"/> n.g. <input type="checkbox"/>					
Aerial <input type="checkbox"/> S. W. <input type="checkbox"/>			Remarks					

This is the three-part card which is the heart of the service system

Dear Customer:

This will acknowledge receipt of \$..... paid to our serviceman for service job #..... If there is any further information you desire regarding the above unit, please call Harrison 7670 and ask for Mr. Sacks. Very truly yours

As far as we know no other service shop in Chicago makes the same effort to have the customer report on the job after he has had a chance to try out the set over a short period.

This policy builds good will and creates a friend of the house who will not forget our shop. In the long run it should pay out well. Because as long as there are tubes, condensers, resistors or transformers there will be service . . . even after Peace and the "new" sets come in!

We have not done much advertising in the matter of batteries. Here we have led the field. We have been buying Signal Corps batteries for some time by bidding whenever we could; and we employ one man (mentioned at the beginning of the article) to use the "guts" of these bat-

teries to "make" 45-volt portable batteries and battery-packs of which the originals have been so scarce since war. As a result, we have been literally swamped with requests for batteries; and the repair of battery sets have been coming to us at a natural complement. Incidentally, the remaking of batteries is a profitable business, as we get list prices for the "new" batteries, which, in fact, they are!

All of our battery business has been gotten through advertising in local papers. Next summer, when it will be possible that not a single portable set will be left with its original batteries, we expect to do a land-office business.

Naturally, to turn over 8,000 sets per year is no small accomplishment and we have our share of headaches. We have not always been able, for instance, to get the customer to come for his set on time, as soon as it was repaired. And we have too little space to permit sets to lie around the shop for a month or so after repair. So when a customer fails to

come around in time we send him a card reading:

Dear Customer:

The repair job you left in our Service Department several months ago, service job #....., has not yet been called for by you. We would appreciate your calling Harrison 7670 advising when you expect to pick up this unit. Unless we hear from you within the next ten days, we will be obliged to dispose of same for charges. Trust that this will not be necessary. Very truly yours,

Believe it or not, we have not had to sell many sets. Mostly, customers either forget that they had their sets to repair, or they have not the money to pay, or they have suddenly gone out of town. We try every way to have them take the set, even giving them plenty of extra time; but in the final analysis, we do sell it, crediting the customer with the charges, and sending him any overage from the sale.

What have we done about the scarcity of tubes? Just this . . . if we have not the tube which the customer requires, we either advise the customer that we believe that he should wait for the tube, or else we try to make a substitution. This is done by either wiring in a new socket to match some tube we have at hand, or else making an adaptor to fit a substitute tube we have in stock. If we are unable to substitute for one reason or another, we return the set to the customer and make out a card for him which reports (a) the tube required, (b) the customer's name and (c) the type set for which it was required. This card is placed in our file under the tube type.

At present we have over 3,000 tube requests awaiting filling. If a substitute or original type pops up, we have merely to pull the card and advise the customer that the tube is in. The card we use for this purpose reads:

Dear Customer:

We have just received your tube, type . . . . . Kindly call for same and bring your old tube with you, also this card. Very truly yours

The tube cards act in two ways. *One*, they create a great customer file for later reference; and *two*, the card is an invaluable piece of good-will advertising.

As for the actual service records themselves—we have all data on one card which is reproduced herewith. The first column is filled out by the serviceman. He checks for all visible things: is the set dead, does it hum, does it rattle, is it weak, noisy, distorted, fading, or otherwise? Also how are the controls, panel bulbs, sensitivity, etc. *In the presence of the customer the counter man marks down the condition of the cabinet, showing the customer where there* (Continued on page 38)

This orderly "disorder" shows action. Lunch hour finds only one serviceman on duty. Normally there are more who work on both sides of bench



# AUTOMATIC C. A. A. RADIO SAFETY DEVICE

*The postwar period will bring many new things into the sphere of the serviceman. Some will go exclusively into airplane and airport radio. Here described is a type of unit they might meet*

**N**EW automatic radio safety devices—with robot-like ability to stand guard over the radio ranges forming the airway lanes over the United States, sound the alarm when anything goes wrong, and return to their silent watch—have been recently delivered to *Civil Aeronautics Administration*.

Probably the most important of these devices is the automatic radio range monitor. Under certain weather conditions, or because of malfunctioning, the four radio courses projected by a radio range station will, sometimes shift without warning to the pilot, or even stop functioning. More than one accident was caused in the past by such wayward behavior of the radio ranges.

One of the "problem" radio ranges of the C. A. A. is that a Salt Lake City where peculiar terrain and other conditions have caused range courses to vary. In July 1943 the C. A. A. installed entirely new equipment, incorporating all the new developments designed to make the signal steady and safe. The automatic range monitor was first installed on the approach leg at Salt Lake City to warn of any deviation from the established courses. It is now undergoing the usual C. A. A. service test. The new radio range monitor eliminates this danger by providing, to both the fliers and the ground crews, instant warning if any radio course shifts as little as 3° from its normal setting, or fades below its normal strength. The monitor may be adjusted to operate all warning devices with a range course shift of less than 1°. Eventually all ranges will be so monitored.

The course monitor receiver is located 1200 feet from the radio range station, directly on the radio course, and is connected through a telephone line to an indicator panel in the airport control room. Four receivers are required for all the four radio courses of the standard government four-course radio

range. So long as the radio course does not shift, the monitor receiver continuously picks up the interlocking A and N signals transmitted by the range station. If the course shifts, either the A or the N signal begins to predominate, the amount of the course shift being indicated by the comparative difference in strength between the A and the N signals. When this happens, the monitor receiver automatically transmits an electrical impulse to the monitor board at the airport, which flashes a red light and sounds a siren to warn the ground crew; at the same time, the monitor automatically dials the range transmitter which instantly begins to send out to all pilots a warning signal at the end of each A-N cycle.

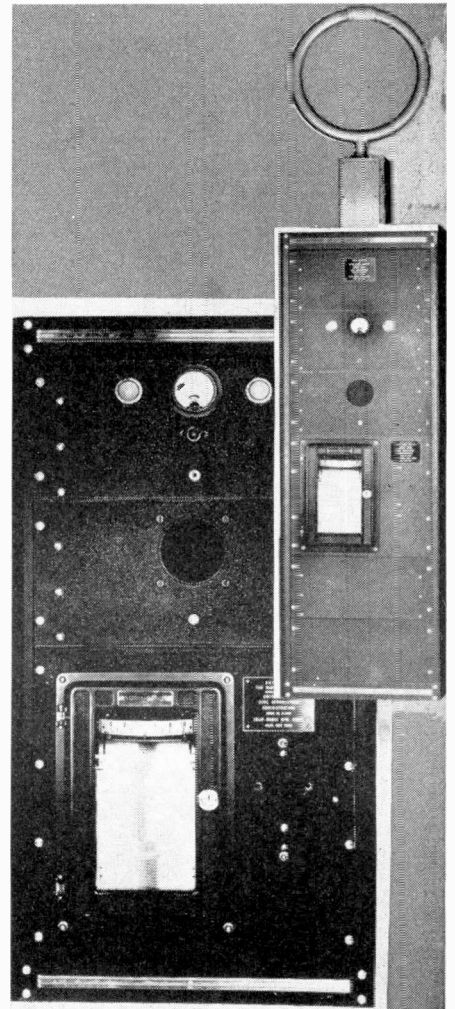
The same warning is given by the automatic monitor if the link circuit relay fails to interlock the A and N signals correctly or becomes locked; or if the output of the radio range station drops below a predetermined level; or if more than one-half of the range station identification call is not being transmitted.

The functioning of the monitor receiver presents many interesting electrical features. To measure the comparative strength of the A and N signals more accurately than it can be done by a human ear, the receiver automatically divides them and feeds them into separate channels. After the two signals have been equally amplified and rectified, the resultant direct currents from the two channels are fed, in opposite phase, to a balanced bridge circuit. Should the course shift, the output of one channel becomes greater, causing the pointer of the indicating instrument on the control board to move, showing how much the course had shifted, and to which side; at the same time, the warning light and the siren begin to operate.

The course monitor board, located at the airport, mounts the visual indicator

to show the radiation strength of the range station; a green light which remains lit so long as the station is transmitting its courses correctly; a red  
(Continued on page 37)

Insert shows complete range monitor; with fan marker monitor panel below



# ELECTRICAL APPLIANCE *Retailing*

## THE CHICAGO EDISON PLAN OF "SWAP"

*The dealers, war workers and Uncle Sam  
all benefited from this unusual scheme*

**L**AUNCHING of a city-wide, co-operative campaign to unearth and recondition idle electric appliances for resale to Chicago families, especially war workers, now unable to obtain such devices because of wartime manufacturing restrictions has been inaugurated by Commonwealth Edison company.

Spearhead of the drive was a broad-gauge newspaper advertising program starting October 18, 1943 which urged the public to "swap" out-of-service or discarded electrical conveniences—regardless of age or condition—for War Stamps at appliance stores participating in the plan. Dealers made whatever repairs necessary in their own shops and then offered the appliances for resale. There were plenty of buyers.

Manager E. M. Ball (right) of Commonwealth Edison explains the plan



The "swap" campaign was the result of a War Production Board appeal to public utilities enlisting their aid in ferreting out and redistributing the millions of cast-off appliances gathering dust in the nation's attics, basements, closets and garages. Sparkling the drive was a recent survey by the Office of Civilian Requirements, the WPB pointed out, which showed a definite relationship between absenteeism in war plants and the lack of labor-saving equipment in workers' homes.

The opening gun in the drive was "fired" at a dinner given to the dealers, when details of the plan were discussed. Meetings were scheduled for other sections of the city.

Although *Commonwealth Edison* Company sponsored the campaign advertising and provided many promotional aids, its own stores did not engage in the "swap" activity. For the convenience of the public, however, the utility maintained a direc-

A window-full display of swapped appliances brought in by Edison Co. plan



Ads like  
this did  
nice job

tory of participating dealers. Customers telephoning the company or calling at its stores were told the nearest location where they could exchange appliances for War Stamps. They were also told where they could purchase new or reconditioned appliances and have out-of-order devices repaired.

In the first eight weeks of the "swap" campaign, 5,766 electrical devices were turned in at participating stores, E. M. Ball, manager of Commonwealth Edison company's dealer cooperation department, reported.

Heading the list of appliances unearthed thus far in the drive, are electric irons with a total of 1,768 turned in to date. Toasters rank

Hy Bergman, owner of shop at the left, who says Swap Plan keeps him hopping



Radio Service-Dealer



# SERVICE HINTS

.....

second with 543, and vacuum cleaners third with 392. Substantial numbers of space heaters, fans, waffle irons, hot plates, coffee makers, broilers and washers have also been "swapped." A total of 296 dealers are now enrolled in the activity.

Many of the "swapped" appliances have been found to be in such good condition they could be resold without repairs of any kind. Dealers report a quick turnover on practically all items.

As explained, the "Swap" campaign had a three-fold purpose.

First, it enabled new family units and people whose electric work-savers needed replacing to obtain appliances which they would otherwise have been denied.

Second, it promoted the sale of War Stamps.

Third, it helped the dealers to increase their business.

The stores of the dealers who co-operated were easily identified by window streamers and window cards advertising the "Swap Plan." This material, as well as tags to identify appliances and a limited number of handbills, imprinted with the dealer's name and address were supplied

(Continued on page 36)

Bill Locke (left) looks over a roaster which he bought swapping War Stamps



Ed. Zima uses War Stamps to purchase a few used appliances for renewing; sale



## Keep Your Customers Happy With Service Hints

Almost every Appliance Serviceman worthy of his salt wants his customers to be a happy lot. He wants this because they will return to him again and again. They will also get him more customers.

Contrary to usual belief, one dealer has adapted a plan of giving his customers a simple mimeographed sheet of "DON'TS" for their toasters and electric irons. So successful has this plan been, that the DON'TS are here set down. They originated with the Proctor Electric Company, well-known manufacturers of appliances.

### Toaster Don'ts

1. Do not permit crumbs to collect in the toaster. Remove bottom plate as per instructions, wipe off crumbs, pick up toaster firmly by opposite corners of base and shake slightly to permit loose crumbs to drop out. Replace bottom plate.
2. Do not drop anything inside of toasters, especially articles made of metal as this will cause serious damage.
3. Do not permit water to come in contact with the toaster.
4. Don't place toaster near an open window, as it may rain while you are out. This causes rust and may cause a short and blow out a fuse.
5. Do not place buttered bread in toaster, as butter will melt and run down inside of the toaster causing electrical parts to become moist, and as a result may cause a short or blow out a fuse, as well as waste butter. Butter the toast after you remove it from the toaster while it is still hot.
6. Do not pry toast out of toaster with a fork or other metal instruments as they may come in contact with the element, and cause the element to burn out.

7. Don't put the appliance away hot.
8. Don't pull cord from outlet by yanking cord. This puts a strain on the terminal connection and may cause a short or a fire.
9. If you have a well-type toaster, do not use bread that is wider than the slot. Do not force any large slices of bread down, as you will not only have a difficult time getting it out, but it may jam against the heating element and cause damage or a short.

### Toaster Do's

1. Always keep the toaster clean by removing all the crumbs, and also clean outside of the toaster with a damp cloth or fine cleaning powder, such as Bon Ami.
2. Remove cord from socket whenever you are finished with the toaster and put the toaster away in its proper place.
3. Keep the toaster in a warm dry place

### Irons—Don'ts

1. Don't let the cord become wet.
2. Don't let the cord become frayed, especially at the end.
3. Do not allow a non-automatic iron to

overheat, causing the element to burn out.

4. Do not place iron on edge of ironing board and thus give it a chance to fall and break.

5. Do not use any electrical appliances on electric currents other than specified on the directions.

6. Do not place iron in such a position that other people, or dogs, may come in contact with the cord and pull the appliance from the table or ironing board.

7. Do not permit the soleplate to become dirty, especially heavily coated with starch stains, as this will cause poor ironing and will not permit the smooth sliding surface to do a good job. The accumulation of starch on the soleplate will cause ironing to become a laborious job.

8. Do not allow the soleplate to come in contact with any hard surface, causing the soleplate to become scratched or nicked, as such nicks may rub or tear fine fabrics.

9. Do not replace cords with an inferior make, or a cord which is not large enough to carry the amount of wattage required by the iron.

10. Keep irons away from open windows because it may rain while you are out. This will cause the iron to rust and perhaps cause a short.

11. Do not put iron away hot.

12. Keep cord away from the hot iron because an iron can burn a cord very badly and break down the insulation.

13. Do not place iron in an oven as a safe keeping place, because you may start up the oven and burn up the iron.

14. Do not have the padding on your ironing board too thick.

### Do's for Irons and Toasters

1. Have your local electrician check over your cord and cord connections, plugs and wall sockets every six to eight months. Remember a stitch in time saves nine.

If your appliance requires any major repair work, we suggest that you return the appliance directly to the manufacturer or to one of his authorized service stations, which are usually located in all of the large, principal cities.

### Supersonic Waves Test Rubber Tires

A new device which tests rubber tires for flaws by means of supersonic waves has recently been demonstrated, according to the November issue of Ohmite Tips.

The tire is placed in a trough of water and slowly rolled. The supersonic waves are transmitted through the water to the tire sides and a microphone picks up the waves passing through the rubber. As long as the rubber is solid, the waves come through and a green lamp is kept lighted. If a flaw breaks the continuity of the waves, a red lamp is flashed, the article concluded.

» » »

## Trouble-shooters' Time Saver

Some simple remedies for appliance ills which can be traced easily by using table below. Paste it over your work bench

COMPLAINT	POSSIBLE CAUSES	COMPLAINT	POSSIBLE CAUSES
<b>Does Not Heat</b>	<p><b>Automatic Toasters</b></p> <ol style="list-style-type: none"> <li>1. Loose connection at wall receptacle. Check service cord plug—spread prongs—tighten prong screws.</li> <li>2. Blown wall receptacle fuse. Check and replace.</li> <li>3. Broken toaster service cord. Check and repair or replace.</li> <li>4. Burned out element. Check and replace.</li> <li>5. Crisper knob in wrong position. Reset to a higher position.</li> <li>6. Switch contact points sprung so they do not contact. Bend slightly for good contact.</li> </ol>	<b>Sticks To Clothing</b>	<ol style="list-style-type: none"> <li>2. Thermostat stuck closed. Replace thermostat.</li> <li>3. Thermostat out of calibration. Check on Proctor iron tester.</li> <li>1. Excessive use of starch. Or clothing not properly rinsed. Or dirt on base of iron. Remove accumulation on iron base with damp cloth. Polish with dry cloth. Silver polish is excellent for stubborn cases.</li> </ol>
<b>Bread Tray Sticks</b>	<ol style="list-style-type: none"> <li>1. Replace tray in guide slot.</li> <li>2. Release trigger bent. Check and straighten.</li> <li>3. Lift spring unhooked. Hook lift spring.</li> </ol>	<b>Smokes</b>	<ol style="list-style-type: none"> <li>1. New or recently repaired irons may smoke for a short period. Place on high heat and leave on circuit for a reasonable time until smoke disappears.</li> </ol>
<b>Burns Bread After Toasting Several Slices</b>	<ol style="list-style-type: none"> <li>1. Compensator is faulty. Replace.</li> </ol>	<b>Never-Lift Irons</b>	<p>In addition to other possibilities listed above the following may occur:</p> <ol style="list-style-type: none"> <li>1. Check to see if legs bind or rub against soleplate or cover. Bend slightly.</li> </ol>
<b>Operates Only One Slot</b>	<ol style="list-style-type: none"> <li>1. May be using wrong slot for single slice. Use slot marked "One Slice".</li> <li>2. Element burned out. Replace element.</li> </ol>	<b>Legs Stick</b>	<ol style="list-style-type: none"> <li>1. Leg assembly may be too far forward. Return to factory for repairs.</li> </ol>
<b>Smokes</b>	<ol style="list-style-type: none"> <li>1. Accumulation of bread crumbs. Remove crumbs.</li> <li>2. New or recently repaired toaster may smoke temporarily.</li> </ol>	<b>Saddle Assembly Stiff</b>	<ol style="list-style-type: none"> <li>1. Legs below soleplate. Remove back nameplate and tighten legs.</li> </ol>
<b>Toasts Bread Unevenly</b>	<p><b>Non-Automatic Toasters</b></p> <ol style="list-style-type: none"> <li>1. Heating element wire may be sagging or out of proper grooves in mica.</li> <li>2. Bread cut unevenly. Bread should be sliced straight.</li> </ol>	<b>Drags or Snags</b>	<p><b>Waffle Iron</b></p> <ol style="list-style-type: none"> <li>1. Loose wall receptacle. Check plug—spread prongs—tighten prong screws.</li> <li>2. Blown wall receptacle fuse. Check and replace fuse.</li> <li>3. Broken cord. Check and repair or replace.</li> <li>4. Thermostat stuck open. Remove thermostat, check and replace thermostat.</li> <li>5. Burned out upper or lower element or broken connecting cord. Disassemble, check and replace.</li> </ol>
<b>Will Not Turn Bread</b>	<ol style="list-style-type: none"> <li>1. Guard bent. Curve guards to proper shape.</li> <li>2. Door bent so it does not drop down far enough. Realign door to open properly and far enough.</li> </ol>	<b>Does Not Heat</b>	<ol style="list-style-type: none"> <li>1. Waffles left in iron too long.</li> <li>2. Batter too thin.</li> <li>3. Recipe not followed.</li> <li>4. Thermostat does not open soon enough. (Calibration?)</li> </ol>
<b>Does Not Heat</b>	<p><b>Irons</b></p> <ol style="list-style-type: none"> <li>1. Possible loose connection at wall receptacle. Check service cord plug—spread prongs—tighten prong screws.</li> <li>2. Blown wall receptacle fuse. Check and replace.</li> <li>3. Broken cord. Check and repair or replace.</li> <li>4. Thermostat stuck open. Disassemble iron, check and replace thermostat.</li> <li>5. Burned out element. Disassemble iron, check and replace element.</li> </ol>	<b>Over-Heats Waffles Burn</b>	<ol style="list-style-type: none"> <li>1. Not preheated long enough.</li> <li>2. Recipe not followed.</li> <li>3. Waffle iron left open too long before batter placed in iron.</li> <li>4. Thermostat calibration.</li> </ol>
<b>Over-Heats</b>	<ol style="list-style-type: none"> <li>1. Thermostat set too high, or clothes not damp enough, or user is ironing slower than normal. To correct, set iron on lower setting.</li> </ol>	<b>Waffles Not Cooked Sufficiently</b>	<ol style="list-style-type: none"> <li>1. Check by baking waffles, using factory recipe. If this bakes unevenly, return to factory for repairs.</li> </ol>
		<b>Waffles Bake Unevenly</b>	<ol style="list-style-type: none"> <li>1. Iron not prepared for making. See instructions on original greasing.</li> <li>2. Batter placed in iron before iron was properly preheated.</li> <li>3. Proper recipe not followed.</li> </ol>
		<b>Waffles Stick To Iron</b>	<ol style="list-style-type: none"> <li>1. Iron not prepared for making. See instructions on original greasing.</li> <li>2. Batter placed in iron before iron was properly preheated.</li> <li>3. Proper recipe not followed.</li> </ol>

Reprinted courtesy Proctor Electric Co.

(Continued on page 28)

## seen, heard, proposed & produced

### **Navy Battle Lamps Defy Salvo Blasts**

WHEN one of the superdreadnaughts of the U.S. Navy fires a broadside from its heavy guns, the shock is almost enough to loosen a man's back teeth, but it does not break the slender filaments in the light bulbs that illuminate the battleship's interior.

The modern "rough service" lamps now in use on Uncle Sam's fighting craft are specially designed to withstand the concussion of heavy guns, permitting interior rooms of fighting craft to remain lighted during an engagement. Formerly it was naval routine to remove bulbs from light sockets and stow them carefully away before gunnery commenced. That was the only way to make sure of having lights afterwards. American lighting engineers have changed that.

In designing the rough service bulbs for wartime conditions they specified a filament strong enough to live through the pounding, but not a hair's-breadth thicker than necessary in order to maintain the maximum light output.

The ruggedness of the lamps is tested in the plants of Sylvania Electric Products by a "torture-wheel" that reproduces with scientific accuracy the amount of jar and shock to be sustained. The wheel provides a thump-test by jarring the bulbs violently as they revolve around its rim. About the size of an automobile wheel, but made of heavy steel and as rugged as a battering ram, the device has sockets in its outer rim in which two dozen rough service bulbs are tested at a time. As it revolves it spasmodically drops against a foil. The bang can be heard two blocks away. The floor quivers. The jar approximates a battleship's salvo. The lighted lamps endure this maltreatment for hours, living through 3,800 to 7,600 separate and variable poundings, depending on the wattage.

### **NEW MODEL CONVERTS -O-CALL**

>> A new inter-communicating system is announced by Fred E. Garner Company, Chicago. The new President's Model Converts-O-Call provides a combination all-master system that greatly facilitates factory and office inter-communication. It is so simply operated, you can page an entire factory or communicate privately with one or more departments instantly and easily. There are no switches to push while talking. All conversations are strictly private—no one can listen in. Calls go through even if the power of the station you call is turned off.

Available for 10 to 30 stations.

For further information, write to Fred E. Garner Co., 53 E. Ohio St., Chicago, Ill.

### **New Timer**

The new, Series S, Signalling Timer

**On this page the Editors plan to keep the dealers well informed on what is going on in the appliance & allied fields**

is designed to command visual and audible attention the instant a time interval is completed. It is exceptionally versatile in applications in that it provides for the automatic closing or opening of a circuit at the end of elapsed time, and operates additional buzzers, bells or lights at remote locations.

When the pointer on the timer is manually set to the required interval shown on the dial, a circuit is closed which operates a pilot light indicating that the time interval has started. The moving pointer revolves counter-clockwise toward zero; at any second, during the interval, the exact time elapsed is shown on the dial. When the interval is completed an audible alarm sounds and the pilot light goes out.

The buzzer continues to sound until the toggle switch on the timer is snapped to off position or the timing interval is again started, by moving the pointer knob to the required time interval.

Timer Series S is enclosed in a black metal case, readily attachable to any wall or panel or standard switch box. Size 5 x 5 x 3½ inches deep. Operates on alternating current, 115 to 230 volts; 25, 50 or 60 cycles, 1000 W. Voltage and frequency to be specified. Motor is slow speed, self-starting synchronous type. Pure silver contacts are used throughout. Connection to the line is made with line cord. Voltage, frequency and switch rating are plainly indicated on name plate. Available from Industrial Timer Corporation, New Jersey.

Charles Kaufman teaches technique of electric iron "rejuvenation" to John Sexton, Leonard Greenberg and George Solar (left to right) at the Chicago Commonwealth Edison Company's service and repair shop. It is believed that this is the first time that a public utility has given instruction to dealers and repairmen. Many local men took advantage of the offered classes in order to be better able to make good in the Company's sponsored "Swap" plan which is described in this issue on page 14. The classes were given without charge; and many different types of appliances as well as many different makes of units were discussed. Instructions were followed by practical repair demonstrations



# NEW ORLEANS UTILITY HELPS LOCAL APPLIANCE DEALERS

**Down south, the public utility company did a fine job by organizing the certified repair shop group**

A CERTIFIED repair shop idea that was put into effect some time ago in New Orleans, La., is proving to be a very good idea and one that is working out very well for those who are in the group, including several radio dealers. The idea started with the *New Orleans Public Service, Inc.*, the local public utility, and is one that could well be duplicated in other parts of the country.

The New Orleans Public Service, Inc., is very much interested in the furtherance of the sale of all sorts of appliances and equipment using electric current; but like every other public service is essentially a company offering current for sale. It naturally knows, however, that unless the appliances and equipment sold is kept in good working order, there will be a backwash that isn't always satisfactory from the viewpoint of their main business selling current.

The countless service calls proved to

by  
**stephen p. lathrop**

be worth more than could possibly be collected for the services rendered. Yet the New Orleans Public Service couldn't well refuse to service such appliances and equipment if it expected to keep the good will of the customers.

In addition to all of this, other dealers in the New Orleans area were selling the same equipment and appliances as the Public Service company and were also customers of the Public Service for power and light. With these thoughts as a background, officials of the New Orleans Public Service, Inc., worked out the idea for a group of Certified Electric Appliance Repair Shops to whom they could and would turn all the repair and service work possible.

Qualified representatives of the Public Service visited the better known

and located shops of dealers in the New Orleans areas and made up a list of dealers who were in a position to make repairs and render service that could be guaranteed and certified. After satisfying itself that these shops and dealers were properly equipped to do the work, they were invited to join the group which is now known as the *Certified Electric Appliance Repair Shop* group.

An attractive emblem has been designed and issued in decalcomania form and supplied to members of the group. Advertising literature was printed with the imprint of each of the members for distribution. All of this was done without a single cent of expense on the part of the group members. Back of the whole idea was a desire on the part of the New Orleans Public Service, Inc., to offer to the public the maximum of service at no additional charge and at the same time to eliminate cutting in of its own customers by doing the same work that its customers likewise did.

Naturally there are people who insist on sending a service or repair job to the Public Service for attention. But wherever possible, the Public Service suggests that the customer send the work to one of the certified shops, the nearest one. In selecting the membership shows in the group, care was taken to select them in all parts of New Orleans with the result that the certified shops are to be found scattered in every neighborhood section of the city.

In some instances the customer insists that the Public Service do the work and where such request cannot be refused, the work is taken in. But

*(Continued on page 35)*

Two of the labels which the New Orleans Company attached to repairs



The shop of A. C. Denny who claimed the scheme brought him new accounts



# Technical Service Portfolio

## SECTION XXXV

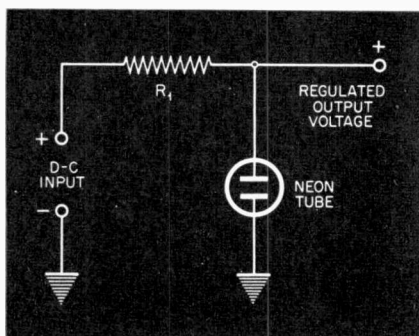
**The often used but little understood voltage and current regulator is the subject for this month**

**A**LTHOUGH tubes to control the current or voltage in radio and other electronic circuits have been in use for many years, relatively little has been written concerning the principles of their operation and application. Insofar as current regulators (ballast tubes) are concerned, these useful but much-maligned devices suffered so much from bad publicity when they were first introduced in their present form, that any discussion of their possible merits was by no means welcome in the radio press.

The bad publicity to which we refer was the fact that some manufacturers, taking advantage of the layman's popular conception that the value of a radio was almost solely determined by the number of tubes it used, produced so-called ten-tube receivers employing as many as six ballasts and only four really essential tubes. Also, some of the early ballasts were simply resistors with no special current-regulating properties. The situation became so bad that the Federal authorities had to step in and forbid manufacturers to designate such devices as tubes in advertising the specifications of their receivers. Partly as the result of this, the radio trade became inclined to think that ballasts were inherently worthless, an equally unfair viewpoint.

Voltage regulators have gone

Figure 1

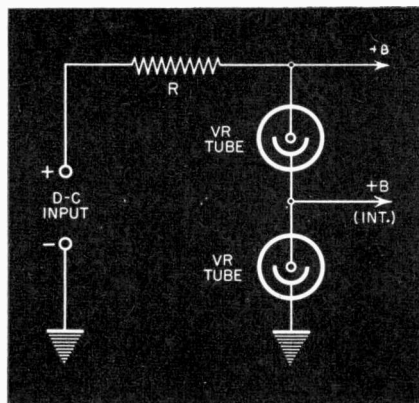


through no such tribulations since their introduction. This may have been due, in part at least, to the fact that voltage-regulator tubes were more expensive than many of the amplifier and rectifier types, and the relatively cheap ballasts were selected for the "so-called" merchandising sabotage. In fact, largely because of their expense, the present uses of voltage-regulator tubes were mainly confined to high-grade all-wave receivers, communication-type sets, and test equipment. Because there is bound to be an increase in the number of high-grade units manufactured immediately after the war, and because these shall probably enter frequency bands where the utmost voltage stability will be required in the receiver oscillator circuits, it seems particularly appropriate at this time to review this subject in the light of possible future applications, as well as the present ones.

The fundamental difference between a current and a voltage regulator is that the former is always placed in series with the load while the latter is always in parallel with the load. The simplest type of voltage regulator is the neon tube, a typical circuit of which is shown in

Figure 1. The resistor R1 serves

Figure 2

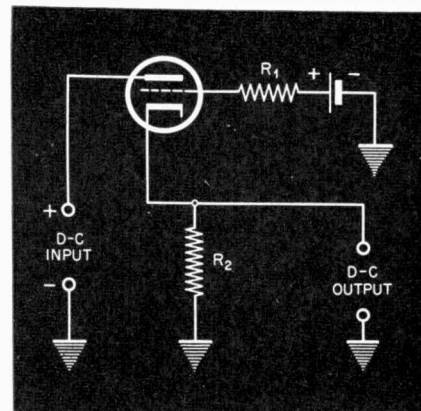


to limit the current which passes through the neon tube. If no resistor were used, the current would rise to very high values, sufficient to act practically as a short-circuit, because the neon gas with which such tubes are filled has the property of decreasing in resistance directly as the voltage applied to it increases, provided the voltage is sufficient to cause it to glow, or ionize. In ordinary commercial neon bulbs, a resistor is built into the bulb base; this resistor must be removed before the bulb may be used for voltage-regulating purposes. Special neon bulbs, designed especially for voltage-regulating purposes, are obtainable without any internal resistor. These bulbs are usually far more stable in operation, and therefore more desirable for this purpose, than ordinary types.

In application, the value of the resistor R1 is so chosen that, with the load connected across the neon bulb, the voltage across the neon tube is slightly in excess of 60 volts. As soon as the voltage reaches the ionization point of the gas, usually about 120 volts, current passes through the neon tube, causing the voltage across it to decrease. If the load is increased, or if the d-c input voltage decreases considerably, the voltage across the neon bulb may fall to the point where the gas no longer remains ionized. Then the glow will disappear and no current will flow through the neon bulb, causing the voltage in the circuit to rise.

Thus the voltage regulator must

Figure 3

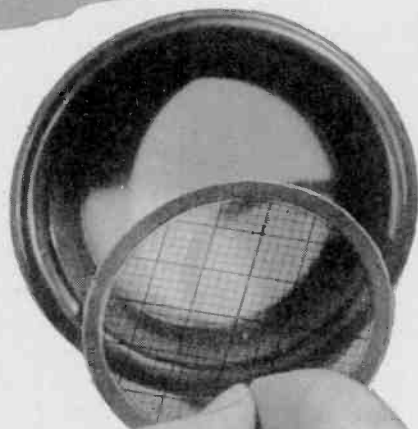


# It's the Little Things That Count

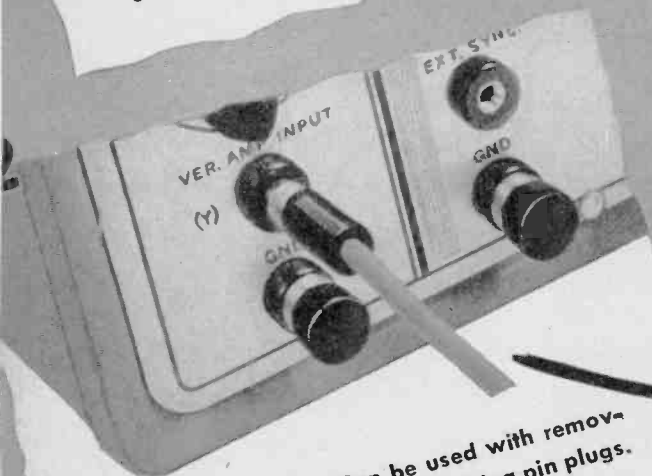
OR, WHAT MAKES THE 155-C DIFFERENT FROM OTHER 3" OSCILLOSCOPES?



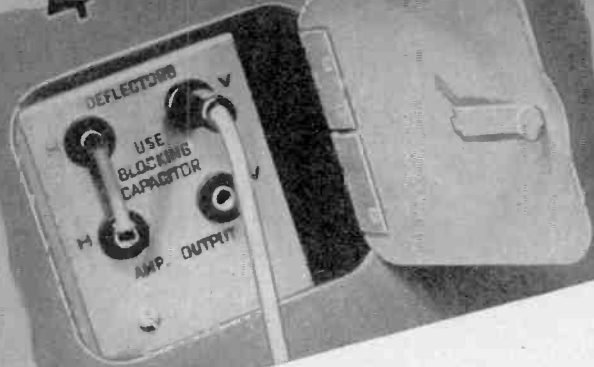
1  
"built-in light shield" — The front of the tube is recessed; you can see transients even in bright light.



3  
"removable graph screen" to permit special observations — Place or replace it with a twist of the wrist.

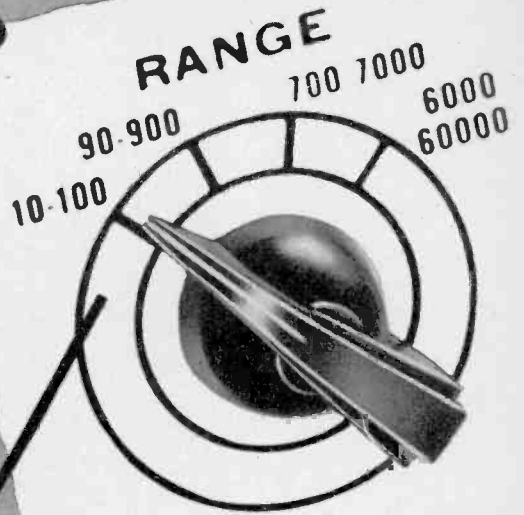


"binding jacks" — Can be used with removable binding posts or with locking pin plugs. A new convenience feature.

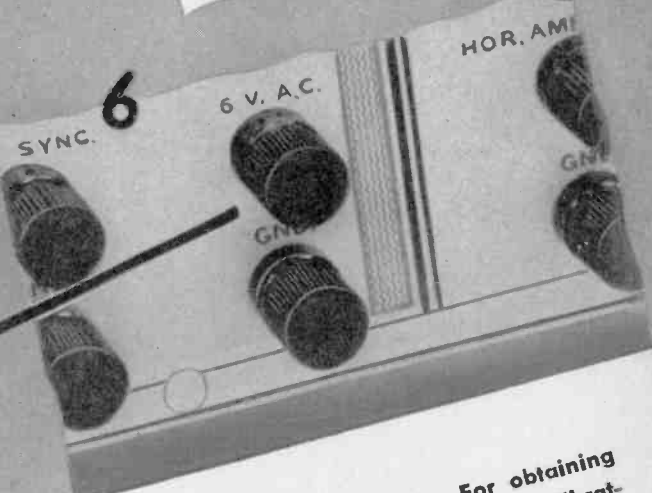
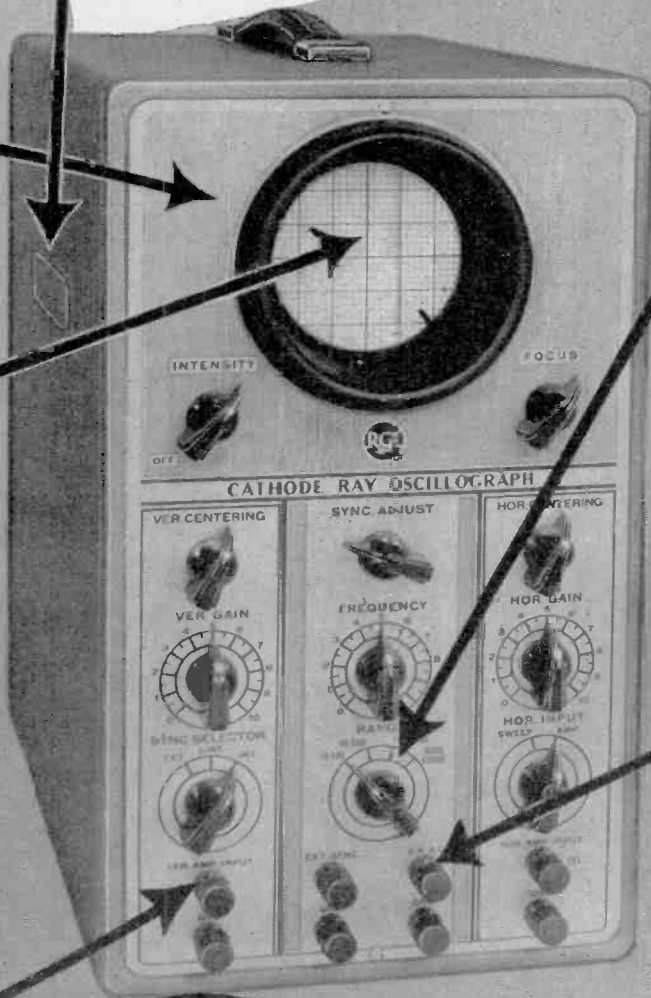


"direct deflector connections" — For observations at radio frequencies when such are desirable.

5



"improved timing axis oscillator" — range extended to 60 kilocycles — more linear sweep.



"6-volt AC terminals" — For obtaining a handy sine wave ordinate for calibrating purposes.



Please address inquiries to  
Test and Measuring Equipment  
Section, Radio Corporation of  
America, Camden, N. J.

Test and Measuring Equipment  
**RADIO CORPORATION OF AMERICA**

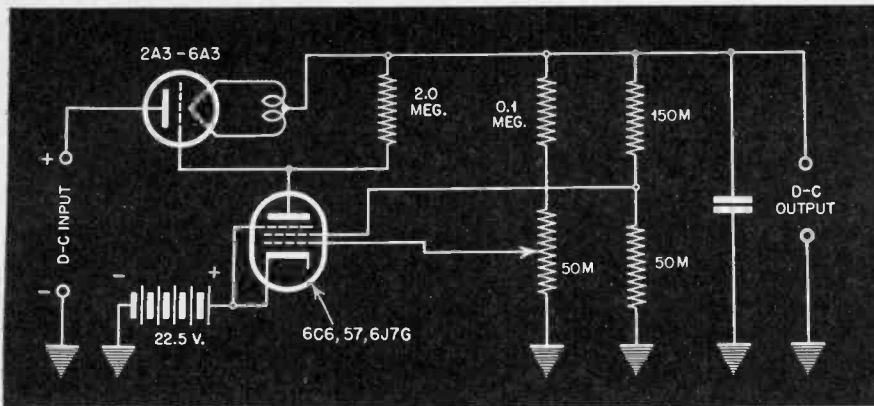


Figure 4

always be used over a relatively narrow range of voltages, or, to state the case as it is more commonly referred to, the current through the voltage regulator must be kept within narrow limits. If the current becomes too high, then the voltage regulator will have to dissipate too much power and will be ruined. If too low, it will cease to function. With small neon tubes, such as the 1/4 and 1/2 watt types, the current range must be kept within a range of but a few milliamperes, and because such bulbs are not usually designed for this purpose, they are none too stable. That is why special voltage-regulator tubes, such as the VR105/30, and others for output voltages from 90 to 150, are in more general use. In this designation, the 105 indicates the output voltage and the 30 is the maximum current in milliamperes which may pass through the regulator tube. For higher currents, the type 874, which

handles 50 milliamperes at 90 volts, may be employed, but it is more expensive and larger in size than the almost universally used VR types.

A typical voltage-regulator circuit of the simplest type is shown in Figure 1. While a neon tube is shown, the same circuit is also applicable to any of the VR types. Maximum control of voltage is obtained when the current in the load circuit is kept low in proportion to that through the regulator tube. When this is the case, the major portion of the current change in the circuit takes place through the regulator tube. In a typical voltage regulator, the maximum current change over which good control of voltage is achieved is from 5 to 30 ma. for the 150-volt type and from 10 to 30 ma. for the 90-volt type.

The value of the resistor R1 is determined by both the load current and that of the voltage-regulator tube. However, to avoid damaging the voltage regulator tube, it is considered good design to choose a resistance value for R1 which will limit the current through the regulator tube to its maximum rating, even though the load circuit is open-circuited. In order to do this, a milliammeter is placed in series with the regulator tube and R1 is then selected so that the maximum current reading, with the input voltage at the highest value it is likely to reach, is 30 ma. This reading will of course be reduced as soon as the load circuit is connected, but if the regulator is employed to stabilize, for instance, the voltage applied to a superheterodyne oscillator (as is often the case), the possible current consumption in the load will be relatively small compared with that in the regulator circuit.

One limitation of standard voltage regulator tubes is that voltages in excess of 150 cannot be regulated with a single tube. By using two or more tubes in series, as shown in

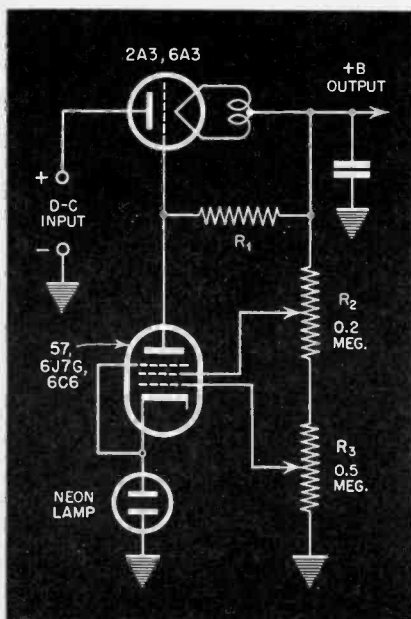
Figure 2, this difficulty may be overcome. In this circuit stabilized output voltages of 240 and 90 may be obtained if a VR 150 and a VR 90 are connected in series. For higher voltages, two VR 150's or a VR 105 plus a VR 150 may be employed. The junction of the two regulator tubes forms a very well controlled voltage point, better by far than when a single voltage regulator tube is used. The resistor R shown in Figure 2, which serves to limit the current through the regulator tubes, is generally the resistance of the filter circuit of the power supply when the load current is not too great. Then small filter chokes, of relatively high d-c resistance may serve as the current-limiting resistance. This type of circuit is particularly adapted to high-grade test equipment.

In any voltage regulator circuit, it must be remembered that the voltage applied to the regulator tubes must be sufficient to start them operating. For the VR 90, the starting voltage is 125 volts minimum and for the VR 150, a starting voltage of not less than 180 is required.

An ordinary high-mu triode may likewise be employed as a voltage regulator provided the current drain of the load is small—of the order of 1 or 2 ma. A method of doing this is shown in Figure 3. Here the grid bias is supplied by the cathode load, bucked by a small battery, with a resistance R1 in series. This resistor may be 50,000 ohms or more; its sole purpose is to prevent excessive grid voltage, should the plate voltage be removed. By using a positive battery bias on the grid, it is possible to employ considerable degeneration in the cathode circuit without reducing the plate current so far that the voltage across the cathode load becomes too small for practical applications in voltage regulating. In practice, the load itself is connected in the cathode circuit, no separate cathode resistor being employed. For oscillator circuits where the voltage applied to the oscillator plate need not be high, this circuit may be employed. The plate supply voltage is then taken directly from the cathode of the regulator tube.

For higher current drains, i.e., more than can be efficiently con-

Figure 5



**CORRECTION!**

Our Dec. 1943 issue Masthead gave Mr. John H. Potts the title of "Associate Editor" which is incorrect. Mr. Potts is, and for a long time has been, a Contributing Editor.—ED.



trolled with a standard 30-ma regulator tube, it is of course possible to use two or more such tubes in parallel. This method is not good, however, because it requires a proportionately increased drain on the power supply, necessitating a larger and heavier power transformer and more expensive filter circuit. While the regulator tubes themselves afford a degree of filtration and thus reduce the condenser capacity requirements in the filter circuit, the chokes must be able to handle the additional current drain. To overcome these limitations, special circuits for higher current drains have been developed.

One such high-current regulated power supply is shown in *Figure 4*. This is a modification of an RCA development which has proved highly successful, providing a voltage output of approximately 180 volts at a maximum current drain of 80 ma. A low- $\mu$ , high plate-current power tube, such as the 2A3, is employed in series with the input from the power supply and the output load. Since such tubes require a high grid voltage, the plate voltage of a pentode may be used for the purpose.

In order that the pentode plate current remain constant, it is necessary that the voltages applied to all its elements be stable, or alternatively, that any changes which must occur shall be compensated for by others which will tend to counteract these effects. Many schemes have been tried to accomplish this, and one, which is used commercially, is to keep the cathode voltage of the pentode constant by using a battery, as shown in *Figure 4*, or a small neon or other regulator tube, as shown in *Figure 5*. Insofar as the other elements are concerned, the grid voltage of the pentode is stabilized by inverse feedback in the following manner: Any increase in the output voltage reduces the grid voltage applied to the pentode. This in turn causes an increase in the pentode plate current and, consequently, a greater voltage drop across the

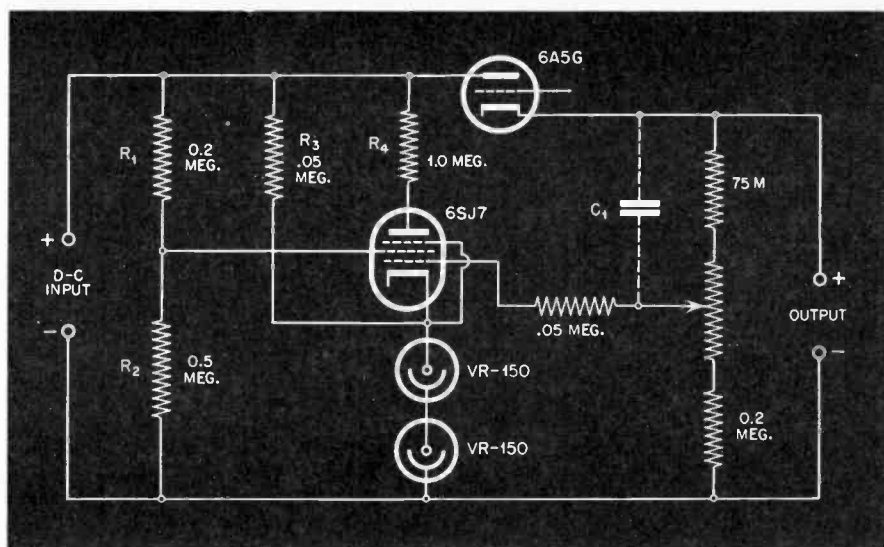


Figure 6

pentode plate load resistor (R1 in *Figure 5*). Because this voltage drop supplies the negative grid bias for the 2A3, this bias is made more negative, thereby decreasing the output current and voltage and increasing the pentode grid voltage. Thus these changes tend to counteract each other and maintain the output voltage constant. The resulting screen voltage variations also help to hold the voltage stable, because they too operate to oppose changes. The output condenser is sometimes omitted.

The preceding circuits provide a high degree of voltage stabilization and reasonably high output current. However, the output of 180 volts is too low for many applications. A circuit which supplies a high output voltage and approximately the same output current is shown in *Figure 6*. The principle of operation is the same as for the circuits shown in *Figures 4* and *5*; the higher output voltage is obtained by putting both

the pentode and the power control tube at a higher potential above ground. Thus the cathode potential of the pentode is fixed at 300 volts, by means of the two VR150's in series. The condenser C1 is employed to improve the grid voltage stabilization; it is kept fairly low in capacity to eliminate any tendency toward oscillation, which may occur in this type of degenerative circuit.

Just as filter condensers serve to smooth out ripple and hum in power supply circuits, so also do voltage regulators reduce these effects. Thus a better, hum-free power supply is obtained when voltage regulation is employed or, if desired, the same degree of hum elimination can be obtained when using voltage regulation with less filtration in the power supply. Voltage regulators also have advantages in circuits

(Continued on page 30)

Figure 8A & 8B

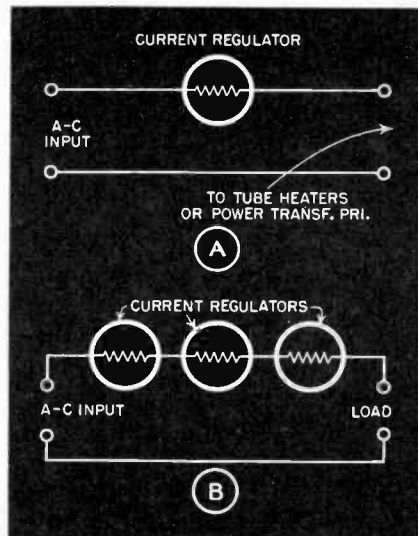


Figure 7

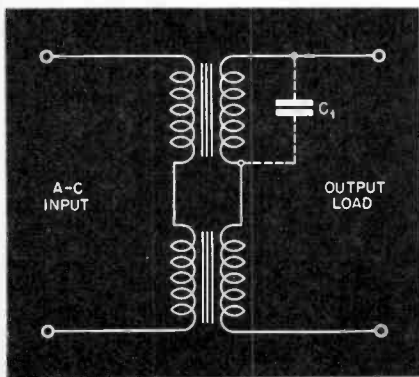
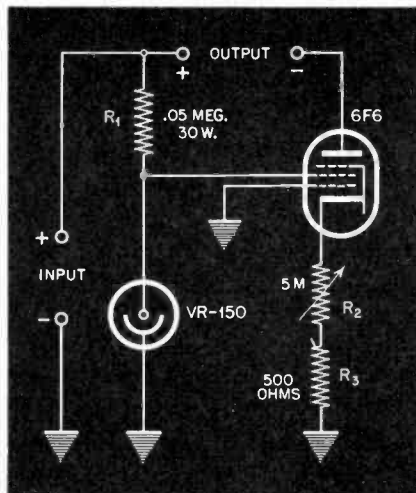
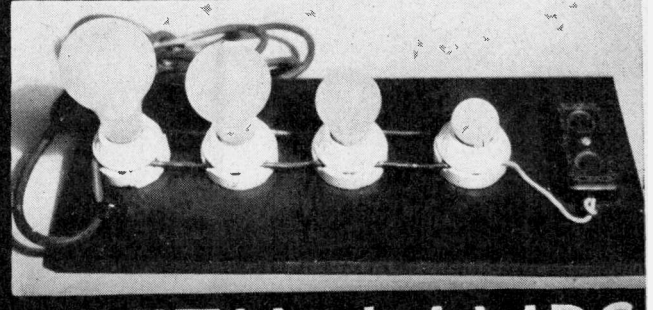
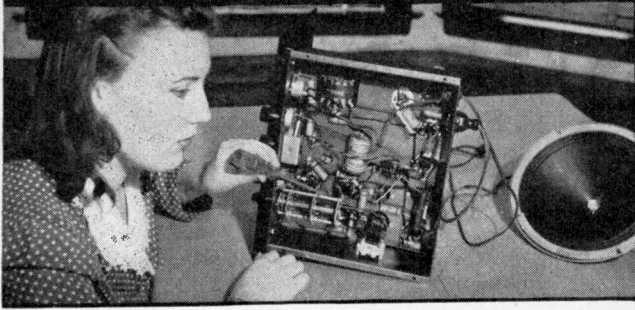


Figure 9



# SERVICING . . .



# .. WITH LAMPS

by

frank I. sprayberry

***Much servicing can be done without expensive equipment. This is the third part of the series describing how to do it with lamps***

## **"Think Before You Test"**

All other condensers (C7, C55, C17 and C18) which we have under test in this first section of the circuit have resistors between them and the B+ feed line. Thus, even though they do develop a full short-circuit, current flow through them will be limited in direct ratio to the value of the resistance in series with the condensers. Therefore, depending on the value of the series resistance, the test lamp may not light up to full brilliance even though the condenser is fully shorted. Furthermore, the fact that the condenser has shorted, causes excess current to flow through the resistors in series with the shorted condenser. *This excess current may burn-out the resistor or resistors.* Thus, suppose C7, in Fig. 2 or 4, a 16-mf. electrolytic condenser, develops a short. Excess current is then forced to flow through R28 and in all probability will burn it out. Thus you must replace both C7 and R28 to get normal reception. This is an important principle that you should always remember. (The instance above-cited is an excellent example of why test procedures should be carefully considered before being applied. Let us repeat: "Think before you test.")

Suppose the condition of a condenser connected like C7 is unknown to us. To check it, we would ordinarily

disconnect one of its leads. Then, if the test lamp decreases in brilliance upon doing this, we assume the condenser is defective. However, if R28 happened to be open, the test would have no effect on C7. Thus, whether C7 was good or bad, it would make no difference. A better preliminary check is to disconnect C7 and then short-circuit from the junction of R28 and R29 to ground. If there is a small spark on doing this and the lamp increases slightly in brilliance it proves R28 is not open. With this proven it becomes possible to make the foregoing test. To prove this disconnect the condenser as previously described and then check on lamp brilliance.

Item R29 in Figs. 2 and 4 is a bleeder resistor. About the only thing that could happen to it would be for it to open-circuit ("open" or "burn out" as it is commonly called). In rare instances, such resistors as R29 change in value, but it would require more than a 100% change in value here to materially affect the operation of the set. Furthermore, conditions which would cause a change in resistance value would also be conducive to burning-out the resistor. Thus, for a resistor like R29 we are principally interested in whether or not it is open.

To prove whether or not a bleeder resistor like R29 is open all you have

to do is to disconnect and reconnect its grounded end several times in quick succession. If it is *not* open, there will be sparks each time you make and break the contact and the test lamp will increase and decrease in brilliance. This assumes of course, that you have already established that a condenser connected as C7 is normal, and that a resistor connected as R28 also is normal.

## **Proper Procedure**

It is for this reason in testing by this method that you must begin testing at the rectifier output and establish the condition of parts as you go along. In other words, you begin testing at the point of highest potential and gradually work down to the point of lowest potential—establishing the condition of all parts as you go along. After you get a little experience by this method you will quickly learn when and how to divide a circuit in sections as we have done at X in Fig. 4.

The value of this is to limit your task to certain sections of the receiver and to reduce the number of parallel paths to ground. The fewer parallel paths of current you have to consider, the more conclusive your tests will be and the less chance of conditions in other circuits upsetting those of the circuit in which you are working.

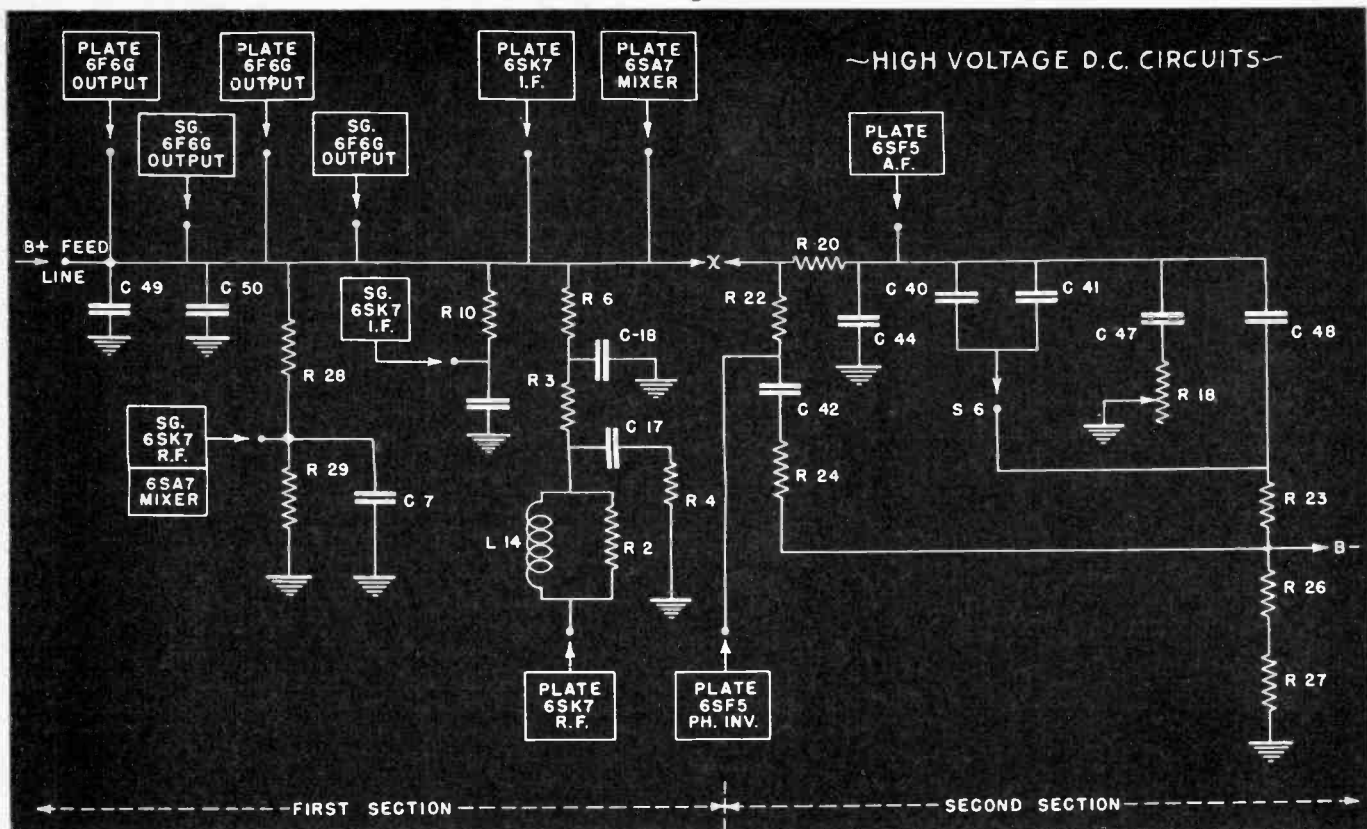


Figure 4. The high voltage section of RCA Model V-250 showing tubes, condensers, etc., in simplified form of Figure 2

In our tests so far we have established the condition of C49, C50, R28, C7 and R29. These are the most vital parts in the voltage distributing circuit, and once it is established that these or others similarly connected in other receivers are not at fault, checking the condition of other parts is comparatively easy, as you will see from further study of this test method.

We now come to R10 and C55. Resistor R10 reduces the B+ feed line voltage for the screen-grid of the 6SK7 i.f. tube, and C55 filters it. In this and in all other similarly connected circuits, we can depend on the factor of "probability" to a great degree. Practice and experience have proven that such a circuit rarely develops trouble. Resistor R10 carries relatively little current, and as long as C55 does not short, such a circuit may never develop trouble. Therefore, in all probability, such a circuit will remain normal throughout the life of the receiver.

Since the above-described circuit condition is, after all, only a probability and not a certainty, you will want to check to make sure. To do this, short (connect a jumper) from the screen-grid terminal of the 6SK7 i.f. tube to ground. In this, we have to be careful. Resistor R10 is 68,000 ohms, and a short from it to ground

will not draw enough current to materially affect the test lamp brilliance. However, small sparks (darken the room you are in if necessary) should be seen on making and breaking the contact if both R10 and C55 are normal. If no small sparks are seen, disconnect one lead of C55 and again make the short-circuit test. If sparks are seen this time then C55 is shorted. If no sparks are seen, then R10 is open.

The circuit of R6, C18, R3, R2, L14, C17 and R4 is tested exactly like the circuit of R10 and C55. Unit R6 is a 1,000-ohm resistor and a momentary short from the junction of R6, R3 and C18 to ground will in this case produce a large spark and the test lamp will increase in brilliance, thus, indicating normal conditions. If you do not get this effect, disconnect R3 from the junction of C18 and R6, and short-circuit from R6 and C18 to ground. If you now get normal effects, then the circuit leading through R3 contains the defect. On the other hand, if you still do not get a normal test, then C18 is shorted or R6 is open. Disconnecting C18 and R6, and making the short-circuit test at the lower end of R6, will now prove whether R6 is open or whether C18 is shorted.

This leaves the condition of R3, R2, L14, C17 and R4 to be deter-

mined. To get a rough test first momentarily short-circuit from the plate of the 6SK7 r.f. tube to ground. This will include an effective d.c. circuit of about 2,500 ohms, consisting of R6, R3 and R2 and L14 in parallel. This is not too much of a limiting resistance, and so for normal conditions, the short-circuit should produce a spark and an increase in test lamp brilliance. If you don't get this effect, you will have to break the circuit down into individual parts as was described for R10 and C55, also R6 and C18. In doing this, you would naturally disconnect C17 and R4, for these represent another parallel circuit. Likewise, since R2 and L14 are in parallel to get a check on each of these, one of them should be temporarily disconnected. As you include each one in the circuit, momentarily short from the plate of the r.f. tube socket to ground. A spark and increase in test lamp brilliance indicates normal conditions. Having determined the condition of both R2 and L14, they of course, should be reconnected to the circuit properly.

Units C17 and R4 remain to be tested, as we have determined the condition of all other parts in this circuit consisting of R6, R3, etc. If you will examine Fig. 2 again, you will note that C17 is an r.f. coupling

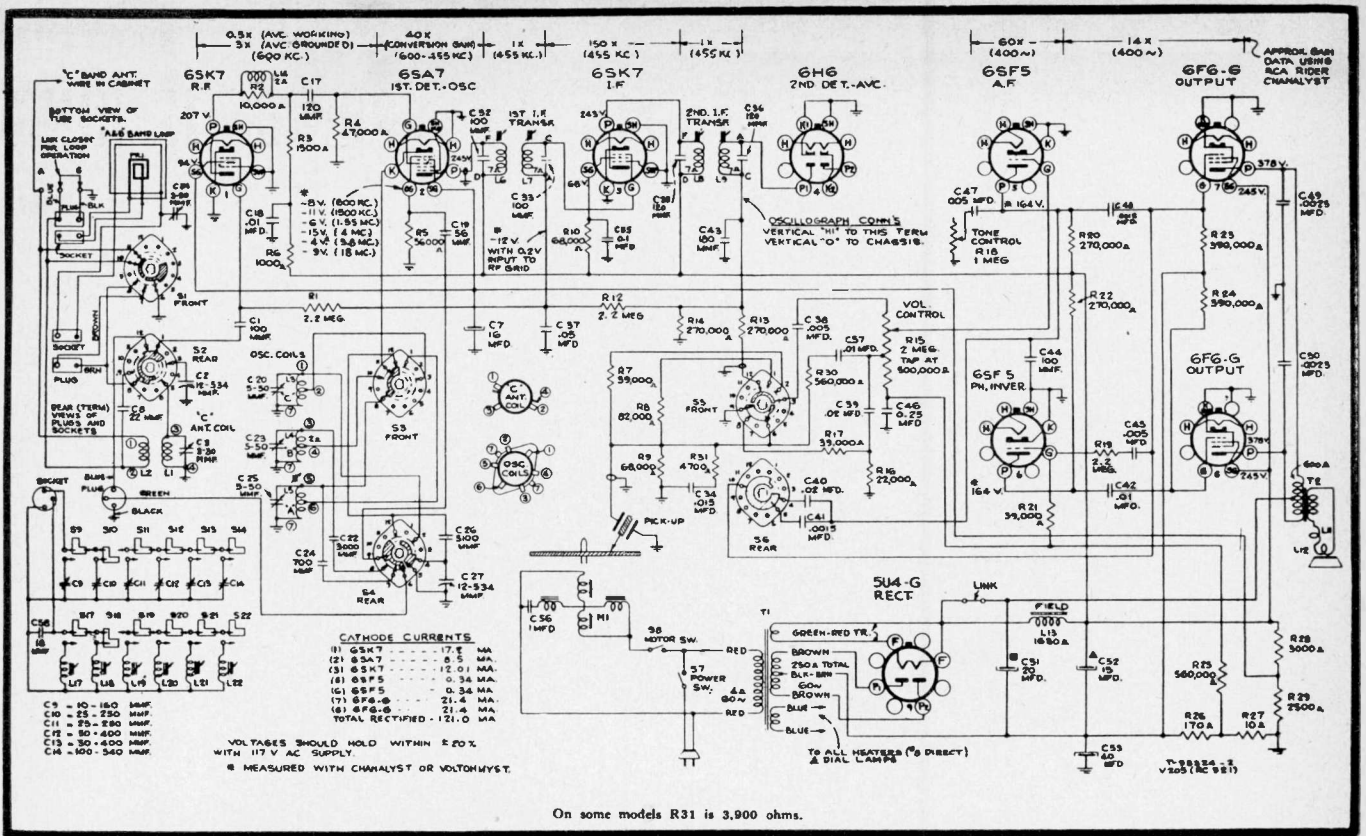


Figure 2. Representative circuit of modern multi-band phono-radio receiver with pushbutton tuning, loop antenna, and other features. Unit can be tested without meters, by following the author's step-by-step procedure

condenser. Thus C17 and R4 do not enter into the high-voltage d.c. consideration unless C17 should develop a short. If it should short, then a high positive bias is placed on the grid of the following 6SA7 tube. It follows, therefore, that d.c. flows through R4 and that a voltage drop occurs across it. To get a check on this and similar circuits, temporarily connect a wire lead across R6 and R3 (short them out of the circuit). This will place the full value of the B+ voltage across C17 and R4. Next separate C17 and R4 and connect or touch this free lead of C17 to ground. If it is shorted, there will be large sparks and the test lamp will increase in brilliance. If it is not shorted, there will be less and less spark as you make and break contact (charging action of the condenser) but the intensity of the test lamp will not change.

### Continuity Tests

There are various ways to test a resistor like R4 without meters. It has a resistance of 47,000 ohms, and therefore, limits current through it to a small value. You will be mainly interested in whether or not this resistance has continuity—if it does, the chances are that it is all right.

It may not have continuity (a condition of being open) especially if C17 has developed a short. Thus, in circuits like this, you may have to replace both C17 and R4 to get normal reception.

One way to definitely establish that R4 has continuity is to temporarily connect one end of it to the highest B+ point in the circuit and connect the other end of it to ground several times in succession. If it has continuity (not open), small sparks will be perceptible when you do this and the test lamp will change in brilliance to a degree depending on the resistance value.

Another way to check for continuity of resistors like R4 is to connect them across a.f. grid leaks in sets known to be in good condition. For instance, suppose you had a set like the one of Fig. 2 in good working condition and you wanted to know whether or not several resistors from another set had continuity. All you would have to do would be to connect them across the terminals of the volume control (R15 in Fig. 2). As you made and broke contact you would hear a loud click from the speaker if the resistors had continuity. On the other hand, if the resistor was open (no continuity),

there would only be a very faint click. The difference in the sound of the type of click from the speaker for an open resistor and for one with continuity is so distinct that there is no possibility for error under these conditions. Finally, resistors connected similarly to R4 or those having a high value can be tested for continuity by using a neon bulb continuity tester—another type of meterless test equipment—as will be described later on.

With the tests on C17 and R4 completed, we are nearly ready to go on to the second section of Fig. 4. First, however, your attention is called to the various plate and screen-grid terminals of the tube sockets of both sections of Fig. 4. In this figure the tube terminals are designated as small dots with blocks of printed matter and arrow heads pointing to them. If you want to establish whether or not voltage is applied to the various plate and screen-grid terminals at the tube sockets, all you have to do is momentarily short the terminal in question to ground with a screwdriver blade. Unless there is a very high resistance in series with the circuit, shorting will produce sparks and an in-

(Continued on page 34)

# MT. CARMEL WHERE ELECTRONICS IS KING



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**Can He Quality?** Even in wartime, Meissner prides itself on its "hand-picked" personnel. Here Personnel Manager White is interviewing a promising applicant. (See main caption at right.)



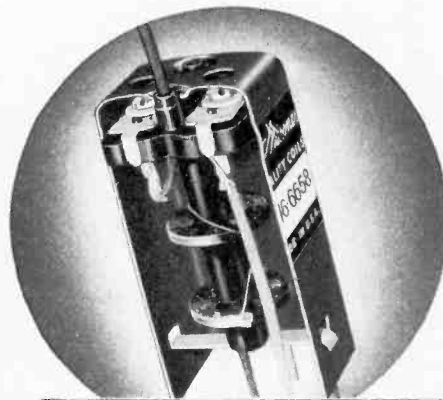
**Your Guarantee of Perfection:** Down through the years, the Meissner name has come to stand for the ultimate in radio quality. These two, along with hundreds of other experienced technicians, are very good "reasons why!"

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Mt. Carmel, Illinois, (population 7,000) is famous for two things: music and electronics. The first reputation is based on its top-flight civic and high school music groups — on such outstanding home-town "products" as Howard Barlow, renowned symphony conductor. The reputation for great electronics ability centers around the humming Meissner plant — where scores of employes have spent their entire working lifetimes on the exacting requirements of Meissner's "Precision-Built" line. Their flying fingers, now assigned to war orders of tremendous strategic importance, long ago lifted them above mere "personnel" into the radio industry's highest honor — "PRECISION-EL!"

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## TROUBLE-SHOOTERS' TIME SAVER

(Continued from page 16)

COMPLAINT	POSSIBLE CAUSES	COMPLAINT	POSSIBLE CAUSES
<b>Grids Discolored</b>	4. Cleaning destroyed original greasing. Retreat waffle grids with unsalted fats.		place.
<b>Smokes</b>	1. Iron allowed to overheat. Clean with stiff brush. Retreat grids.		4. Element may be open. Check and re-place.
<b>Pilot Light Does Not Light</b>	1. New or recently repaired irons will smoke temporarily. Allow to remain on circuit until smoking stops.		5. Thermostat set at "off" position. Re-set.
	1. May be due to burned out lamp. Re-place lamp.		6. Thermostat stuck open. Check and re-place thermostat.
	2. Open circuit in element, connections, cord, etc. Check and repair or replace parts.		7. Loose connection at terminal block inside of roaster or at thermostat. Remove bottom cover and tighten.
	<b>Roasters</b>		
<b>Does Not Heat</b>	1. Loose connection at wall receptacle. Check service cord plug—spread prongs—tighten prong screws.	<b>Does Not Heat Enough</b>	1. Thermostat set too low. Use higher setting.
	2. Blown wall receptacle fuse. Check and replace fuse.		1. Thermostat set too high. Use lower retting.
	3. Broken cord. Check and repair or re-	<b>Gets Too Hot</b>	2. Element shorted — replace or clear short.
			3. Thermostat stuck closed. Replace thermostat.

## RECORDS

(Continued from page 9)

over and the record demand reaches its peak.

We carry fully as many "classical" as we do popular records. In brands we have *Decca*, *RCA-Victor* (both *Red-Seal* and *Bluebird*), *Columbia* (*Popular* and *Masterpiece*) and *Capitol* and *Hit*. The latter two, alone, we stock into the hundreds.

Then we keep educational records, children's records, language records (*Linguaphone*), *Musicraft*, Morse-code and collectors' items. In the last category the sales are mostly made to fans of certain artists. Reprints of old-time tunes featuring these stars make good, though sometimes spotty sales, with the one exception—*Bing Crosby*.

From our bookkeeping department figures we can safely say that *Bing Crosby* is the biggest drawing card in the record business, barring none! What his records have done for the *Decca* crowd in view of the above, can only be imagined. This is still true in spite of the recent *Down Beat* magazine poll awarding the crown of

best-liked crooner (swooner?) to *F. Sinatra!*

The sale of popular records is not always as simple as some people think and it will pay every dealer to apply the same technique to the sales of popular records as he would to the sale of the classicals. There is really no difference—except in the type of buyer. After trying many different methods, we have universally adapted the internal slogan that "the sales person must know his business" to sell records. Thus when a customer asks for a recording by, say *Harry James*, and regardless whether we have it in stock or not, the salesperson can discuss other titles which are of the same calibre and type. We call this "selling up." And believe us, to sell about 3/4-million records, you *have* to sell up! To enable our sales people to know their business we encourage them to do some extensive research. We lend them records so they can study the various artists. This gives them the needed confidence that they really know the records because they have had the chance to hear them in the privacy of their homes.

Thus in the sale of say, *Red-Seal* records, there is no substitute for a conversation with the customer born of understanding not only the recording under discussion but a broad general outlook on the artist's works and recordings. This leads *not* to the *suggestion* method of "selling up," but to the customer buying in confidence and in *consultation* with our salesperson. That, we believe, is the real secret of selling records, —confidence!

Not to be underestimated are the booths, mentioned in the beginning of this article. There is no substitute for a listening booth. It elimi-

nates corrections in the sales with the customer. It enables the customer to decide what he wants. Often a customer will want to hear several recordings of the same subject made by different companies or orchestras. We have laid down only one rule regarding our booths: No smoking is permitted. There is nothing more discouraging to a sale, than to enter a booth and find it full of rank, stale cigar or cigarette smoke. Since our stores are air-conditioned, we have included some vents into the booths so that they too are air-conditioned. This feature alone is a tremendous sales maker. Then in each of our stores we set aside a rather large booth specially for the lovers of classical music and here we install a somewhat better type of electric phonograph. We do not as a rule permit the playing of popular recordings in these booths.

Then again we have fixed the gain controls of the various record players so that they cannot be turned up too loud and annoy the person in the adjoining booth. We encourage the young folks to come in and hear their favorites, and they come in droves. We like them—they make excellent customers. We let a prospect keep a booth any reasonable length of time—generally as long as he chooses; and for the most part make no check on whether he buys or not, except in glaring cases of bad faith on the part of the customer. We cheerfully hand the buyer whatever records he chooses, and let him take as many of them (within reason) to the booth at one time. We have never regretted this policy; and our sales have reflected it by the steady ringing of our cash registers.

What about the record-players? We built them ourselves in our radio

### \$1.00 PAID FOR SHOP NOTES

Write up any "kinks" or "tricks-of-the-trade" in radio servicing that you have discovered. We will pay \$1 in Defense Stamps for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor," RADIO SERVICE-DEALER, 342 Madison Ave., New York 17, N. Y. Unused manuscripts cannot be returned unless accompanied by stamped and addressed return envelope.

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RADIO EQUIPMENT HINTS

# SYLVANIA SERVICEMAN SERVICE

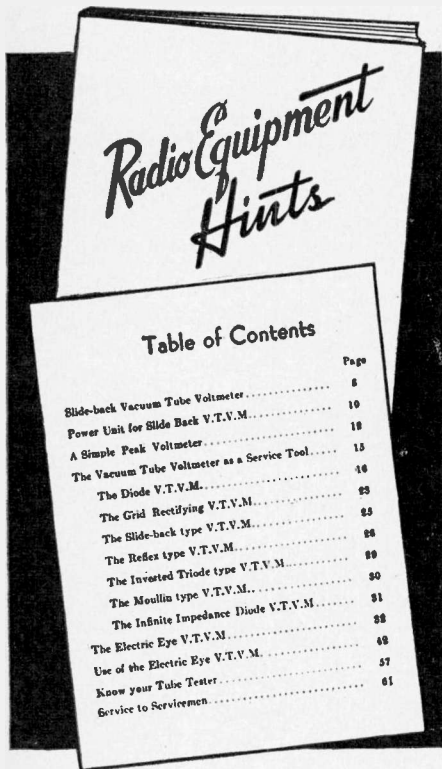
by  
**FRANK FAX**



"RADIO EQUIPMENT HINTS" describes testing equipment so important to every radio man's service bench. Hints on how to use this equipment will save your time in tracing and locating receiver troubles.

There are 59 pages of clear information from radio tube headquarters. The volume is liberally illustrated with photographs, circuits and graphs.

Read over the subjects in the Table of Contents, reproduced below:



This is the second of the new Sylvania "Hints" series.

"Radio Equipment Hints" is FREE. If your jobber does not have copies, write to: FRANK FAX, SYLVANIA, EMPORIUM, PA.

# SYLVANIA

ELECTRIC PRODUCTS INC.  
RADIO DIVISION • EMPORIUM, PA.

repair department. Ruggedly put together, of good component parts, they are for the most part rebuilt audio sections of radio sets which we had traded years ago, before Pearl Harbor, for other radio sets. Each player is fitted with a simple one-record turn-table and a good crystal or magnetic pickup. Permanent needles are used throughout. Most of the record-players come equipped with tone control and volume control. Five and 8-inch speakers predominate. For the most part these players have given little or no trouble and they are faithful workers in our cause.

Then there is another policy which we think has more than done its share in making the *Hudson-Ross* "chain" popular with the people of Chicago. In spite of handicaps of the war, we practice the fact that "the customer is always right!" And—page Mr. Ripley—we always refund his money *cheerfully*, if he does not like the deal he has made! In the record business that is unusual. It has been abused by very, very few of our customers, and the great majority like it, and we find that they lean over backwards in their efforts to meet us more than half-way.

What do we think of Postwar record business? Well, we plan to stay with it, as we said before. There will be a better record business after the Peace than even now. The light-weight pick-up arms coupled with longer lived needles and automatic changers are all definite factors leading to an increased record business. Then the convenience of getting raw materials and competitive improvements in quality of reproduction of records, such as the raising the range of response above the present 4000 cps will all act to increase the sales. Needed is a method of eliminating the record-scratch without, at the same time, taking out a "band" of the music or recorded sound. This improvement will be mechanical and not electrical, we believe. All these things will help to put records over.

Also to be expected, is the return of recording discs which have virtually disappeared now. A brisk home-recording business had just started before Pearl Harbor. It will be bigger and better than ever after victory.

All in all, records have been a God-send to us. In fact, and this even though the dollar volume of the 3/4-million records does not equal our sales in radios and radio combinations—without the records we would not have been able to survive and prosper at the rate we have. So we can truthfully endorse the Government's statement:

"Records are morale builders!"

They sure are . . . even built up our own!

## TECHNICAL PORTFOLIO

(Continued from page 23)

where a degree of hum filtration is required, yet where the time constant of a resistance-capacity filter cannot be tolerated. This is the case in some oscillograph sweep circuits, television applications and in certain test equipment. In such cases, the by-pass condenser in the resistance-capacity circuit is often successfully replaced with a small neon bulb. A specific application of this sort is in the screen and plate supply filters of voltage-amplifier pentodes.

Another type of voltage regulator employs the phenomenon of magnetic saturation of the power transformer, illustrated in *Figure 7*. Two transformers, or separate windings on a single transformer of special core design, may be used. One transformer may be of a conventional type, but the other is so designed that, with its primary winding connected in series with the other, it develops a degree of core saturation when the line current passes through the windings. The secondaries are connected to buck each other, but most of the output voltage is supplied by the partially saturated transformer. When the line voltage increases, the secondary voltages of the transformers likewise increase, but in such manner that more of the output voltage is contributed by the conventional transformer and less by the partially saturated one. The result is that the output voltage remains substantially constant.

Some difficulties arise in filtering the rectified output of such transformers; by shunting a condenser across the secondary winding of the saturated transformer, its waveform is improved and the filtering troubles are greatly reduced. This condenser is designated as C1 in *Figure 7*. This condenser also helps somewhat in maintaining the output voltage constant, in combination with the normal performance of the arrangement.

Current regulators function by taking advantage of the fact that some metals have a relatively high positive temperature coefficient. By using an iron, or similar wire filament in the current regulator, as the current through the regulator increases the resulting increase in heat causes the resistance of the filament to increase, thus opposing the effects of the increase in applied voltage. When used in connection with power transformers, the primary winding is usually designed to operate at a voltage lower than it normally would if no current regulator were employed. In general, the larger the voltage drop across the current regulator, the greater will be its current-regulating efficiency. Commercially, though, a compromise



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is reached whereby the power transformer winding is made of the order of 90 to 100 volts and the balance of the voltage drop is taken up by the current regulator.

A typical circuit for a current regulator is shown in the very simple schematic, *Figure 8A*. While these regulators are best adapted commercially to voltage control of the filaments of battery-type tubes, which are far more critical as to operating voltage than the heaters of a-c type tubes, they have been used for both purposes, in addition to their application with power-transformer operated apparatus.

These current regulators are generally called ballasts. Some ballasts

have true current-regulating properties; others are simply fixed resistors, enclosed and mounted so they may be plugged into receivers. The latter type is generally employed in a-c/d-c sets, where the regulation of current is generally of little importance.

A simple method of securing excellent current regulation is shown in *Figure 8B*. Here three or more current regulators are connected in series so that a very large voltage drop occurs across them. Thus three 35-volt current regulators can be used in series with a 115-volt line supply to furnish a 10-volt drop across a load which is chosen to make the total current in the circuit

equal to the current rating of the regulator tubes. While a single tube could be designed to accomplish the same results, such are not commercially available except on special order. Furthermore, the use of more than one tube permits better dissipation of heat than could be obtained with a single tube without increasing the size of the bulb.

Early receivers employed special current regulators, known as the types 876 and 886, both designed to operate over a voltage drop range of from 40 to 60 volts. The former is to be employed with power transformers requiring, under load, a primary current of 1.7 amps. and the latter for a current of 2.05 amps. The high voltage drop across these ballasts gives them excellent current regulating properties, but they are seldom used now except for renewal purposes. The operating temperature is necessarily high (150° F.) so they must be enclosed within a metal ventilator.

A method of using a standard 6F6 or other power pentode for current regulating purposes is illustrated in *Figure 9*. The VR 150 voltage regulator is employed to stabilize the screen voltage, and a measure of grid-voltage stabilization is obtained because any increase in plate voltage causes a corresponding increase in cathode current, which in turn increases the grid bias and thus reduces the plate current. The output current is controlled by adjustment of R2, a lower value of cathode resistance causing an increase in the plate current. Because the output load must be connected in series with the pentode plate, as shown, it is not possible to ground the load circuit unless all points in the regulator circuit are isolated from the ground. Alternatively, if the negative side of the load circuit is to be grounded, the plate of the 6F6 may likewise be grounded, but not any of the other points in this circuit.

Around the service shop, either a voltage regulator circuit or a current regulator in combination with a resistance of known value is most useful for checking voltmeters, milliammeters, etc. Even the simplest regulator, such as that shown in *Figure 1* will supply an output voltage accurate enough to check any d-c meter at the calibration point corresponding to the voltage output rating of the regulator tube. By using two or more voltage regulators in series, as shown in *Figure 2*, additional points may be checked.

The standard voltage regulator tubes, such as the VR types, should not be used on alternating currents. The reverse current will quickly ruin them. >>>>



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## LETTERS TO EDITORS

(Continued from page 4)

judging from tubes my customers buy some of them are cutting rates . . . would sell them a defective 50L6-35L6 or any 12-volt (tube) from \$1.65 to \$2.50, that would not work or would last for a couple of days. Who is getting the MR tubes? It is the work of authorities to find out.

George Vouzouner  
New York City

As we understand it, MR tubes are reserved for *Umbrigo* or perhaps for

*Yehudi!* (Apologies to Jas. Durante and J. Colona).

### PAGING SENATOR TRUMAN

Editor:

Why don't you specifically state that all radio technicians should get all radio owners to write to Congressmen in Washington asking for a Government investigation in re radio tube black market.

Roland Dougherty  
Maryland

You got something there, Brother!

### MORE ON BLACK MARKETS

Editor:

. . . . I wish to take the liberty of

expressing my thanks to you for exposing the Black Markets. Your Editorials are attempting to do a good job, but are you? May I suggest that you ask all your subscribers to submit to you names of wholesalers in their territory who are hoarding tubes. . . .

A World War Veteran\*  
Illinois

(\*Name withheld for obvious reasons)

What do you other readers say to the suggestion? How many tube-hoarding wholesalers are there in your territory? What are your problems with the Black Market Gangsters? Your name will be protected, and you will help all radio-men and dealers by giving the information. We should and will fight them hip and thigh.

« « «

## SERVICING WITH LAMPS

(Continued from page 34)

crease in test lamp brilliance, if the circuit is normal. Should one or more plate or screen-grid terminals have high resistances in series with them, temporarily connect a wire across the resistor or resistors so as to short them out of the circuit and proceed as usual. If you get no sparks and no increase in test lamp brilliance, check back over the circuit until you find an open resistor or shorted condenser as one or the other of these defects will probably be present.

We are now ready to check the second section of *Fig. 4*. Reconnect the circuit at X so as to complete the B+ circuit (remember this procedure is simply typical of the average receiver and it will be up to you to decide in other sets just where they should be divided into sections. Remember, too, you can divide a complete receiver circuit into as many sections as you wish to make for convenience in testing).

Either resistor R20 or R22 may be tested first. To test R22 short-circuit the plate terminal of the 6SF5 phase inverter tube socket to ground. Resistor R22 has a value of 270,000 ohms. Therefore, for normal conditions there should be a faint spark and only a slight increase in the test lamp brilliance. If there is any doubt in your mind, about the continuity of this or a similar resistor, test it for continuity as previously described. To finish this parallel circuit test C42 and R24 just as was described for C17 and R4 in the first section.

Units R20 and C44 should be tested next. A "short" from the plate terminal of the 6SF5 a.f. tube will determine the condition of both R20 and C44. A slight spark and slight

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increase in test lamp brilliance indicate normal conditions; without these it means R20 is open or C44 is shorted. To determine which is true, separate these two units and test as described for R28 and C7 of the first section.

Units C40, C41, C47, R18, C48 and R23 remain to be tested. To test C40 and C41, temporarily ground S6 and disconnect one end of both condensers, one at a time. If either one is already shorted, the test lamp will be at about full brilliance. However, on disconnecting the shorted condenser, the test lamp will decrease in brilliance, thus proving that a short existed. Condensers C47 and C48 may be tested in the same way. To do this, connect one side of both condensers direct to ground. If either one is shorted, the test lamp will light up bright; disconnecting the other side of each condenser, one at a time, then will prove which one is shorted.

Unit R18 is a tone control. Rarely will it become defective unless a series condenser like C47 becomes shorted. If your test should prove that a series condenser like it is shorted you can almost assume the tone control is also defective without testing it. However, if you do want to test it for continuity, test it just as described for R4.

Resistor R23 has a resistance of 390,000 ohms and is a grid leak. Any of the forms of continuity testing as was described for R4 will also work for a resistor like R23. Resistors R26 and R27 are not strictly a part of the high-voltage d.c. supply. Therefore, we will consider them, in the following Part, under testing for the low-voltage supply—cathode circuits, etc.

**IMPORTANT NOTE:** In the foregoing tests we have gone into detail in testing or determining the condition of each part. In any given defective receiver this long procedure *will not be necessary*. The reason for this is simple—not all the parts will be defective. Usually the trouble will be just one defective part and with it found and replaced, the receiver will probably operate normally. It will usually be possible for you to short the tube socket terminals to the chassis and from effects exhibited you will get a general idea of the type of trouble. Then if you use the principles set forth herewith you ought to be able to go right to the direct cause of the trouble. After a little experience with this test method you will soon gain speed and be able to do a good and quick repair job.

## NEW ORLEANS UTILITY

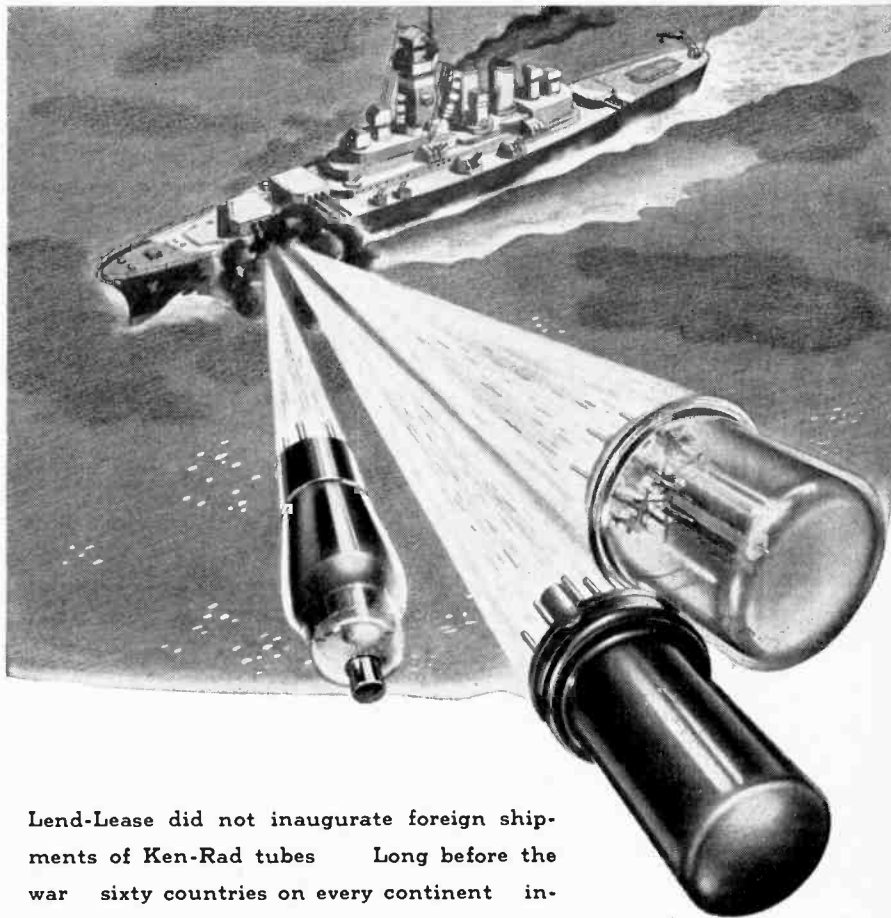
(Continued from page 18)

when the finished job goes back to the customer it goes with two tags, one of which calls attention to the Certified Electric Appliance Repair Shop group; and indicates that time and trouble can be saved by sending the next service or repair job to the nearest group member. Then, in order to make it easy for the customer to know who is a member, the second tag lists all of the members of this group with address and telephone number. In other words, a complete service is offered to the customer for his benefit, and at no

greater service charge than he would otherwise have to pay.

"We find the Certified Electric Appliance Repair Shop idea works out very well and has advantages to the members of the group," says a representative of A. C. Denny, with a radio shop located at 512 St. Charles Ave. "We are happy that we were included as a member of this group because it has been proven that there goes a certain amount of prestige with membership. Naturally our firm is well known and well established but it does help to have a large firm like the New Orleans Public Service, Inc., recommend us to others.

"Apart from the prestige that comes with membership in the group we have



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also found that it is productive of new business for us, too. Sometimes a person living in our section who has not been a customer of ours is recommended to our place for a service or repair job. We do the work in a satisfactory manner and so gain a new friend who is almost certain to see us when some new tubes are needed or when some other purchase is contemplated.

"Of course, right now, it is a hard job to keep up with our service and repair work because of war conditions. Like every other radio dealer we have lost service men to the defense industries and also to the war effort. But present unusual conditions brought about by the war won't continue always. When we finish our war job we will go back to more normal times and I feel sure that the certified shop idea will prove very much worth while in that new day just as it proved itself in the days just before the war. We are very much for this certified idea."

### PHILCO MYSTERY CONTROL

(Continued from page 10)

B. Holding the "Stop" in this position, bring the Control unit close to the receiver. Using the padding wrench, tune the padding screw (126) located on the bottom of the unit until the

2A4G thyratron in the receiver glows at full brilliance.

No, turn the sensitivity control on the receiver towards the "near" position until a point is reached where the 2A4G tube almost stops glowing. Then, readjust the padder (126) of the unit again for maximum brilliance in the 2A4G tube. The Mystery Control unit should now be adjusted to the same frequency as the control frequency in the receiver.

### WITH THE EDITOR

(Continued from page 2)

tubes will be marked "MR" for maintenance, repair; cannot be sold on rated order or diverted from civilian channels."

Service-dealers and set-owners will shout with elation if, as and when actual delivery of the tubes in question is made. We cannot forget that very recently WPB deliberately implied, through press releases, that millions of "MR" tubes had already been made and delivered for civilian use, knowing that such was absolutely not true. This latest WPB publicity leaves us cold for we know that there is a vast difference between scheduling tube production and then

actually making deliveries. Owners of dead radios want tubes, not promises.

Even if 4½ million replacement type tubes are delivered to service-dealers by coming Spring, such a small quantity will hardly suffice to serve the needs. Many of the country's radios are already inoperable and the figure is rising with every passing second. Recently the Washington, D. C., Times Herald stated that in the Capital nearly 50 thousand sets were "on the blink" from lack of tubes. It is possible that the President read that news item and, planning to run for a 4th term, realized that he might not have any radio audience whatever, unless the public gets tubes quickly. Could it be that F. D. R. is behind this sudden charitable impulse on the part of WPB towards set-owners?

*S. R. Lovan*

### CHICAGO SWAP PLAN

(Continued from page 15)

without charge by the Commonwealth Edison Company.

Further to plug the campaign, the Company put numerous "spot" announcements over the local Chicago radio stations. These were the major network outlets and the chain-breaks were well spaced to catch the ear of the public. In addition the campaign was "pitched" into a participation program over the CBS station WBBM. Even the well-known character *Dick Tracy* (WENR—local outlet) was pressed into action to plug the War Stamp Swap Plan.

Several dealers reported that the demand for appliances was so great that they had waiting lists. One exhibited a note book filled with the names and phone numbers of people who had asked to be advised as soon as the dealer obtained certain types of appliances. The dealers are building excellent customer lists for immediate and postwar business.

Probably the most unusual occurrence was the dealer who entered into a working agreement with all the janitors in the area of 5 or 6 blocks around his shop. They have kept him so well supplied with appliances and repair work that he has had to move to larger quarters on the first of last month. « « « «

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## C.A.A. RADIO SERVICE

(Continued from page 13)

warning light which flashes on if anything goes wrong; a siren with a re-setting switch which allows the ground crew to silence it while repairs are being made whereupon it automatically resets itself to sound a new warning; and an Angus-Esterline recorder which automatically traces a complete record of the performance of the radio range station.

A similar device is used to safeguard the functioning for the airway fan markers—those fan-shaped fountains of radio energy transmitted athwart the radio courses as the pilot approaches an airport, to give him a definite position check along the radio range course.

The fan marker monitor receiver is located near the marker, and is connected through a telephone line with a monitor board in the airport control room. If the marker radiation strength, or its percentage of modulation, drops below a certain level, or if the marker identification signal keying becomes faulty, the red light flashes on the monitor board and the sirens are sounded. The fan marked monitor board has all the automatic features of the course monitor board; in addition, a neon light is provided which flashes with the keyed signal to provide visual check on the functioning of the fan marker.

«««

### G. E. Announces Unusual Post-War Broadcast Equipment Plan

The General Electric Company announced today a reservation plan for the purchase of post-war radio broadcasting equipment, requiring the deposit of United States war bonds with the company in sums varying with the amount of equipment reserved for post-war delivery.

The plan will help General Electric prepare for an orderly transition from wartime to peacetime manufacture, and help keep workers at their jobs, Paul L. Chamberlain, in charge of sales for the company's transmitter division, told a meeting of 50 General Electric sales executives, newspaper and magazine representatives. "It will also support the war effort and enable broadcasters to make a definite reservation for equipment to be built and delivered as soon as conditions permit," he explained. The plan is being mailed by the company to the industry to arrive early next week on broadcasters' desks.

Pointing out that General Electric is building almost a million dollars worth of military radio every working day, Mr. Chamberlain said that the company in the post-war period will be able to furnish the broadcaster everything from microphone to antenna, including buildings, and will finance the whole transaction if the broadcaster's credit is good.

W. R. David, in charge of broadcast transmitter sales for the G.E. transmitter division, told the group that "FM

(frequency modulation) radio stations will eventually supplant all local, most of the regional and some of the high power AM stations now in operation." He predicted that five years after the war there will be 500 FM stations in operation (compared with about 50 today) and 750 AM stations. The United States also will have 100 television stations (compared with nine today) and 50 international shortwave stations in operation at that time, Mr. David said.

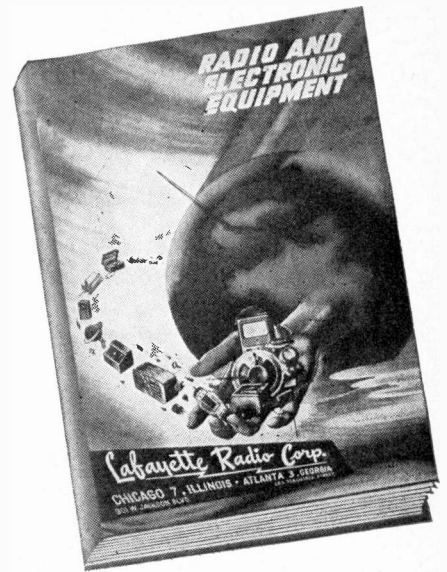
He predicted further the extensive use after the war of "wireless" FM networks. Whereas their use is limited today because it is necessary for each station in the chain to pass the program along to the next station, Mr. David said that "tomorrow's wireless FM networks will differ from today's in that the relay transmitters will be operated on very high frequencies. They will be small units with highly directional antennas located at strategic high points and probably operated automatically," he explained. "Such stations may be set up as a public utility, similar to the telephone system, or they may be set up as an auxiliary operation of the major networks. In this type of wireless network, the intermediate broadcast stations will not be responsible for passing the program on to the next station."

In the areas where FM stations are now operating, there is an immediate potential post-war market for 12,500,000 home radio receivers with the FM band, he said, and there is another big market in car radios with this same FM service. The American public after the war will probably consider a radio receiver without FM as being obsolete, and this will furnish a strong incentive for the purchase of sets with the new kind of reception service included, the group was told.

In elaborating on the broadcasting equipment reservation plan, Mr. Chamberlain said that the plan is not an order for equipment. "The broadcaster will not have to sign a contract to buy. Under the terms of the plan, he can place his order for equipment at any time up to 90 days following the date when the production and sale of commercial transmitters is authorized. To maintain his reserved position, he must enter into a mutually satisfactory sales contract within this 90 day period. The bonds remain the property of the broadcaster, of course, as well as all income from them. They will be returned when a contract is signed, or at any time the broadcaster wishes to withdraw from the plan. In the latter case, the broadcaster loses his priority position for equipment."

Expanding on the services General Electric will be able to furnish the broadcaster after the war, Mr. Chamberlain said that all a prospective broadcaster will need is an open mind and good credit. "If the customer desires it, we will purchase the land, and, in cooperation with a firm of architects, will take care of the construction of the necessary buildings. We will be prepared to take care of the wiring and sub-station equipment, of the lighting and air conditioning. We will supply everything from microphone to antenna, will train operators and program personnel if desired, and will

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LARGE STOCK OF REPLACEMENT PARTS AND CABINETS ALWAYS ON HAND

*Serving the Armed Forces*

...AND THE

# HOME FRONT, TOO!

- Despite material and manpower difficulties, and our participation in the war effort, we are producing and delivering the Government-approved Victory Line of Condensers. Write for list of Victory items and prices. Shipments are made on L265 Ratings, or better.

For VICTORY Buy United States War Bonds and Stamps



# POLYMET CONDENSER CO.

699 E. 135th ST., NEW YORK 54, N. Y.

finance the whole transaction if the broadcaster's credit is good."

Mr. David explained that the leading radio manufacturing companies will continue to explain the advantages of FM radio to the public through advertising. Network support of FM, rather than interest from viewpoint of protection, is confidently expected, he said. Present war developments will facilitate establishment of high-fidelity radio relay facilities, and big name programs will come to FM stations through wholehearted network support, he predicted.

### New Sound Distributor

The Langevin Company, Inc., New York City, has just announced a new type of Annular Sound Distributor, Type L-360. This distributor utilizes a different principle of sound distribution in that it combines molecular reflection and collision instead of collision alone as in other speakers. The use of this principle results in a uniformity of sound distribution both as to frequency and power over a horizontal plane of 360° and a vertical plane of approximately 40°. The Type L-360 Distributor is 23" in diameter with an over-all height of 25". It will safely handle power input of 20 watts when equipped with Jensen U-20 Drive Unit.

### Financial & Production

In two years of war since Pearl Harbor, the Hallicrafters Company, Chicago, has manufactured and delivered more than \$44,000,000 worth of short-wave communications equipment to the armed forces and lend lease.

Radio's dramatic part in this global conflict, where communication is playing a determining role, is portrayed in an action-laden film, "Radio at War," which will be available for release to schools, colleges and civic organizations.

A 24-minute presentation on 16 mm. sound film, "Radio at War" pictures the adventures of two typical American boys, Jim and Joe Brown, who leave high school shortly after Pearl Harbor to join up, Jim entering the Army Signal Corps and Joe the Navy, where he likewise finds himself in the communications section. The picture is sponsored by Radio Corporation of America, in cooperation with the communication branches of the Army and Navy.

Training camp routine is pictured in interesting detail, followed by scenes taken at actual maneuvers during which

many phases of electronics communications are brought into play. Moving rapidly forward, the film carries the two boys into convoy action as a battle sequence, reveals how radio-borne orders to ship commanders allow instantaneous action to meet possible attacks.

A high point of the film is the sequence of recent official Army and Navy motion pictures of an invasion in the southwest Pacific and the establishment of a beachhead, with authentic battle scenes adding to the exciting portrayal of radios vital part in the operations. Final scenes show Jim Brown, on the beach with his Army Signal Corps outfit, contacting a warship at sea, relaying information on the battle ashore, and the message being received aboard ship by his brother, Joe.

### SERVICING BUSINESS

(Continued from page 12)

are scratches, breaks, cracks and any other aberrations from normal. This last we have found to be of utmost importance. It eliminates having a customer later claim that we did some damage to his cabinet.

In the second column the serviceman puts down the list of parts he has added to the set and the charges therefor. Then the labor cost.

In the final column, a final test made by a benchman is recorded in detail.

One segment of the card, (which is a three-part device) is given to the customer as his "call-receipt," the second part stays with the set for the filling out as above noted. The third part is attached to the set to identify it.

After delivery, we file the center part and thus keep a perpetual check on our customers' sets. If there is future trouble, we can make good on our 90-day guarantee by checking what we had done to the set before. Many times this, alone, has been worth the cost of the card and the keeping of records.

The last question usually asked is: "What does this all pay you in dollars and cents?"

It has paid us well. We have averaged \$150 per day—or about \$50,000 per year.

And that, fellow servicemen, ain't hay!

# 14 NEW STANCOR Victory Model TRANSFORMERS AND CHOKES ARE NOW AVAILABLE FROM STANCOR JOBBERS!

If your present supplier is unable to supply your requirements for VICTORY MODEL Transformers and Chokes, contact your nearest STANCOR Jobber today. A nation-wide distribution system is maintained for your convenience. If you don't know your nearest STANCOR jobber, write us.



**STANDARD TRANSFORMER CORPORATION**

1500 NORTH HALSTED STREET, CHICAGO

### \$1.00 PAID FOR SHOP NOTES

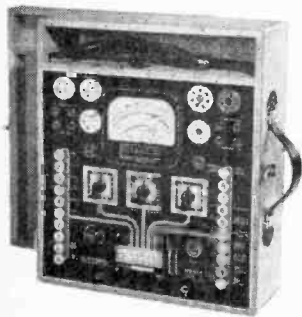
Write up any "kinks" or "tricks-of-the-trade" in radio servicing that you have discovered. We will pay \$1 in Defense Stamps for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor," RADIO SERVICE-DEALER, 342 Madison Ave., New York 17, N. Y. Unused manuscripts cannot be returned unless accompanied by stamped and addressed return envelope.





Supreme's New "Hauline Accuracy" Meter

**ALLIED LIVES...** Allied victories... depend upon the Communication waves and wires. These channels of contact **must** be kept open. Our fighting men rely on the accuracy, dependability and ease of operation of Supreme Instruments and Meters, assured by Supreme's 15 years of experience. Supreme Radio Testing Equipment Keeps Communications Open.



Supreme 504-A Tube and Set Tester

**SUPREME**

SUPREME INSTRUMENTS CORP.  
REEDWOOD, MISSISSIPPI, U. S. A.

### New WPB Form Helps Dealers

Wholesalers and retailers, who use Form WPB-547 (PD-IX) to apply for priority assistance in obtaining scarce goods, are cautioned not to order supplies of this form for more than immediate needs, the War Production Board said today. A simplified version of PD-IX is under consideration, and is being submitted by the Wholesale and Retail Division of WPB to appropriate Industry Advisory Committees.

The new form, if adopted, will require less time to fill out and less time to process at the War Production Board. Any changes will be made public well in advance of the effective date, probably some time in January.

### Atlanta Firm Moves to New Quarters

The Yancey Co., Inc., recently purchased new quarters at 340 West Peachtree Street, Atlanta, Ga., to provide improved facilities for the huge volume of war work being handled by the firm combined with the services given the company's 750 dealers throughout the South.

### New Stackpole Catalog

Just off press is the new 36-page Stackpole Electronic Components Catalog giving full details on Fixed and Variable Resistors, inexpensive Switches, and Iron Cores for a wide variety of electric, radio, and other electronic applications. Also included, is a wealth of engineering information and data of interest to those dealing with items of this sort.

Particular interest attaches to the listing of Stackpole standard and high-frequency iron cores, this catalog representing the first assembling of complete information on these popular items. In addition to complete listings on the various types of Stackpole insulated and non-insulated cores, etc., the catalog contains helpful reactance charts as well as time constant charts for series circuits.

### Moves to Pueblo

Frank L. Sprayberry, nationally famous as the friend of thousands of aspiring radio technicians and one of radio's leading instructors has just announced the removal of his school's offices and facilities to new and larger quarters in Pueblo, Colorado.

During the past decade, the Sprayberry Academy of Radio has been situated in Washington, D. C. Here it has achieved an outstanding record of success in Home Study training of men all over the world for useful and profitable careers in the field of Radio-Electronics.

From the very beginning, growth of the Sprayberry Academy has been vigorous and steady... but with the advent of war has advanced at such an accelerated pace as to exceed the availabilities of adequate housing and manpower under present conditions in wartime Washington. With conditions of equal stress prevailing in other metropolitan areas it was deemed expedient to transfer the school to a non-critical area where expansion could proceed without limit.



## Throat Microphones

For Aircraft Inter-Communication systems and radio telephone applications. These microphones open an entirely new field for industrial communications, allowing the wearer to make use of both hands without hampering his other movements. Ideal for use in noisy surroundings where communications must be made by use of headphones.

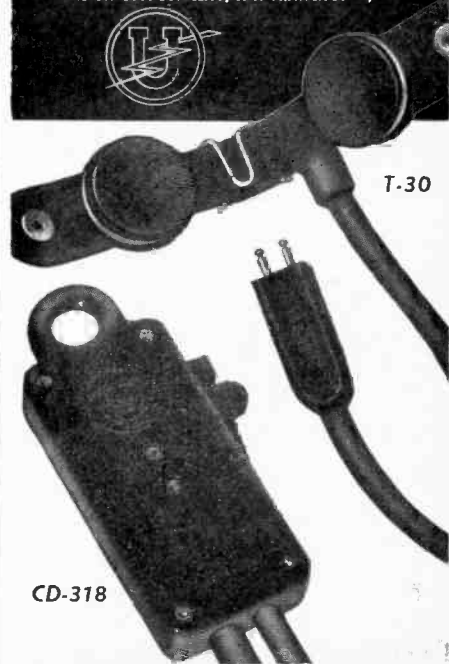
Model T-30 with CD-318 extension cord and switch, for U. S. Army Radio circuits, now available to priority users through local radio jobbers.

Write for Catalogue No. 961

**UNIVERSAL MICROPHONE CO., LTD.**

INGWOOD, CALIFORNIA

CANADIAN DIV: 560 KING ST. WEST, TORONTO 2  
FOREIGN DIV: 301 CLAY, SAN FRANCISCO 11, CAL.



**WPB Changes Official  
Class B & Class A List**

The "Official CMP Class B Product List and Class A Civilian Type End Product List," issued May 15, 1943, will no longer be used, the War Production Board said today. Its place will be taken by publication in "Products and Priorities" of the "Official CMP Product List," brought up to date monthly.

"Products and Priorities," issued each month by WPB, is available for reference at all offices of the Board. Persons wishing copies for themselves may order from the Superintendent of Documents, GPO, Washington, D. C. Subscription rates are \$2.00 per year; single copies, 20 cents.

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● Available in a selected range of voltages and capacitances to serve the widest range of standard radio sets, these "Victory" Dandeels are the answer to your wartime electrolytic replacement needs. You can install them—and forget them—for the duration. When the war is won, other Aerovox types will again be available. ● Consult our jobber.

**AEROVOX**  
Capacitors  
INDIVIDUALLY TESTED

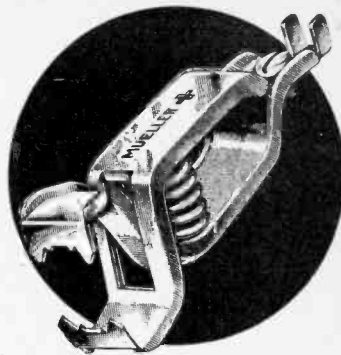
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**RADIO AND ELECTRONIC DEVICES**

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**CLIPS**

**FOR MAKING QUICK  
TEMPORARY CONNECTIONS**

- Made in 10 sizes—from the tiny wee-pee-wee to the 300 ampere Big Brute.
- Offered in both steel and solid copper.
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**A CLIP FOR EVERY PURPOSE**  
Immediate deliveries on practically all items.

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ROLLING ON TO



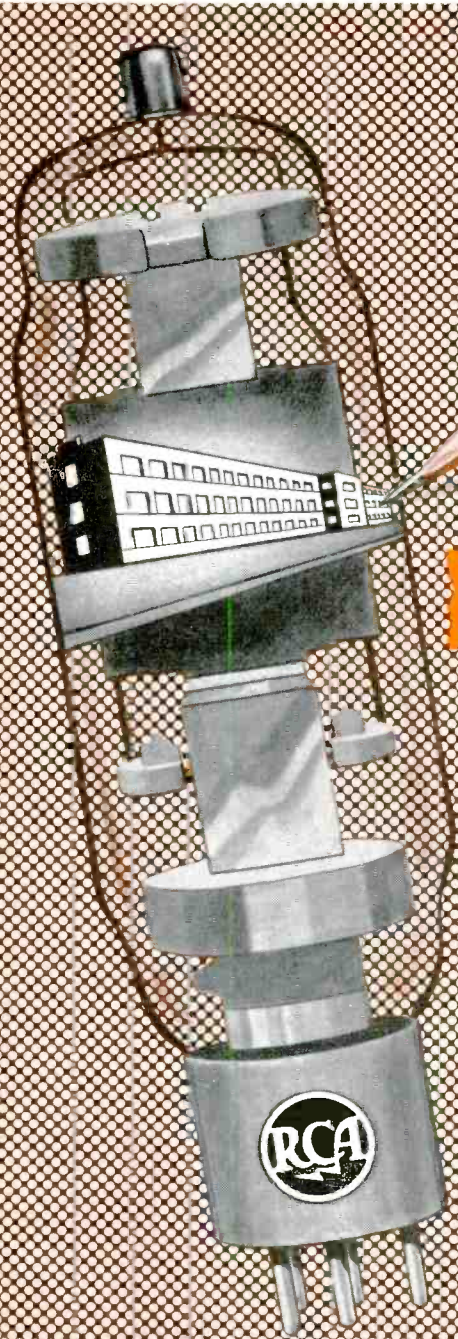
★ Clarostat continues to be engaged 100% in the most important job of all—winning the war—on land, sea and in the air.

But after victory has been won, Clarostat promises the trade—servicemen, jobbers and others—that Clarostat products for initial and replacement uses alike, will once more be generally available for peacetime pursuits. Meanwhile, let's keep 'em rolling!



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CLAROSTAT MFG. CO., Inc. - 785 7th St., Brooklyn, N. Y.

Radio Service-Dealer



## THE EXTRA ELEMENT

## IN EVERY RCA ELECTRON TUBE

**Y**OU can hold the tube in your hand and examine it thoroughly, but you won't see the extra element that distinguishes it.

Not until after you've put the tube to use will you finally become aware of that extra element.

It's in every RCA Electron Tube—the extra element that makes the RCA monogram worth looking for and insisting on.

It's research. It's engineering knowledge. It's experience.

It's "know how"—the kind of "know how" that's built into every RCA Electron Tube—and it's best exemplified by the modern RCA Laboratories at Princeton, N. J., devoted almost exclusively to electronic research.

There, men skilled in research seek new electronic facts.

There, the electron tube is recognized as the keystone of the whole vast structure of electronics.

There, basic facts are uncovered to assist RCA tube engineers on design, development, and production in turning out ever better and more advanced electron tubes.

The RCA Laboratories are a fitting symbol of the extra element that recommends RCA Electron Tubes to you.



The Magic Brain of All Electronic Equipment Is a Tube and the Fountain-Head of Modern Tube Development Is RCA



TUNE IN "WHAT'S NEW?"  
RCA's great new show,  
Saturday nights, 7 to 8,  
E. W. T., Blue Network



# RADIO CORPORATION OF AMERICA

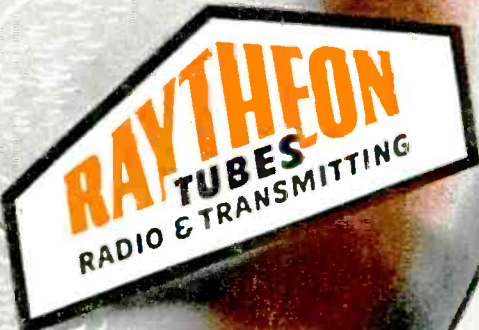


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**B**efore the war, tubes made by RAYTHEON were used by the majority of important receiver manufacturers . . . because RAYTHEON tube developments kept pace with the latest engineering thinking . . . aiding RAYTHEON set customers in keeping at the top of the art in receiver designs.

During the war, there has been a 1000% increase in RAYTHEON technical achievements in protecting the fast requirements of our Army and Navy.

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Each Division of Raytheon has been awarded the Army and Navy "E"

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