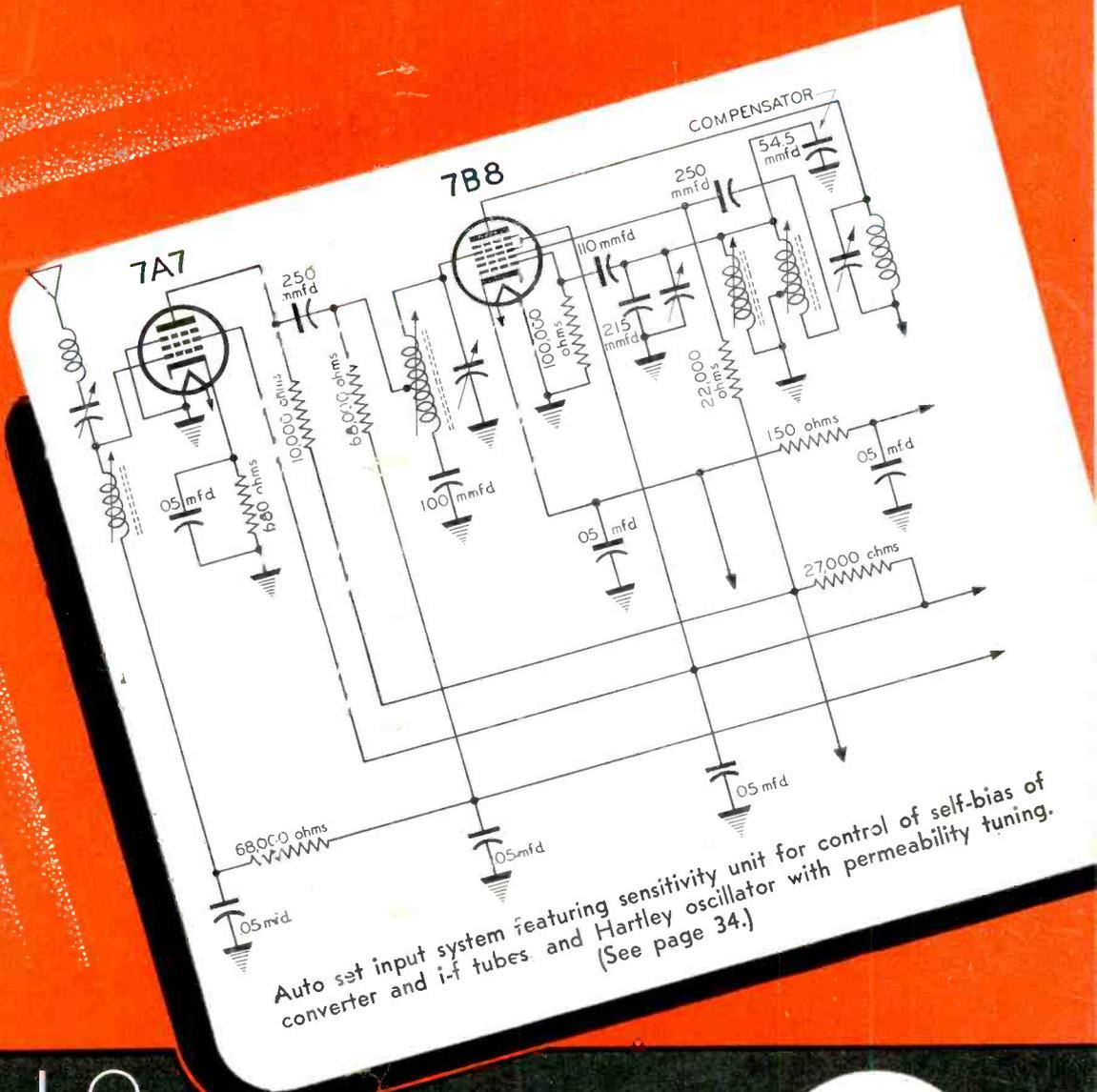


SERVICE

A MONTHLY DIGEST OF RADIO AND ALLIED MAINTENANCE



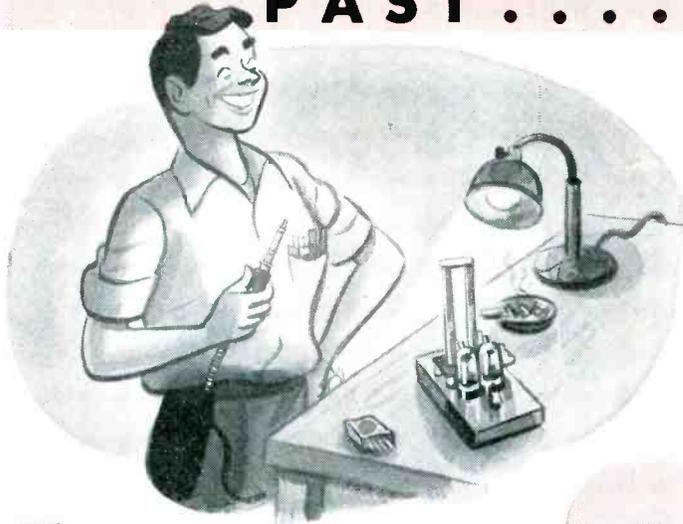
★ RADIO
★ TELEVISION
★ ELECTRONICS

October
1944

"Ham" Radio and

HYTRON

P A S T



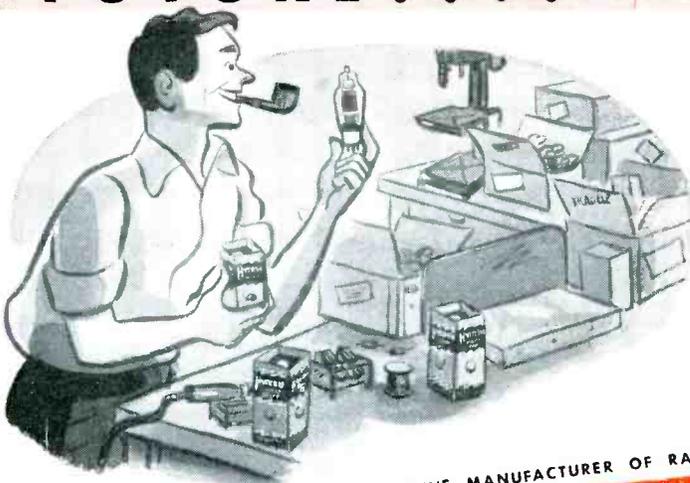
THE radio amateur trained himself during peace to be invaluable to the Nation during war. Specializing on tubes exclusively designed for ham radio, Hytron when war began was prepared for immediate and direct conversion to war production. Hytron transmitting and special purpose tubes proved by the ham were ideally suited—with little or no changes—to military applications. Years of practical experience made Army and Navy specialists of radio amateurs overnight. Peacetime tools of these same hams, Hytron tubes joined immediately this new fighting team.

. . . . P R E S E N T



HAMS with the Services in all parts of the world know the war job Hytron is doing. High-speed receiving tube techniques plus know-how derived from special purpose engineering of tubes for the amateur, make possible a flood of dependable Hytron radar and radio tubes to these fighting ex-hams and potential hams. Proud of winning the Army-Navy "E" for its performance on a huge production job, Hytron is also proud of its ham friends who are transforming innocent-appearing Hytron tubes into deadly weapons.

F U T U R E



THERE should be no concern about adequate post-war amateur frequencies. Excellent wartime performance on far-flung battle fronts has made for ham radio many enthusiastic and influential friends. The ARRL reports that it looks forward with absolute confidence to the opening of new frontiers in expanded frequency ranges to be made available to the post-war amateur. Hosts of hams will return to their old friend, Hytron. For the more familiar lower frequency bands—the very high frequencies—or the new superhighs—their choice will be Hytron.

OLDEST EXCLUSIVE MANUFACTURER OF RADIO RECEIVING TUBES

HYTRON
CORPORATION

ELECTRONIC AND
RADIO TUBES

SALEM AND NEWBURYPORT, MASS.



BUY ANOTHER WAR BOND



The United States Navy has awarded the men and women of Hallicrafters a special "Certificate of Achievement" . . . first award of its kind . . . for outstanding service with the radar-radio industries of Chicago in speeding vital war material to the Navy. Added to the four Army-Navy "E" awards, this makes five times Hallicrafters workers have been cited for distinguished service. They promise that this kind of service will be continued until total victory is ours.

★ BUY A WAR BOND TODAY

hallicrafters RADIO



THE HALLICTRAFTERS CO., MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 16, U. S. A.

SERVICE, OCTOBER, 1944 • 1

EDITORIAL

DURING the past months, we've received many letters from both boys overseas and here who expect to reenter the business of Servicing when they return to civilian life, and Service Men at their bench, asking about postwar prospects. Ideally suited to provide all the answers to this important question are the service managers of our leading manufacturers, specialists who have studied the problem closely so that they might effectively participate in service programs of the future. We therefore asked a representative group of service managers to submit their views, and on pages 12, 13, 26, 27 and 28 of this issue, these expert views appear. The experts all agree that the opportunities for the Service Man never were brighter. But they all point out that advanced training and adoption of streamlined procedures will be essential. Radio servicing is vital to every community and conducted as a major community service, it can't help but flourish, these experts acclaim!

HEARING aids are finding their way to many service benches. While many Service Men are repairing these devices expertly, there are many who are not too careful. While it is prudent to exercise care in repairing all equipment, hearing aids demand the closest of attention. For they are an essential tool to their owner, a tool that must operate perfectly continuously. Hearing-aid owners will be grateful for your cooperation.

ATHOROUGH knowledge of antenna properties will become increasingly important as the swing to f-m and television rises. Dipole, reflector and coaxial installations require the utmost amount of skill. Accordingly, many Service Men have begun to study these antennas and their problems carefully. Special f-m and television antenna departments have already become a feature of some service shops. And many more shops will follow this practice soon. It would be wise to study these antennas now!

SERVICE

A Monthly Digest of Radio
and Allied Maintenance

Reg. U. S. Patent Office

Vol. 13. No. 10

October, 1944

ALFRED A. GHIRARDI

Advisory Editor

LEWIS WINNER

Consulting Editor

F. WALEN

Managing Editor

	Page
Diode Detectors. By Arthur Moore	11
Disc Recording Control. By Donald W. Aldous	14
Ser-Cuits. By Henry Howard	22
Servicing in the Postwar Era: By S. J. Thompson	12
W. E. McConnell	12
W. L. Jones	13
I. J. Kaar	13
Charles A. Nichols	26
H. A. Newell	26
Win Campbell	27
H. B. Donley	27
M. J. Schinke	28
Service Jobs in Wartime. By Willard Moody	18
Circuits	
Atwater Kent 40	20
Emerson, CUL 261	22
G. E. A-63, A-65	18
Philco S-1826 (cover)	34
Sentinel 170 BL	22
Sentinel 160 BL	24
Stromberg-Carlson 10-11	20
Cover	
Philco S-1826	34
Service Helps	
Philco 38-7	33
Index to Advertisers	40
Manufacturers	
News	35
New Products	38
Jots and Flashes	40

Copyright, 1944, Bryan Davis Publishing Co., Inc.

Published monthly by Bryan Davis Publishing Co., Inc.
19 East 47th Street, New York, 17, N. Y. Telephone PLaza 3-0483



Bryan S. Davis, Pres.
F. Walen, Secretary



Paul S. Weil, General Manager
A. Goebel, Circulation Manager

James C. Munn, 10515 Wilbur Avenue, Cleveland 6, Ohio
Pacific Coast Representative: Brand & Brand, 516 W. Fifth St., Los Angeles 13, Calif.; Telephone. Michigan 1732

Entered as second-class matter June 14, 1932, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Subscription price: \$2.00 per year in the United States of America and Canada; 25 cents per copy. \$3.00 per year in foreign countries; 35 cents per copy.



NEW COMPLETE RADIO TUBE DATA BOOK BY RAYTHEON

THE new complete data on tubes, including characteristics, outlined drawings and basing diagrams of all standard receiving tube types; simplified interchange information including over 1600 substitutions; hearing aid tube data and technical information regarding radio panel lamps. All this is included in the new Raytheon Tube Data and Substitution Chart prepared by the Technical Service Department of Raytheon Manufacturing Company.

The value of the technical information in this manual is inestimable and yet it may be obtained FREE from your Raytheon receiving tube distributor. Every-

one concerned in the repair and maintenance of radios must have this ready reference book.

This manual is the first step in a tremendous merchandising plan which will bring you better business. This program teamed up with the superior, "Plus-Extra" quality Raytheon Tubes, will assure you of better customer goodwill, faster turnover and greater profits.

Raytheon Manufacturing Company

RADIO RECEIVING TUBE DIVISION

Newton, Massachusetts • Los Angeles • New York • Chicago • Atlanta



All Four Divisions Have Been Awarded Army-Navy "E" With Stars

RAYTHEON

High Fidelity

RADIO AND ELECTRONIC TUBES



DEVOTED TO RESEARCH AND MANUFACTURE OF TUBES FOR THE NEW ERA OF ELECTRONICS SERVICE, OCTOBER, 1944 • 3

SPRAGUE TRADING POST



A FREE Buy-Exchange-Sell Service for Radio Men



REPLACING WET ELECTROLYTICS WITH DRYS

In many cases—particularly in old sets—you can use Sprague Atoms (midget drys) in available Victory Line types to replace unavailable wet electrolytic capacitors. Atoms stand the gaff! A few precautions should, of course, be observed, and these are described in the Sprague "Victory Line" Catalog C-304. Write for your copy today.

FOR SALE—MacEroy oscillation code oscillator complete with 117N7GT tube, and MacEroy 200 code key to match—both like new. Cecil Lee Briggs, R. 1, Box 267, Denton, Texas.

WANTED—Multitester for service work. Robinson Radio, 3647 Main St., Kansas City 2, Mo.

WANTED—Tube tester, oscillator, condenser tester, vibrator tester, ohmmeter and 1115 tubes—what can you offer? F. R. Wentz Radio Service, Millerstown, Pa.

FOR SALE—Sig. generator, Superior 42 Osc. Good condition, reasonably priced. Glen Peterson, Glen Miller, Ont., Canada.

FOR SALE—Several hundred 6L6 metal tubes, some slightly used, 50c ea. W. W. Hofferbert, 3225 Ridge Ave., Dayton 5, Ohio.

WANTED—Meters and other radio equipment—swap or cash. K. M. Spencer, R. R. #2, Wellsboro, Pa.

WANTED—Communications receiver—preferably Hallcrafters' S-20-R or S-19-R. Merlitt M. Mitchell, Rt. 7, Box 841, Ft. Worth, Texas.

WANTED—Set of plug-in receiver coils, with tuning condenser to match. L. D. Lynch Radio Shop, 814 Fulton St., Jeffersonville, Ind.

FOR SALE—New Triplett #1213 tube tester for all latest tube types; also UE633A dynamic mike. Want sig. generator and Rider manuals. S. Mayo, 372 E. 16th St., Brooklyn 26, N. Y.

WANTED—Carborundum crystal detector; also instruction sheet covering operation of old Dayrad "B" tube tester. C. M. Delano, 4618 Hamilton St., San Diego 4, Calif.

WILL SWAP—16 size 19-jewel green gold B. W. Raymond man's watch for 3 Rider manuals, from 1932 on. D. M. Murray, 173 Union Ave., Jackson, Tenn.

WANTED—Hallcrafters' Sky Buddy receiver. Can trade some tubes or other parts—what do you need? J. T. Boyd, Jr., R.F.D. #2, Box 230, Wilmington, N. C.

REPLACING WET ELECTROLYTICS WITH DRYS

In many cases—particularly in old sets—you can use Sprague Atoms (midget drys) in available Victory Line types to replace unavailable wet electrolytic capacitors. Atoms stand the gaff! A few precautions should, of course, be observed, and these are described in the Sprague "Victory Line" Catalog C-304. Write for your copy today.

FOR SALE—Radio engineering and communication books. Thos. Whalen, 2622 S. Park Ave., Lackawanna 18, N. Y.

URGENTLY NEEDED—Tube tester, set tester, and all kinds of service parts. Dale B. Schow, 2518 Third Ave., No., Billings, Mont.

WANTED—1-12-25-35-50-70-117 series tubes; E-200 Precision sig. generator, recording equipment; and RCA voltohmmeter, Jr. or Sr. Monroe Radio Service, 111 Shelby St., Kingsport, Tenn.

FOR SALE—Sonora camera type radio, \$25; Zenith 4K-600 pocket radio, \$25; Emerson DF-208AC-DC battery type portable, \$25; Emerson R-152 5-tube AC radio, \$25; Spartan 587-2, \$25; Wards 62-5030 AB pack 7 1/2 V.A. 90 V.B., \$3.75; RCA 171 station allocator, \$20; Supreme 396 substitution box, \$15; and Meissner 1000 remote control and push button tuner, \$15, also good selection guaranteed tubes. Goodwin Radio Shop, Rankin, Ill.

WANTED—All type tube tester, or adapter to test all tube types on Confidence special tube tester; also 0-100-DC mil. meter. Henry Oliver, 105 Hobart St., Danvers, Mass.

WANTED—Dynamic tube tester—also ohmmeter. John H. Green, 518 W. Prospect St., Cameron, Mo.

FOR SALE—Supreme tube tester and analyzer, #502, and RCA test oscillator #153. Edward R. Fogle, R.F.D. #1, Wellsville, New York.

WILL SWAP—Clough-Brengle OMA oscilloscope, CHA oscillator, typewriter and K & E slide rule. Want battery operated sig. generator. V. Taverna, Unexcelled Radio Co., 155 Blackford Ave., Port Richmond, S. I., N. Y.

WANTED FOR CASH—Superior dynamometer, channel analyzer, and Superior sig. generator. B. G. Atkins, Kernersville, N. C.

FOR SALE OR SWAP—Dials and knobs. Want Rider manuals. Michael D. Susny, Modern Radio & Appliance, 12 River Bend Dr., Dayton 5, Ohio.

WANTED—Echophone EC-1 receiver. Pvt.

David G. Wallace, A.S.N. 1901665. Sq. A, 465th Base Unit, Paine Field, Everett, Wash.

WANTED—Jackson test oscillator #640 or equivalent, in good shape; also oscilloscope. Radio Department, Lincoln Appliance Co., 146 Second St., Fall River, Mass.

FOR SALE OR EXCHANGE—Triplett 0-1 m.a. meter, with voltohmm scale; Triplett 0-250 m.a. square shaped meter; brand new Triplett multi-range AC red dot meter; Superior #1280 tube tester and multimeter (AC side not working properly); and Green Flyer 2 speed 50-60 cycle turntable. Want 2A3, 53, and 117Z6 tubes; also high power 15" p.m. speaker that will take at least 20 watts and output transformer to match 4-2A3's in push pull parallel. Bert Shade, 1714 S. Ethel St., Alhambra, Calif.

FOR SALE OR TRADE—Good stock of new tubes, including 12SK7's, 25Z5's, etc. Want late model tube tester and sig. generator. J. Guilbault, Box 231, Chincottville, P. Q., Canada.

WANTED—Small transceiver for phone and C-W with tubes, mike, etc. J. Harvey Newborn, B-305, Kingston, N. C.

WANTED—Late model tube tester, multi-tester, sig. generator and wireless record player. Carl Malenfant, Cheboygan, Mich.

FOR SALE—2-0A4, 1-01A, 2-1A5GT, 1-1C5GT, 4-8C5, 4-6L7G, 5-68D7GT, 3-68P5, 5-68A7GT, 8-68K7, and many other tubes, all new and boxed. Levenson, Suite 6, 7 Monroe St., Mt. Vernon, N. Y.

FOR SALE—Triplett #1210-A (no charts). Urgently need multimeter, oscillograph, and condenser tester. R. J. LeGrand, 1323 Liberty St., Franklin, Pa.

WANTED—Any standard make sig. generator, tube tester, V-O-M, and sig. tracer—preferably the portable type, 1938-1944. Marvin Cohen, 104 S. Maryland Ave., Atlantic City, N. J.

FOR SALE—50 ma., 100 ma., 150 ma., 200 ma. and 300 ma. power transformers (all have filaments and 110 v. pri.); 50 ma., 100 ma., 150 ma., 200 ma. and 300 ma. chokes, all mounted or cased; also filament transformers, line transformers, mike, audio, mixer, modulation and plate transformers (no filament windings). Wood Electric Shop, 10950 Longview Dve., Detroit 5, Mich.

WANTED—Tube tester for new and old style tubes; volt ohmmeter, preferably Weston or Triplett; sig. generator, 1A7, 1H5, 1N5, 25Z6, 35Z5, 13SK7, Q7, A7, 6AT, 85Y3, 6K7, 6Q7 tubes; resistors and

condensers. Clyde E. Downing, 2813 Du Maine St., New Orleans, La.

WANTED—Power transformer for Buick auto radio #980650—must be exact replacement. Jim's Radio Shop, Mankato, Kansas.

FOR SALE—Weston #280 meter, 6 scales, 3, 15, 150 v., 15, 1.5, 15 amp., Weston #519 meter, 2 scales, 7.5, 150 v. in Victor test box; and Jewell #109 analyzer with 1 meters, 1 AC. G. E. Bennett, 51 Sunrise Ave., Katonah, N. Y.

URGENTLY NEEDED—1G8GT, 1J84 or 19 tube. Wm. A. Plees, Box 241, Whitehall, Mich.

WANTED—45Z3 tube for portable radio. Robt. T. Dill, SOMH 3/c, U. S. Naval Detach., Fort Winfield Scott, San Francisco, Calif.

WANTED—Late model Jackson or Triplett multi-tester and tube checker, preferably portable with both instruments in same case. Taylor, C. W., 2304 W. Washington St., South Bend 19, Ind.

FOR SALE OR EXCHANGE—6K7, 50L6, 6A6, 25L6, 41, 35Z5, 12A8, 6P7, 78, 75, 381, 25Z5, 12K7, 12SG7, 6Q7, and many other tubes—some brand new, all test good; small copper oxide rectifier, 110 AC to 12 v. DC; 300-watt rotary converter; 500-watt self-excited 110 AC 60 cycle generator and Crosley miniature portable radio #45 B.V. Want V-O-M, sig. generator and Sky Buddy receiver. Michael Pimental, 61 East Main St., West Warwick, R. I.

RETURNED WAR VETERAN—Will trade RCA Rider channelizer for short wave receiver. Will pay cash for urgently needed test equipment and radio tubes. Floyd E. Baker, Chica, Calif.

WILL TRADE—Two Mallory Vibrapaks #552 for 2 Racon units, in good shape. William Maeres, 151 Woodland Ave., Campbell, Ohio.

FOR SALE IN CANADA—Readrite #410 tube tester, in A-1 shape, \$17.50. Wm. L. McCarter, 4684 W. 8th Ave., Vancouver, B.C., Canada.

WANTED—Rider manuals, last three copies. Charles W. Thompson, 6326 Repton St., Los Angeles 42, Calif.

FOR SALE OR TRADE—Triplett #1501 V-O-M, tube tester, condenser checker, combination, in good condition, \$25; and Triplett pocket V-O-M, #735, \$7, in good shape. Want good camera, .22 cal. target pistol, or binoculars. Rowland St. Louis, Jr., R.F.D. #1, Granite Bay, Branford, Conn.

URGENTLY NEEDED—2-25D8, 2-70I7 and 2-50Y6 tubes. Perkins Radio Service, 1935 Fruitvale Ave., Oakland 1, Calif.

YOUR OWN AD RUN FREE!

This is Sprague's special wartime advertising service to help radio men get needed parts and equipment, or dispose of radio materials they do not need. Send your ad today. Write **PLAINLY**—hold it to 40 words or less. Due to the large number received, ads may be delayed a month or two, but will be published as rapidly as possible.

Sprague reserves the right to reject ads which do not fit in with the spirit of this service.

HARRY KALKER, Sales Manager.



SPRAGUE PRODUCTS CO., DEPT. S-104, North Adams, Mass.

(Jobbing distributing organization of products manufactured by SPRAGUE ELECTRIC COMPANY)

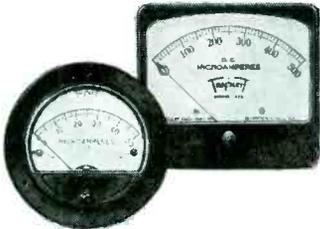
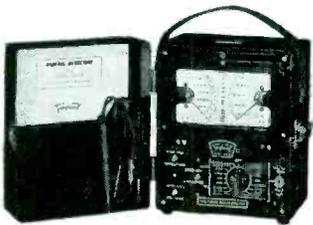
SPRAGUE CONDENSERS * KOOLOHM RESISTORS

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

*TRADEMARK REG. U. S. PAT. OFF.

What will you need...

IN THE FIRST SIX POST-WAR MONTHS

		
<p>SIGNAL GENERATORS</p>	<p>PANEL INSTRUMENTS</p>	<p>VOLT-OHM-MILLIAMMETERS</p>
		
<p>POCKET TESTERS</p>	<p>TUBE TESTERS</p>	<p>VOLT-OHM-MILLIAMMETERS</p>

✓ CHECK THE TYPES AND QUANTITY

Now—right now—is the time to protect your post-war business by estimating your future equipment needs. Check those needs, list them and place a *tentative post-war order* with your jobber now. This foresight will enable him to stock the Triplet instruments you will need, and will assure you quicker resumption of civilian business than you could expect if you wait till the last minute. Give best priority you can obtain to facilitate deliveries as production is available.

Newly perfected developments now being produced on important war contracts, and many other outstanding instruments, will be incorporated in Triplet offerings for the first time beginning with our initial civilian production. Be sure you get the complete list of Triplet instruments and radio test equipment.

Triplet

ELECTRICAL INSTRUMENT CO.
BLUFFTON OHIO ***

STANDARDS ARE SET BY
TRIPLET



KEITH THOMAS

History of Communications Number Seven of a Series

EARLY COMMUNICATIONS BY AIR

While electronics use the ether and other media, one of the most speedy methods of communications in the early days was through the air by carrier pigeon. With a finely printed note fastened to the leg, these birds faithfully reached home to bring in the latest news events and stock market reports.

Today news commentary reaches into your homes in a flash of a second via electronic voice communications making use of the various types of Universal broadcast microphones. This being a modern age, the battle front is brought into the homes of the informed peoples of the democracies via military microphones such as those now being manufactured by Universal for the Allied Armed Forces.

< Model 1700-UB, illustrated at left, is but one of several military type microphones now available to priority users through local radio jobbers.



MODEL
1700-UB



UNIVERSAL MICROPHONE COMPANY
INGLEWOOD, CALIFORNIA



FOREIGN DIVISION: 301 CLAY STREET, SAN FRANCISCO 11, CALIFORNIA .. CANADIAN DIVISION: 560 KING STREET WEST, TORONTO 1, ONTARIO, CANADA

6 • SERVICE, OCTOBER, 1944



HOW BUSINESSES ARE RUINED --



Lets Be Reasonable by don herold

The wisest thing Abraham Lincoln ever said was: "This, too, will pass." I forget what he said it about. But it was some kind of trouble.

The smartest thing any of us can say about this war is: "This, too, will pass."

If we're wise, we'll figure on still being in business at the same old stand with the same old customers, and some new ones that the satisfied old ones have sent in.

So let's be reasonable. Reasonable (to ourselves and to our customers) in prices. Reasonable in our attitudes. Reasonable in our conduct toward our public.



If possible, we should make some money. There is no point to pleasing customers if we aren't going to be here when they come back for more. We're all entitled to fair mark-up on our merchandise.

I like to see even my competitor make money. It's better for two

of us guys to be making honest money in a community than for both of us to go broke in a big way.



On the other hand, nobody ever got rich selling the Brooklyn Bridge. There's no future in it. If we overcharge anybody during the war, we'll never see him after that armistice. "This, too, will pass." Let's be here with a lot of old and new friends, when it does.

No. 8 in a series of special messages prepared by America's famous business writer, humorist and cartoonist, Don Herold. . . In sponsoring these Don Herold "broadcasts," IRC pays tribute to the thousands of Radio Service Men who, whenever possible, specify and use IRC resistance units in their work.



INTERNATIONAL RESISTANCE CO.

401 N. Broad St. • Philadelphia 8, Pa.

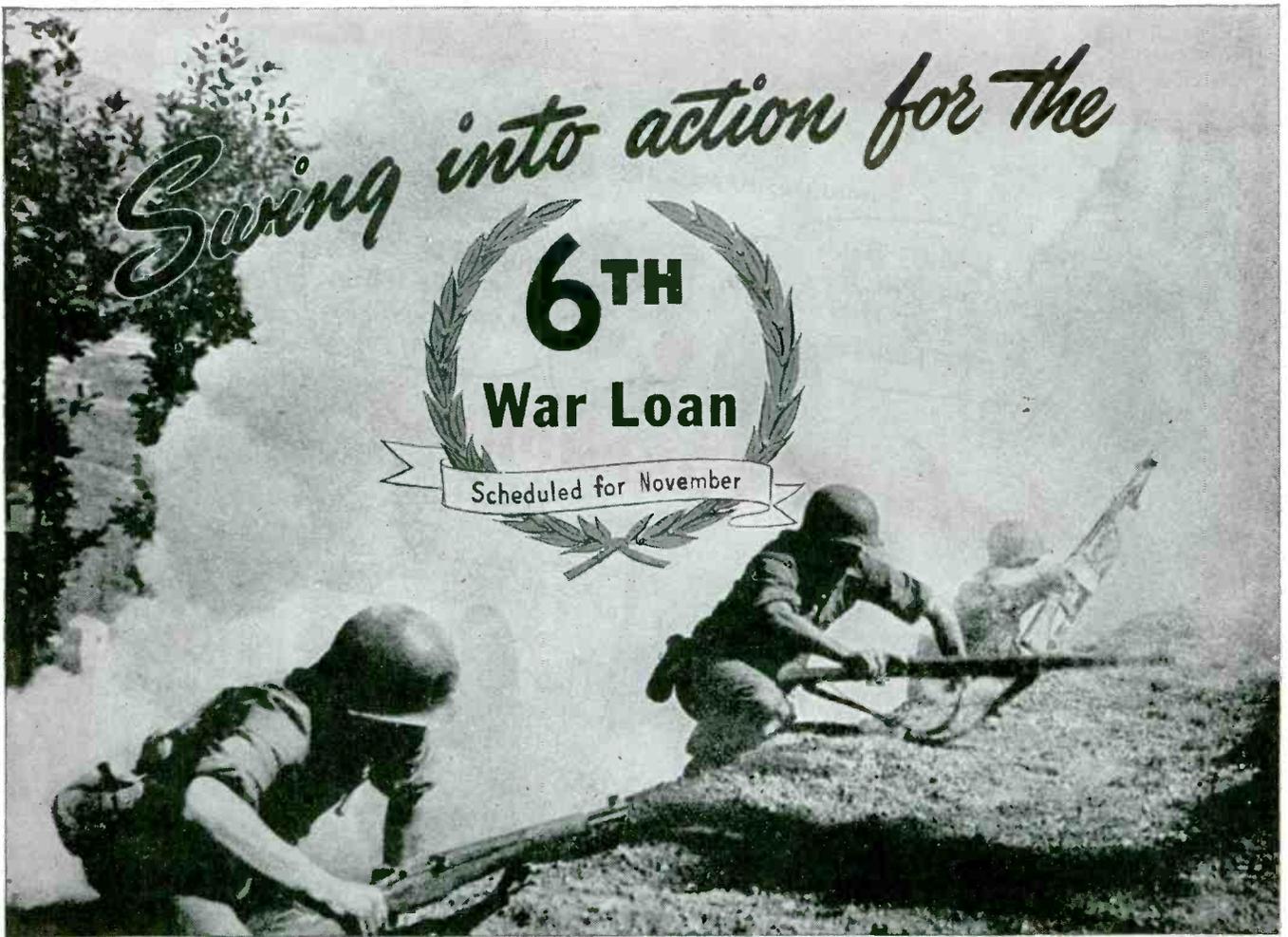
IRC makes more types of-resistance units, in more shapes, for more applications than any other manufacturer in the world.



Swing into action for the

**6TH
War Loan**

Scheduled for November



PLAN YOUR PLANT DRIVE NOW!

Good organization will be needed to sell the 6th. The task of raising the huge sum required will be the most difficult ever asked of Industry. As each new military success brings us closer to Victory, the public naturally will feel that the urgency of war financing is lessened—whereas it isn't. So organize now to prevent a letdown on the home-front from causing a letdown on the fighting front. Build your plant's payroll campaign around this fighting 8-Point Plan. You don't have to wait for the official Drive to start—swing into action NOW!

- 1 BOND COMMITTEE**—Appoint a 6th War Loan Bond Committee from labor, management and each representative group of the firm.
 - (b) *Pre-drive letter to employees from management and labor.*
 - (c) *Competitive progress boards.*
 - (d) *Meeting schedules, etc.*
- 2 TEAM CAPTAINS**—Select a team captain, for each 10 workers, from men and women on the payroll—but not in a supervisory capacity. Returned veterans make most effective captains.
- 3 QUOTA**—Set a quota for each department and each employee.
- 4 MEETING OF CAPTAINS**—Give a powerful presentation of the importance of the work assigned to them. Instruct them in sales procedure. Have them carefully study the Treasury Booklet, *Getting the Order*.
- 5 ASSIGNMENTS**—Assign responsibilities for:
 - (a) *Music, speeches and announcements of the opening rally.*
- 6 CARD FOR EACH WORKER**—Dignify each personal approach with a pledge, order, or authorization card made out in the name of each worker. Provide for a cash purchase or installment pledge. Instruct each captain to put a pencil notation on the card to indicate the subscription he expects to solicit from each worker.
- 7 RESOLICITATION**—People don't mind being asked to buy more than once. Resolicit each employee toward the end of the drive in a fast mop-up campaign. Call upon your State Payroll Chairman; he's ready with a fully detailed plan—NOW!
- 8 ADVERTISE THE DRIVE**—Use all possible space in the regular media you employ to tell the War Bond story.

The Treasury Department acknowledges with appreciation the publication of this message by

SERVICE

This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council

Extreme SENSITIVITY in its simplest, most compact form!



WESTON **Sensitrol* **RELAYS**

in pre-war days provided positive control at energy levels low as 2 microamperes . . . today are many, many times more sensitive!

**Sensitrol — A registered trade-mark designating the contact-making instruments and relays, the contacts of which are magnetic, as manufactured exclusively by the Weston Electrical Instrument Corporation.*

Before costly and intricate amplification is included in tomorrow's circuits, check the SENSITROL and other WESTON Sensitive relays. More than likely, you'll find amplification unnecessary . . . that a tiny Sensitrol relay will give you the positive control you seek. For SENSITROL Relays, which in pre-war days controlled at values low as 2 microamperes, now provide positive control at input values of a *far lower order*. This extreme sensitivity, plus the other virtues of the Sensitrol such as its cost and weight saving, and its trouble-free operation, may be just the thing to round-out or make entirely practical the device or circuit you have in mind.

Why not obtain all the facts on "what's ahead" in sensitive relays and indicating instruments by contacting WESTON today. Check with them, too, for all war instrument requirements.

Laboratory Standards . . . Precision DC and AC Portables . . . Instrument Transformers . . . Sensitive Relays . . . DC, AC, and Thermo Switchboard and Panel Instruments.

WESTON

Specialized Test Equipment . . . Light Measurement and Control Devices . . . Exposure Meters . . . Aircraft Instruments . . . Electric Tachometers . . . Dial Thermometers.

Weston Electrical Instrument Corporation, 604 Frelinghuysen Avenue, Newark 5, N. J.

SERVICE, OCTOBER, 1944 • 9

RCA LEADS THE WAY

KEEPING YOU UP TO THE MINUTE ON TUBE DATA

YOUR business demands that you always have reliable, up-to-date tube information and data at your fingertips for future planning, as well as for today's restricted operations. RCA gets this information out for you when you need it, and the way you need it . . . in a clear and usable form. It's one more service for which distributors, dealers and servicemen look to RCA . . . a part of RCA's continuous merchandising program to provide sales support for you.

Listed here are some of today's most popular RCA publications. They are all available to you—through your RCA distributor, or direct from Radio Corporation of America, Commercial Engineering Section, Dept. 62-22G, Harrison, New Jersey.

1. RCA Tube Substitution Directory
—Lists for radio servicemen over 2000 substitutions for civilian receivers. Includes data on space limitations, circuit and socket changes involved. 16 pages, 8½" x 11", price: 10¢.

2. RCA Receiving Tube Manual (RC-14)
—Basic tube theory, application data, circuits and charts on 340 RCA receiving types. 256 pages, 5½" x 8½", price: 25¢.

3. RCA Receiving Tubes and Allied Types Bulletin (1275-B)
— Characteristics and socket connections of RCA receiving and allied types. 16 pages, 8½" x 11", single copies free.

4. RCA Guide for Transmitting Tubes
—Data and circuits for popular power tubes, uhf acorn types, gas-triodes, and gas-tetrodes. Special chart showing air- and water-cooled tubes, rectifiers, cathode-ray tubes, phototubes, voltage-regulator tubes, and special tubes. Facts on design, adjustment, and operation of transmitters. Illustrated. 72 pages, 8½" x 11", price: 35¢.

5. RCA Power and Special Tubes Bulletin (TT-100)
—Covers air- and water-cooled transmitting tubes, rectifiers, television and oscillograph tubes, phototubes, thyratrons, voltage regulators, and special amplifier tubes. Charts of modulator and class C amplifier data. 16 pages, 8½" x 11", single copies free.

6. RCA Phototubes Bulletin
—Phototube theory. Data on 15 types. Circuits for light-operated relays, light measurements, and sound reproduction. 16 pages, 8½" x 11", single copies free.

7. RCA Radiotron Designer's Handbook
Valuable to anyone interested in principles of circuit design. Illustrated, with charts, tables, and miscellaneous data. 356 pages, stiff cover, 6" x 9", price: \$1.00.

8. RCA Tube Handbook—All Types (HB-3)
—Two loose-leaf volumes of data and curves on all RCA receiving, transmitting, cathode-ray and special tubes, and phototubes. De luxe binders, 5" x 7½". Available by subscription. Write for descriptive folder and order form.

The Magic Brain of all electronic equipment is a Tube . . . and the fountain-head of modern Tube development is RCA.

1919

1944

25 Years of Progress
in Radio
and Electronics



RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION • CAMDEN, N. J.

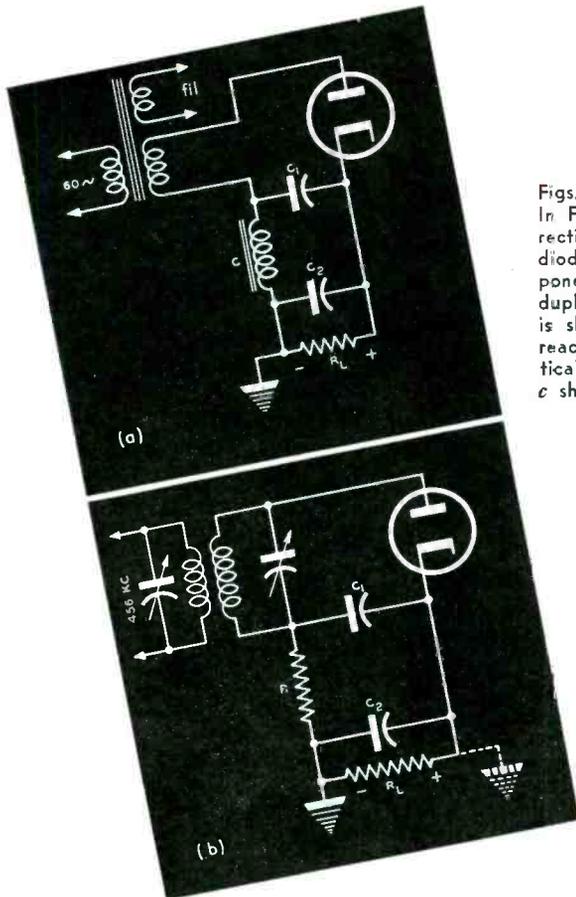
LEADS THE WAY . . . In Radio . . . Television . . . Tubes . . .
Phonographs . . . Records . . . Electronics



LISTEN TO
"The Music America
Loves Best"
Sundays, 4:30 p. m.
E. W. T.
NBC Network

DIODE DETECTORS

by ARTHUR MOORE



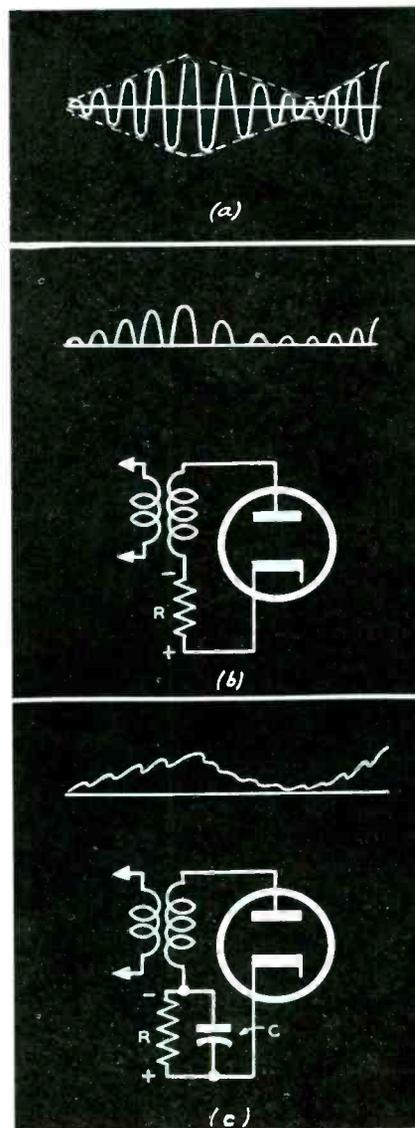
Figs. 1 (left) and 2 (right). In Fig. 1a, we have a typical rectifier circuit. A conventional diode circuit with the components so arranged as to duplicate the rectifier circuit is shown in Fig. 1b. Circuit reaction and operation is identical for both. Figs. 2a, b and c show the progressive action

of a diode detector. A modulated r-f carrier is shown in a. In b appears the modulation effect on the current in the diode circuit. And in c we note how the addition of a bypass condenser causes a continuous voltage to appear, R_L , varying in amplitude with the modulation component of the r-f carrier of a.

where the detector is designed to take advantage of variations in voltage levels.

The basic principles of electronics may be observed in the action of a diode detector. This is demonstrated in Fig. 2. Fig. 2a shows a simple modulated r-f carrier, of, say 456 kc, varying in intensity as well as polarity. This variation in voltage level represents the modulation present.

(Continued on page 30)



MOST Service Men readily understand the action of a power rectifier, such as the 5Z3, yet seem to have difficulty in tracing troubles in diode detectors. The two are basically identical in action and service failure.

In Fig. 1a is shown a standard half-wave rectifier. Its diode counterpart, Fig. 1b, is arranged so as to imitate the rectifier in layout. In this comparison, several slight differences may be noted. In place of the iron-core transformer in 1a, we have a conventional i-f transformer in 1b. In place of the filter network in 1a consisting of choke C and filter condensers C1 and C2, we have resistor R and condensers C1 and C2 performing a similar function in 1b. The load resistor in 1a is duplicated in 1b. The action of both circuits is identical except for frequency and power level of operation. If, in the power rectifier, the primary volt-

age were to vary, the B power after rectification would also vary. The same is true of the diode detector, except that it is this variation in level, or modulation, that the detector utilizes. This variation in voltage level, or modulation, would be reflected in the voltage developed across R_L in 1b. Changing the ground point, as shown by the dotted line in 1b, would have no effect on circuit operation, except to change the polarity of the developed voltage with respect to ground.

Component values are quite different in both cases. Since the frequency of operation of the detector is very much higher than that of the rectifier, the size of the filter condensers reduces to micromicrofarads (mmfd). Again, the detector is primarily a voltage device, whereas the power rectifier is, as the name implies, a power device. Also, the rectifier constants are so designed as to give constant output,



Left to right: S. J. Thompson, Service Manager, Belmont Radio; I. J. Kaar, Manager Receiver Division, G.E.; W. L. Jones, Vice-President and General Manager, RCA Service Company.

SERVICING IN THE

IN the postwar era to come, service procedures must, it seems to me, keep pace with the technical progress made in all electronic equipment. It cannot be predicted how much the knowledge gained through wartime developments will be carried over into the early production of peacetime radios. It is probable that for a time radio equipment will differ very little from the prewar technical design. It would seem, however, safe to assume that as rapidly as accumulated technical knowledge can be applied to future design, some marked improvements may be expected.

Television technique has been quietly advancing through wartime work. It will unquestionably take its place as a very important part of the electronic industry in the early postwar period.

Frequency modulation, originally glamorized on a basis of high fidelity, seems destined now to become a vital and more practical part of the broadcasting system, for it lends itself admirably to localized noise-free trans-

by S. J. THOMPSON

*Service Manager
Belmont Radio Corp.*

mission where limited coverage of high quality is a requisite.

These two advances alone present a serious challenge to the entire service industry, for many of the prewar service facilities will be wholly inadequate for effective and economical repair work. It might be well for the industry as a whole and for the individual Service Man in particular, to bear in mind that service has suffered disastrously during the war. We need not go into the reasons, for they are only too well known; but the fact remains that the postwar reaction is quite apt to be antagonistic towards servicing in general.

The obvious remedy is an adequate technical knowledge, able to cope with the new merchandise to come, and service facilities, testing equipment and general business procedures which will permit the application of this knowl-

edge in a satisfactory and profitable manner. The individual Service Man, therefore, faces in the months to come a three-fold problem:

(1)—He must, through intensive study, catch up with much that the engineers have learned during the war. He must in particular know the servicing of f-m and television equipment.

(2)—He will be required to invest in new and modern service equipment and must learn to use this equipment to its fullest.

(3)—Business methods must be improved to remove forever the *kitchen-mechanic* status of much of the repair work done in the past.

To the individual requirements might be added the necessity for greater cooperation of the service fraternity as a whole. A strong national Service Men's association could do much by way of binding the Service Men together under a code of ethics and a legitimate scale of charges that would bring the income of the average Service Man up to a level commensurate with the energy, knowledge and sincerity required of them.

THE present conflict, we believe, will produce many new Service Men, many of them highly trained by the U. S. Signal Corps. Test equipment, such as oscilloscopes and vacuum-tube voltmeters, will be seen in a great number of service departments. This will mean that radio sets can and will be checked more thoroughly, and repairs made that will keep the set in satisfactory operation.

Frequent call-backs for service by disgruntled customers are expensive to both the jobber and dealer from the standpoint of immediate profit and long term customer satisfaction. A sales or-

by W. E. McCONNELL

*Service Manager
Wilcox-Gay Corp.*

ganization with the reputation of taking care of their merchandise in such a manner that it stays put can well be expected to be successful year after year. It can be seen that the service department should not be considered as a *necessary evil* but rather as a profitable *maintenance of good-will* department.

Postwar products, even though they will be greatly improved, will invar-

ably require some setting up or pre-adjustment before the customer can take over. In many cases the impressions a customer receives at the hands of the Service Man will determine his satisfaction with the merchandise.

It is our sincere endeavor, as a manufacturer, to design and build equipment so well that the Service Man will derive a certain satisfaction out of making adjustments and repairs, knowing that once having done this it will stay in operation year in and year out. This will build a long term security and reputation for both himself and his firm.



Left to right: Harold A. Newell, Service Manager, Crosley; Harold B. Donley, Manager Radio Receiver Division, Westinghouse; W. E. McConnell, Service Manager, Wilcox-Gay Corp.

POSTWAR ERA . . . AS SEEN BY

Service Managers of Belmont Radio, Wilcox-Gay, RCA, Farnsworth, G. E., Crosley, Packard-Bell, Westinghouse and Stewart-Warner

by W. L. JONES

*Vice-President and General Manager
RCA Service Company*

AFTER the first World War the advance of the radio art was rapid. Millions of receivers found their way into American homes and the supplying of parts and service for them became an industry in itself. After a period of rapid change, however, radio Service Men found that basic circuits became relatively stable and did not change appreciably from year to year.

The present war has introduced another period of rapid change and of new developments in radio and electronics. They have been applied to a wide variety of tasks. Radio has spread a protective network of communications over our men and materials of war on land, in the air, and at sea. The full significance of radar and other electronic devices will be understood only when the war is safely won.

These devices will have a profound influence on domestic postwar radio and electronic products. Some of these devices, such as radar, will need more adaptation than others for civilian applications. Television stands ready to become the billion-dollar industry that has been predicted for it. F-M will pick up where it left off. Facsimile will go forward. Industrial plant broadcasting will find even wider application in peacetime. Electronic power generation is finding ever widening fields of use in industry. Electronic test and measuring equipment, safety controls, and automatic control

equipment foreshadow a greater *electrization* of industry.

Radio service personnel must go forward similarly if they are to be properly equipped to handle the servicing and maintenance of these forthcoming electronic devices. Technical training, specialized knowledge, proper equipment and improved business methods will be necessary in the service field. Thousands of men will return from the armed services with improved and specialized technical experience, but even they will require additional skill and experience in applying their knowledge to the peacetime service field. Those now engaged in this field will have to improve their technical knowledge in order to keep abreast of new developments. Those who do this will have wider horizons and increased opportunities in the future.

IT is not news to anyone that most of the competent personnel comprising the nation's radio service structure which was in existence before the war are now in the armed forces. Anyone who has attempted to have a radio receiver or television receiver serviced is very much aware of this fact.

Someday soon, we hope, these men will be back with us, and will be looking for jobs. Certainly jobs will exist for the servicing of f-m and broadcast receivers, but in addition, if the FCC treats the recommendations of the RTPB kindly, there will be created an enormous new job; installation and servicing of television receivers.

Prior to the war the number of

by I. J. KAAR

*Manager Receiver Division
General Electric Company*

television receivers in use was insignificant, but a servicing trend seemed to be in the making and was exploited in and around New York City. The New York enterprise comprised a coalition of Service Men for the purpose of installing and servicing television receivers. They got away to a very good start but, of course, the war and the failure of television to come through were not conducive to their success.

It seems to me that small service or-

ganizations of this kind could well be formed in the larger cities, and that such action would be of benefit mutually to themselves and to the television art.

An organization of Service Men presumably could afford the purchase of first-class servicing equipment, which the individual could not do. Furthermore, such an organization would be in an excellent position to further its own knowledge and education beyond that possible by any individual alone.

It should be borne in mind that television servicing is going to be a much more complex undertaking than the servicing of broadcast receivers. A

(Continued on page 26)

DISC RECORDING CONTROL*

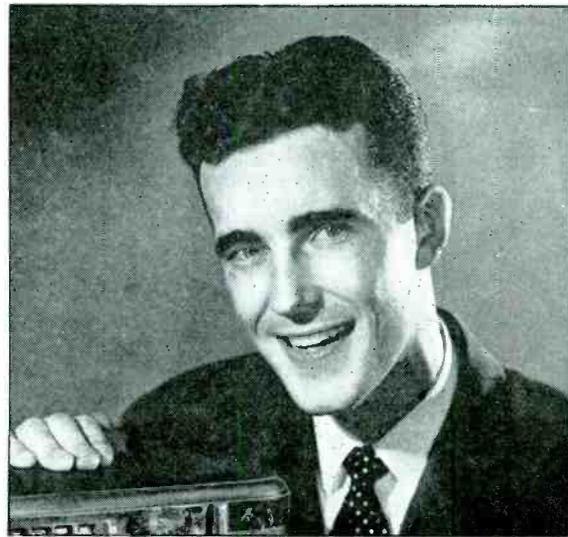
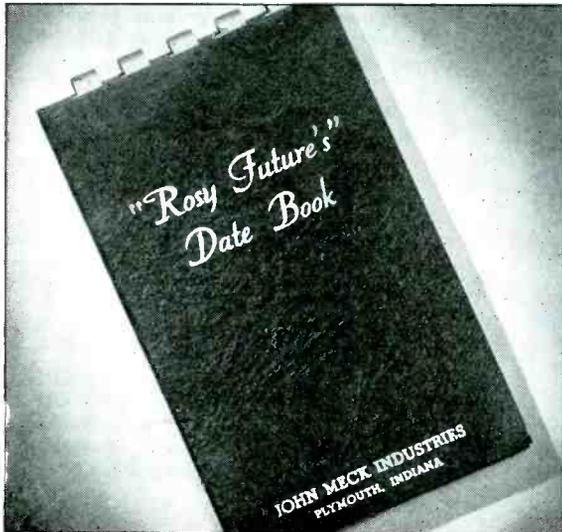
by DONALD W. ALDOUS

Descriptive Term	Symptoms (Visible or Audible)	Causes and Cures
Banding. Defective tracking.	Uneven groove spacing.	Faulty action of traversing mechanism, e. g., binding. Also may be due to lack of precision in feed gear or lead screw in cheap equipment.
Chatter.	An erratic <i>spotted</i> pattern in grooves, with short alternate light and dark strips.	Poor stylus or one set at wrong angle; or by insufficient vertical damping. Too deep a cut in the disc coating may also produce a similar effect, which is most likely to occur in the centre of the record.
Cut-over. Overcutting. Groove wall breakdown. Crossover.	One groove running into the next, causing <i>repeating</i> .	Overmodulation, i. e., too high recording level for particular groove pitch in use; or cutting too deep.
Cutting through.	Penetrating through coating of disc and into base material, usually thereby damaging stylus.	Cutting too deeply; extraneous vibration; damaged gear tooth in feed mechanism; dirt on lead screw; feed mechanism not fully engaged when cutting head is lowered on record surface and later slipping into engagement with a jar; hard drop in setting down cutting head; cutting head bouncing after thread tangle; failure to raise cutting head as end of feed mechanism is reached.
Dry cut	A badly cut groove, indicated by thread appearing kinky, brittle and dry.	Incorrect cutting angle; bad stylus; old or inferior quality blank.
Echo. <i>Ghost</i> effect. Double talk.	The modulation from one groove is faintly impressed on the adjacent groove.	Overmodulation; too deep cut; too light pick-up; use of blunt non-ferrous playback needles; soft type of blank coating; and with solid stock pressings, displacement of grooves during processing, or surface flow of matrices in pressing operation; or surface flow of original wax during cutting.
Flutter.	A type of <i>wow</i> having fluctuation changes between 6 and 30 per second. Produces harmonic distortion in lateral groove and increases residual noise level by modulating surface hiss.	Undesired vertical oscillations of cutting head caused by mechanical resonance, e.g., the mass of the cutting head in combination with blank coating material or the compliance of the turntable. Remedy by adding vertical damping, say oil dashpot type. Also due to irregular blank surface, non-level or unbalanced turntable; or transmission of motor vibration through turntable drive or suspension; poor playback equipment. Effect can also be caused by magnetic pull of cutting head on steel turntable beneath; remedy is to place $\frac{1}{4}$ " thick circle of lino or beaverboard between the turntable and blank.
Grey cut.	Reflected light reveals that record grooves have dull greyish appearance. Results in increased surface noise.	Imperfect or worn cutting stylus; incorrect cutting angle.
Groove jumping.	Pick-up needle will not remain in groove on playback.	Too shallow cut; uneven playback turntable; pickup carrying arm stiff or out of alignment; unsuitable needles.

*From the book, "Manual of Direct Disc Recording", presented through the courtesy of the author and the publishers, Bernards, Ltd., London, England.

WANTED

"HOME ENTRY" AND "CONFIDENCE" WORKERS



BIG OPPORTUNITY FACING YOU

As a result of your knowledge and skill in radio, you are welcome in the homes of your community. Your statements carry weight because your customers have confidence in you. Have you thought what this sales advantage means to your future? To meet that future, when there may be less service work, MECK has planned a line of Radios and Phonographs that are Built to Perform and Priced to Sell. MECK is offering you "Rosy Future's" Date Book—Free—to record the future needs of your present service customers. Send for your copy today. Then — when "Delivery Day" comes, meet those customers' needs with MECK Radios and Phonographs.

Built to Perform — Priced to Sell!

WRITE FOR *Free*
"DATE BOOK" NOW

Pocket size, durable — get started on YOUR post-war plans now. Just write — it's free!



DISTRIBUTED NATIONALLY THRU RADIO PARTS JOBBERS



MECK RADIOS • PHONOGRAPHS
★ ★ ★
INDUSTRIAL SOUND

BUY MORE BONDS — AND KEEP THEM!

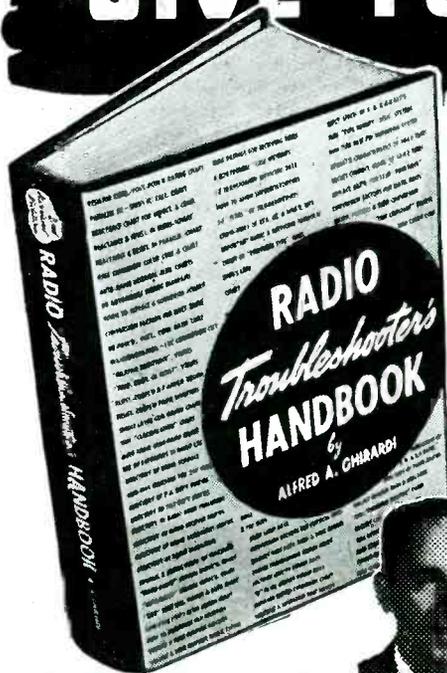
JOHN MECK INDUSTRIES, PLYMOUTH, INDIANA, U. S. A.

SERVICE, OCTOBER, 1944 • 15

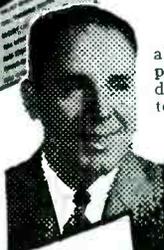
Descriptive Term	Symptoms (Visible or Audible)	Causes and Cures
Groove skating.	Pick-up needle tends to climb or <i>skate</i> the groove walls, causing fluctuations in output with accompanying several db rise in surface noise, in addition to increased harmonic distortion and record wear.	Usually pickup with too low vertical pressure, particularly if combined with appreciable tracking error and horizontal inertia. Can also be caused by cutting with broken tipped sapphire, resulting in flat bottom to groove. One remedy, other than obvious replacement, is to use a non-ferrous needle for playback. (A minimum force of 12 grams is required to prevent <i>skating</i> with the 0.002" maximum amplitude and 90° groove commonly employed.)
Hum.	Small arrow head (V's) patterns, distributed over record surface.	May be due to excessive hum in recording amplifier. Often occurs with cheap recorder, where hum is masked in playback by restricted-low frequency response.
Kinky thread	Thread breaks off in short loops or tends to curl tightly instead of lying straight like a flexible chain.	Either dull, worn stylus or over dry or aged blank.
Orange peel effect.	Mottled appearance (similar to skin of orange) on blank surface that increases surface noise.	This surface irregularity is usually attributable to the manner of applying surface coating, i. e., dipping.
Patterns. Patterning. Pattern weaving.	Generic term applied to peculiar designs that are sometimes visible on blanks examined at a particular angle under direct light.	Usually turntable vibration, vertical or lateral, or a combination of both. Check adjustment of rim-drive tension with this type of turntable; and, on rubber mountings, adjust tightness of mounting bolts.
<i>Moiré</i>	A pattern resembling the cloth of the same name, or watered silk effect.	Usually indicates vibration in turntable mounting or transmitted to it by motor-drive coupling; or worn rubber drive wheels; thread or dirt in feed mechanism; overloaded motor; amplifier hum.
<i>Skip</i>	Cutting head has <i>skipped</i> portion of blank surface (on one radius), due to bouncing during recording.	Produced by dented or bent base of blank, or swirled coating. Occasionally due to hard spot in coating. Keep weight of cutting head arm and counterweight at minimum; use advanced ball.
<i>Spoke</i>	Recurrent design in the form of curving spokes; i.e., alternate light and dark areas or arrow heads.	Light and heavy cutting, due to motor drive vibration, or worn pulley or bearings; impulses from an overloaded motor.
Piano whine.	Unpleasant whine when reproducing pianoforte recording.	Sudden variations in recording or reproducing turntable speed, due to large initial amplitudes occurring in piano music. One remedy is to use a heavier turntable.
Rumble.	Undesired low-frequency noise present in disc playback.	Vibration; sometimes due to external noises, e. g., traffic or movement of people. Effect is particularly noticeable when too much bass boost in reproduction is being used, especially with circuits of condenser type, without inductance. Remedies: record more bass frequencies; oil turntable shaft with thick automobile oil.
Surface noise. Scratch. Background noise.	Hissing noise in disc reproduction.	Dust and foreign particles in grooves; aged blank or type of blank used; worn cutting stylus; wrong depth of cut; usually too deep. Incorrect stylus <i>rake</i> angle; stylus not straight in cutting head; cutting head not tracking across a radius (approx.) of blank. Type of pickup and needle used. In solid stock pressings, noise is due to their granular structure, processing steps and embraces all frequencies.

[To Be Continued]

THESE GHIRARDI BOOKS GIVE YOU THE ANSWERS



A. A. Ghirardi—the man who has personally answered over 50,000 inquiries on radio construction and servicing!



Speed Up! Do More Work in Less Time! Make More Money!

Regardless of what Radio set you are called upon to repair, this 3rd (Wartime) Edition of Ghirardi's famous RADIO TROUBLESHOOTER'S HANDBOOK is guaranteed to save you time! From beginning to end, it's designed to help you repair more radios BETTER AND TWICE AS FAST. Hundreds of servicemen write that it has paid for itself on the first job or two.

THE HELP YOU NEED!

Never before has such a wide variety of useful servicing information been compiled so helpfully. In addition to over 400 pages of Trouble Case Histories (common trouble symptoms, their causes, and remedies) for 4,820 specific receiver and record changer models, there are literally scores of time-saving graphs, and tables, which give instant answers to your daily problems.

A. A. Ghirardi is not a theorist. He is a practical radio man who spends more time in leading service shops and with manufacturers than he does in his own office. He knows exactly the help servicemen need—and this new, fully revised edition of his RADIO TROUBLESHOOTER'S MANUAL brings you full benefit of his years of rich experience.

CUTS SERVICING TIME IN HALF!

Included are I-F alignment peaks for over 20,000 superhets; dozens of pages on interchangeable tube types and modernizing old receivers; the most complete tube chart ever compiled; plug-in and ballast resistor replacement charts; a tabulation of I-F transformer troubles—condenser, resistor, coil, and transformer charts and formulae—and hundreds of pages more designed to give you just the help you need—WHEN YOU NEED IT MOST!

Sold for only \$5 complete (\$5.50 foreign) on an absolute 5-Day Money-Back Guarantee. Can you afford to be without it these busy days?

SAVE TROUBLESHOOTING TIME

Cut down your troubleshooting time with the greatest compilation of "Case Histories" ever published! This big new wartime edition of A. A. Ghirardi's Radio Troubleshooter's Handbook contains common trouble symptoms and remedies for over 4,800 receiver and record changer models—all carefully indexed for instant reference. A servicing information gold mine that has taken years to compile! Used daily by thousands of shops throughout the world!

SAVE REPAIR TIME

When a Radio comes in for repairs, first turn to your Handbook instead of to your tester. You'll be amazed what a whale of a lot of time you'll save. For remember: Ghirardi's TROUBLESHOOTER'S HANDBOOK isn't a "study" book. It's a reference book that you turn to when you want the answer to a specific repair question or to learn about some specific set.

MAKE MORE MONEY

Why bother figuring out things that have already been figured out for you and recorded in easily-found, quickly-understood style in this big new 710-page manual-size book? Smart servicemen everywhere say Ghirardi's TROUBLESHOOTER'S HANDBOOK is helping them turn out from 50% to 100% more work with less labor and that means 50% to 100% more money for the same amount of effort!



Only \$5

complete (\$5.50 foreign)—or

See Special Money-Saving Combination Offer Above Coupon

THIS IS THE BOOK THAT WILL TEACH YOU RADIO SERVICE WORK Right!

Ghirardi's famous 1300-page MODERN RADIO SERVICING is a hard-hitting, intensely practical course in modern service work . . . the only single, inexpensive book that gives a thorough explanation of the workings of all Test Instruments; Receiver Troubleshooting Procedure; Circuit Analysis; Testing and Repair of Component Parts; Installation; Adjustment; Maintenance; etc. 706 illustrations, 720 self-testing review questions, 766 different topics.

SPECIAL MONEY-SAVING COMBINATION OFFER

Make your servicing library complete—keep it up-to-the-minute and profit accordingly. Get both Ghirardi's RADIO TROUBLESHOOTER'S HANDBOOK and MODERN RADIO SERVICING—a big \$10 value for only \$9.50 (\$10.50 foreign). Over 2,000 pages chock-full of the finest, most practical help money can buy!

RADIO & TECHNICAL DIVISION,
Murray Hill Books, Inc.
Dept. S-104, 232 Madison Ave., New York 16, N. Y.

Enclosed find \$5 (\$5.50 foreign) for Ghirardi's new 3rd Edition RADIO TROUBLESHOOTER'S MANUAL, postpaid; or send C.O.D. (in U. S. A. only) for this amount plus postage. I may return the book at the end of 5 days and receive my money back.

Check here if you wish to take advantage of MONEY-SAVING COMBINATION OFFER (see above).
 \$9.50 enclosed (\$10.50 foreign) or send both big books C.O.D. (in U. S. A. only).

Name

Address

City & Dist. No. State

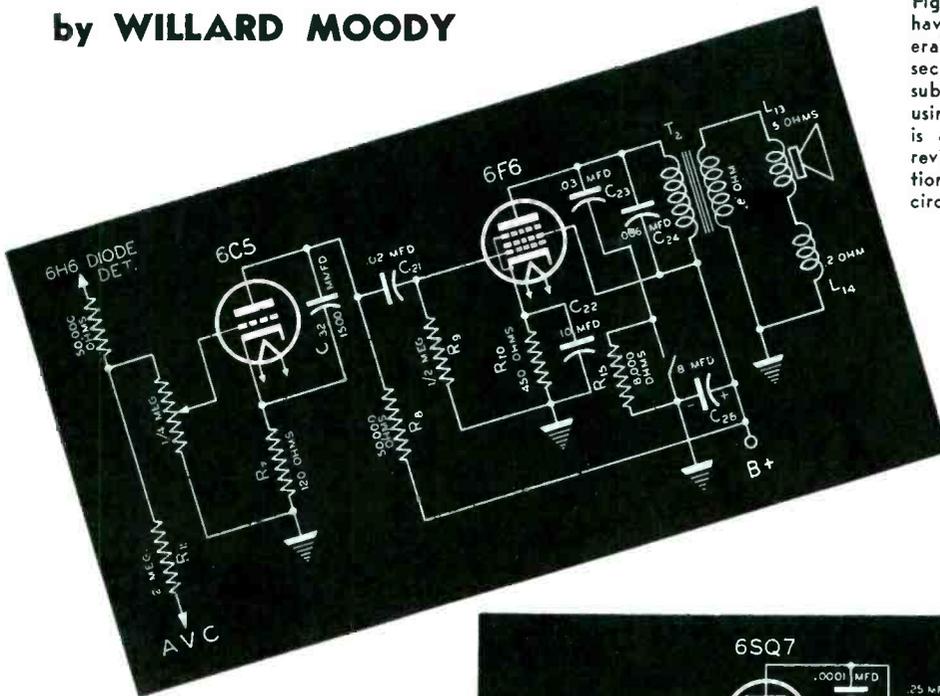
5-DAY MONEY-BACK GUARANTEE

MAIL THIS NOW!

SERVICE JOBS IN WARTIME

by WILLARD MOODY

Figs. 1 (left) and 2 (below). In Fig. 1 we have the original audio circuit of the General Electric A-63, A-65. The problem of securing a 6F6 makes it necessary to use a substitute, such as the 42. A revised circuit, using this tube, is shown in Fig. 2. A 6SQ7 is also used in place of the 6C5 in the revised circuit. This tube provides additional volume. In addition, the modified circuit provides for tone compensation.



THE necessities dictate the course of action in these wartime days. When a tube is not available, you use what you have or can get. Frequently, with the exercise of some ingenuity an improvement over original performance is possible. The audio circuit used in the General Electric A-63, A-65, Fig. 1, offers a typical example of wartime circuit-change possibilities. Here we have a 6H6 diode detector, 6C5 audio and 6F6 output. With a 6F6 unavailable, a 42 may be used instead, by installing a new six-prong socket. If a 450-ohm cathode resistor for the output tube is not available, two 225-ohm or two 250-ohm resistors may be used as a substitute. The cathode current is normally about 45 ma and the voltage is 20 volts across the cathode-bias resistances (cathode-to-ground). The power in the total resistance is $20 \times .045$ or .9 watt. Each resistor handles .45 watt, so that in a pinch carbon resistors rated at 1 watt could be used, but 2 watts per resistor would be a safer rating.

A midget 16-mfd unit rated at 150 volts can be used across the resistance, or a 50-volt type will do, whichever you can get. By using a 6SQ7 in place of the original 6H6-6C5 combination, additional gain and pep are secured and at the same time there is a saving of one tube. Tone compensation is a welcome improvement. A tapped volume control allows the tone to decrease

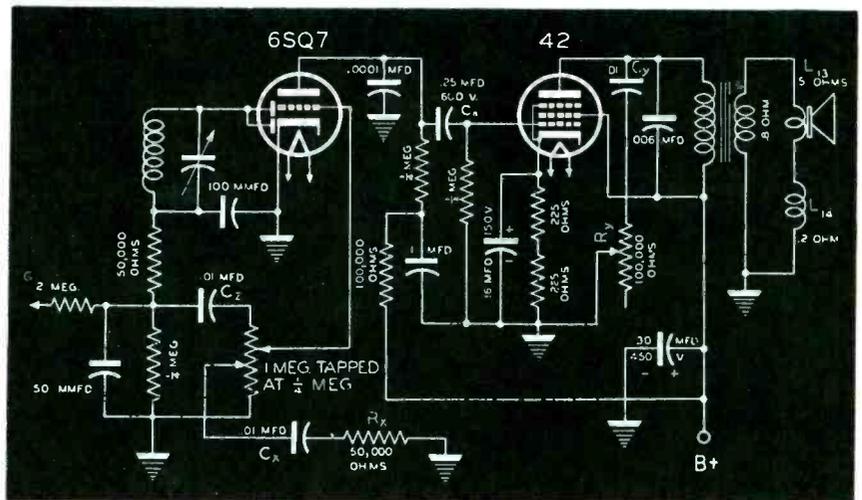
towards more bass at low volume which is pleasant. It may be necessary to try different values of C_x and C_y for the best results. The original tone-control circuit permitted only a rough-change from bass to treble. R_y allows smooth variation of the tone. The control is put in the plate circuit because of the desirability of having tone control in a low impedance circuit. If placed in the high-impedance circuit trouble from oscillation or hum pickup may very well be experienced. The tone control does not break down because the voltage is high on C_y , particularly if C_y is rated at 600 volts. The connection to the grid of the 42 usually proves unsatisfactory, although fair results may be obtained. This is due to the high impedance, 500,000 ohms. And both the load on the 6SQ7 and the input impedance of the 42 are changed over fairly wide limits, affecting the

gain quite a bit. The impedance change in the plate circuit affects the gain only slightly because of the small net change in impedance, while still affording adequate tone control.

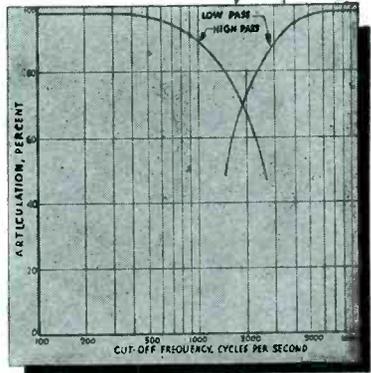
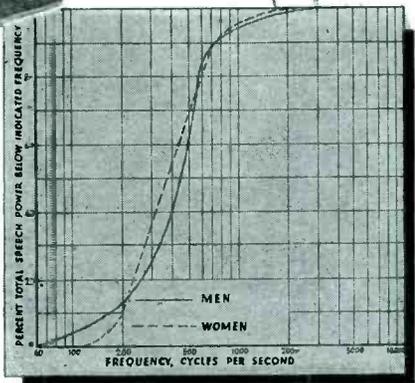
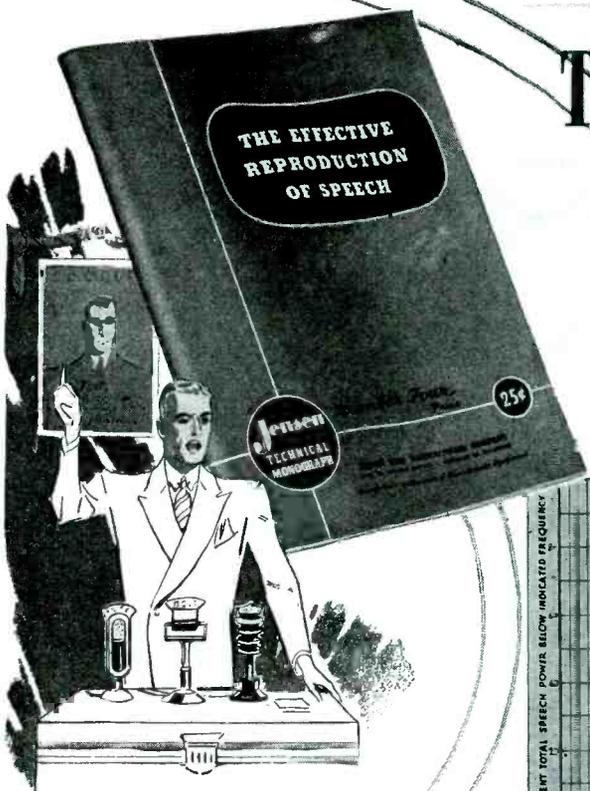
The use of a 250,000-ohm diode load resistor seems to assure longer life of the volume control, D-c is kept out of the control because of isolation condenser C_x . Improved bass response follows due to use of a large condenser, C_x . The speaker will have more of a tendency to rattle with improved bass response, because of the high power in the bass signals. It may be necessary to recenter the voice coil, clean the air gap and recement the rim of the speaker with Duco. The use of a large bypass across the B supply, 30 mfd, also picks up the bass response.

Atwater Kent model 40 receivers with their gridleak detectors and t-r-f

(Continued on page 20)



THE EFFECTIVE REPRODUCTION OF SPEECH...



When casually considered, the reproduction of speech may appear to present less exacting requirements than the reproduction of music. Yet faithful speech reproduction requires a frequency band almost as wide as for music. Amplified speech for strictly communication purposes usually presents a different requirement. Here, such matters as articulation, loudness, masking, power requirements and the ability to deliver the message through noise, become the more important considerations.

"The Effective Reproduction of Speech"—Number 4 in the series of JENSEN Technical Monographs—presents much up-to-date data on this important subject in convenient form, together with useful conclusions and practical information for everyone interested in sound reproduction. Get your copy from your JENSEN jobber or dealer, or fill out the coupon and mail it with 25c for each copy ordered.

The Series So Far Issued

- No. 1. Loud Speaker Frequency-Response Measurements.
- No. 2. Impedance Matching and Power Distribution.
- No. 3. Frequency Range in Music Reproduction.
- No. 4. The Effective Reproduction of Speech.

FREE to men in the Armed Services, and to Technical Schools, Colleges and Libraries.



Jensen

RADIO MANUFACTURING COMPANY
 6621 South Laramie Avenue
 Chicago 38, Illinois

- Send me The Effective Reproduction of Speech.
 Frequency Range in Music Reproduction.
 Impedance Matching and Power Distribution.
 Loud Speaker Frequency-Response Measurements.
 (Check one or more. Send 25c for each book ordered.)

NAME _____
 ADDRESS _____
 CITY _____ ZONE _____ STATE _____



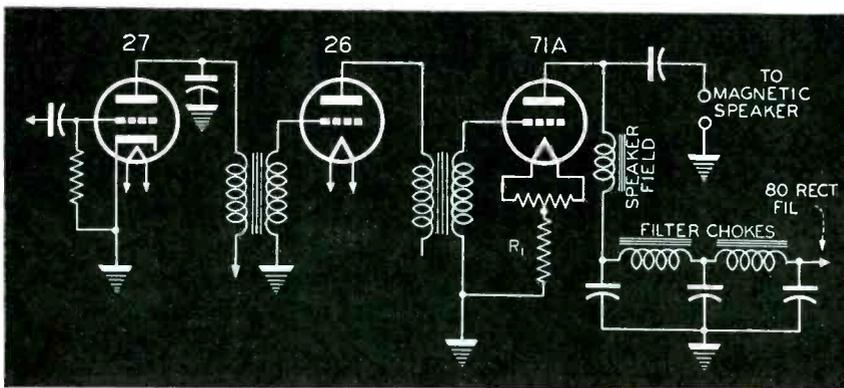


Fig. 3 (above). Original circuit of Atwater Kent 40, with 71A in output

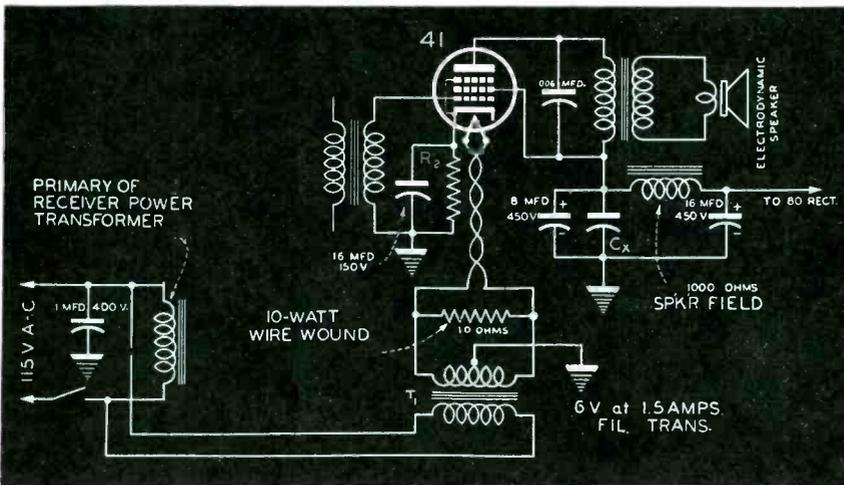
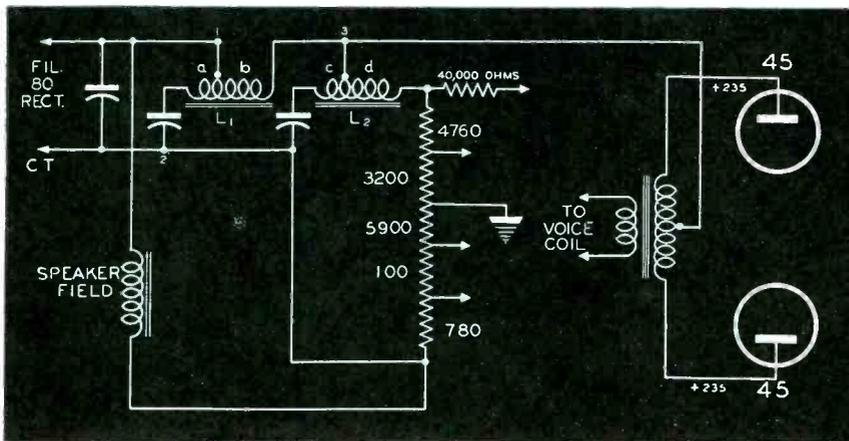
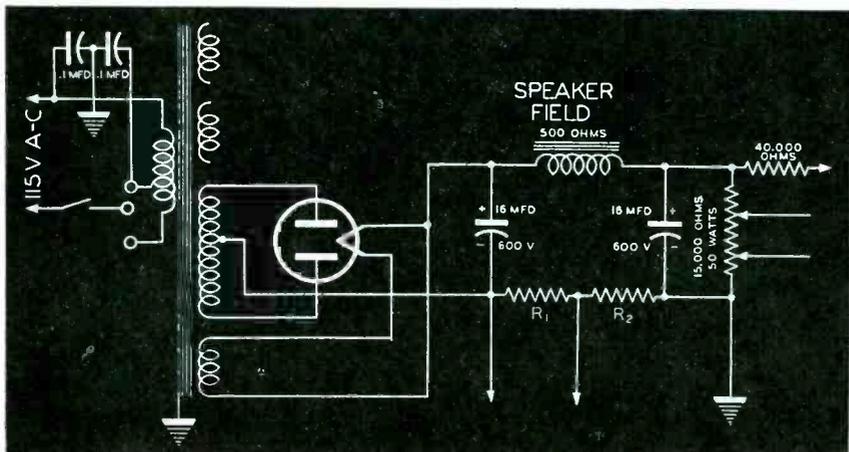


Fig. 4 (above). Modified output of A-K 40, with 41 in output.



Figs. 5 (above) and 6 (below). Fig. 5, original 45 circuit of Stromberg-Carlton 10 and 11. Fig. 6, modified version.



circuits can also be modified effectively. The original had a 71A in the output, giving enough power for home reception, but the magnetic speaker did not have too much power-handling ability and frequently would rattle. An improvement may be made by substituting a 41 output tube. This tube draws about 21 ma with 13.5-volts bias and 180 volts on the plate. The 71A draws about 20 ma, with 180 volts on the plate and a bias of -40 volts. The power supply will not be overloaded if the 41 is used.

The original four-prong socket of the 71A need not be disturbed, but a six-prong socket can be mounted on a piece of hard rubber or bakelite and secured to the shelf that consists of the 71A socket. In any event, inspection will show just how the socket can be added.

The filament transformer can be mounted on the underside of the board which supports the chassis if the set is in a wood cabinet. A twisted pair can be run to the filament contacts of the 41 socket. The original bias on the 71A was about 40 volts. The peak input signal would have this value to drive the tube to full output. The 41 requires 13.5 volts. Overloading of the tube can result if too strong an input signal is fed, but the level can be controlled by the potentiometer in the antenna circuit. Working the set at a low value of input potential will automatically prevent overloading. The effect will be to increase the sensitivity. Reserve power will be available and it may be possible to get away with using a shorter antenna which will tend to increase the selectivity.

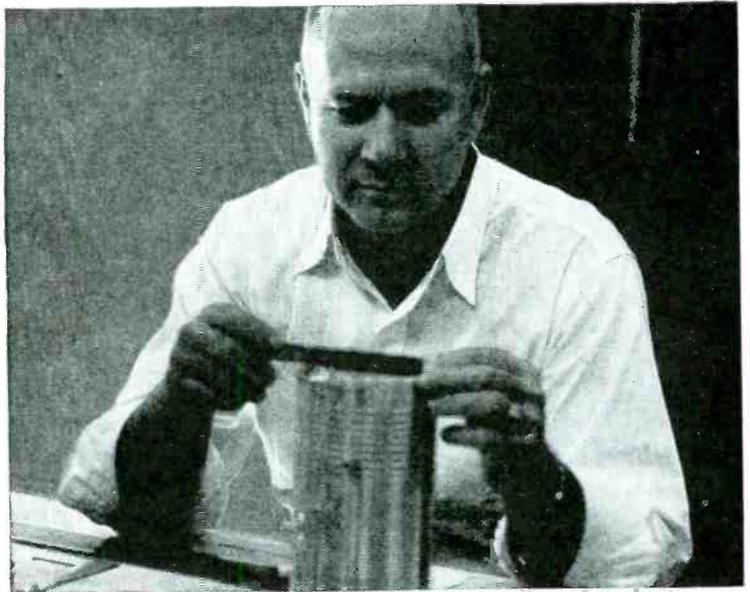
The original chokes will take it, if a permanent-magnet dynamic speaker is available. For energizing the speaker field of an electrodynamic, the B supply current should be used, hooking the field up as a series-choke inductance.

A 6F6 draws more B supply current than the 41 and therefore should not be used on this job. The 6K6 may be used as it is equivalent to the 41. The two leads to the filament winding for the 71A are disconnected. The bias resistor for the 71A is not used but is left in the circuit. One part of the resistor furnishes bias for the r-f tubes.

In the Stromberg-Carlton 10 and 11, a high-resistance speaker field is connected across the output of the B supply, between the rectifier filament and the center tap of the high voltage winding on the power transformer. If a speaker of this type is not available, a permanent-magnet dynamic may be used. The result will be somewhat less of a load on the power supply so that

(Continued on page 25)

WHY PERSONNEL BECAME PRECISION-EL



As the fame of Meissner personnel began to spread, a new descriptive word came into being, rapidly caught hold. Precisely describing the ultimate in ability to do precision work, it is, naturally enough, "precision-el!"



A thousand miles from New York—200 or more from Chicago—is a little city where hundreds devote their working lives to electronics. They have developed exceptional facility, resourcefulness, and pride of workmanship. The city is Mt. Carmel, Illinois, and Meissner is its leading industry.



Pictured on this page are four of the many craftsmen who make Meissner synonymous with quality in the manufacture of a wide range of precision-built radio products. Conscientious, capable... they are your guarantee of lasting satisfaction.



Easy Way To "Step Up" Old Receivers!

Designed primarily as original parts in high-gain receivers, these Meissner Ferrocart I. F. Input and Output Transformers get top results in stepping up performance of today's well-worn receivers. Their special powdered iron core permits higher "Q" with resultant increase in selectivity and gain. All units double-tuned, with ceramic base, mica dielectric trimmers, thoroughly impregnated Litz wire, and shield with black crackle finish. Frequency range, 360-600. List price, \$2.20 each.



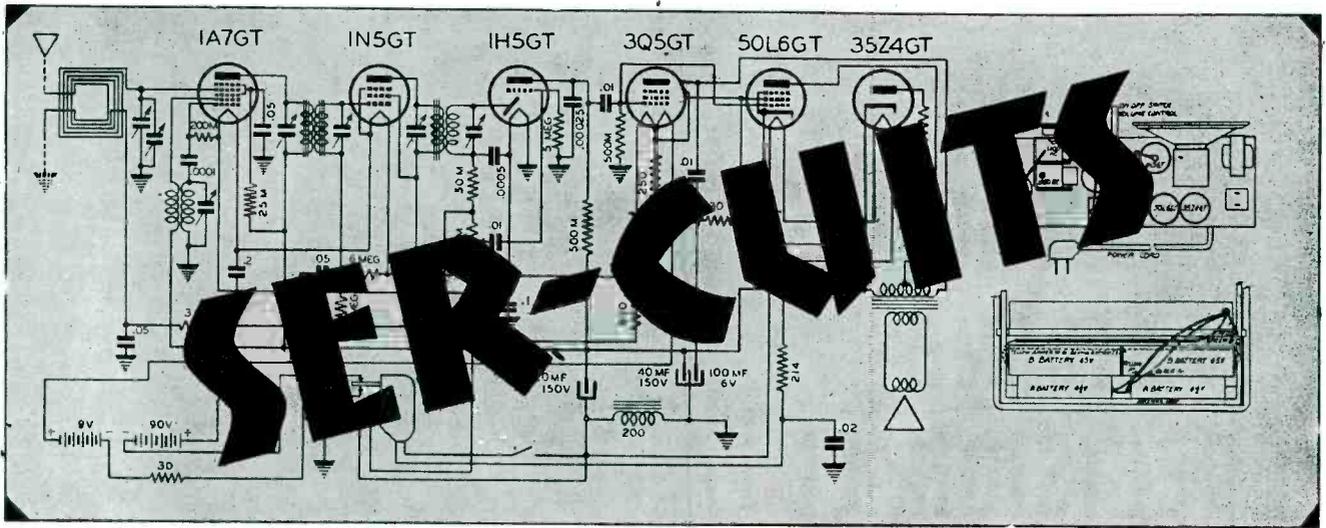
MEISSNER

MANUFACTURING COMPANY • MT. CARMEL, ILL.

ADVANCED ELECTRONIC RESEARCH AND MANUFACTURE

Export Division: 25 Warren St., New York; Cable: Simontrice

SERVICE, OCTOBER, 1944 • 21



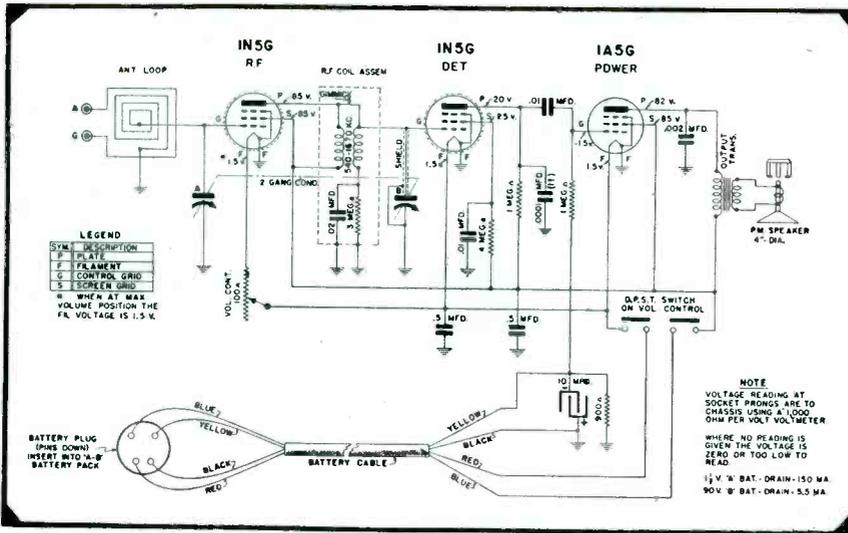
TUNED r-f appears to have been popular with designers of not only the small battery sets, but a-c/d-c, models, too. In Fig. 1 we have a t-r-f 3-tube, 1½-volt battery model, Sentinel, using a 1N5G for r-f, a 1N5G grid-leak detector and a 1A5G pentode in the power output. Low drain is

by **HENRY HOWARD**

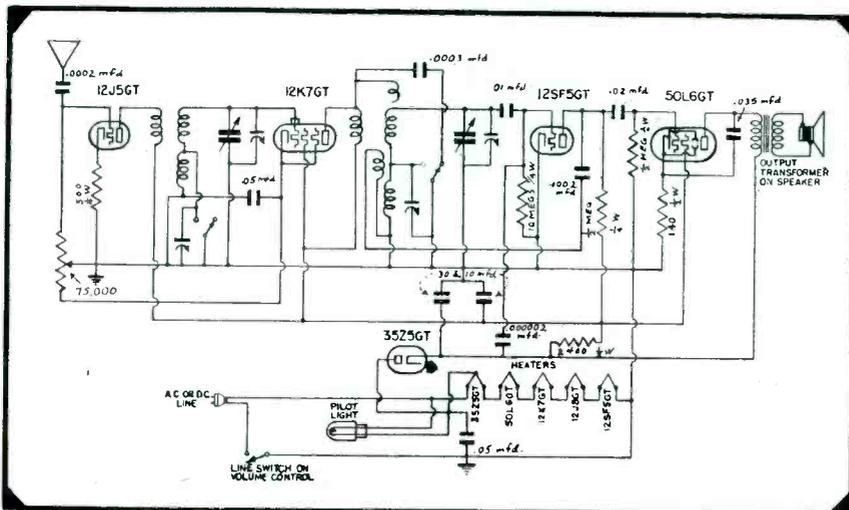
a feature; *A* drain but 150 ma, and *B*, 5.5 ma. The volume control operates on quite an old principle, changing the filament temperature, but it is very effective in a low gain set of this type.

Decreasing the filament voltage decreases the mutual conductance of the tube and, at the same time, raises its plate resistance.

The grid-leak detector is more sensitive on weak signals than a grid-bias detector and provides ample sensitivity for the reception of local stations. Since there is no bias on the grid, grid current flows during the positive half cycles of the signal voltage, setting up a d-c potential across the grid leak similar to the avc voltage developed by a diode detector. The 3-megohm grid leak acts as a load and a .02-mfd grid condenser. Since a high value grid leak allows greater sensitivity, and a lower value increases the audio gain, the 3-megohm compromise was introduced. This type of detector loads the preceding circuit like a diode detector because of the grid current flow. Therefore, the selectivity of the input circuit is reduced. On a very strong signal the overall selectivity would seem poor, but the loop may be used perpendicular to the strong station to reduce its strength, giving an apparent increase in selectivity. A *d-p-s-t on-off* switch opens the *B* as well as the *A* battery to prevent small leakage currents from draining the batteries.



Figs. 1 (above) and 2 (below). Fig. 1. Sentinel 170 BL, 1½-volt battery model.
Fig. 2. Emerson CUL W-261, a-c/d-c t-r-f two-band receiver.



Emerson CUL W-261

In Fig. 2 appears another type of t-r-f receiver, a 5 tube a-c/d-c, two-band model, CUL W-261 Emerson, covering broadcast and long-wave. The tube lineup is very unusual: 12J5GT first r-f, 12K7GT second r-f, 12SF5GT grid-leak detector, 50L6GT power output and 35Z5 rectifier. The first tube is an untuned triode with a 500-ohm cathode fixed bias. This is not bypassed. The volume control is a familiar t-r-f type, performing two functions on a single control; shunting a resistor across antenna and ground

(Continued on page 24)

filter. We note, that thus far, the i-f amplifier is not unusual. It feeds the usual iron core second i-f transformer. The detector, incidentally, is located in the 1N6G power tube. Now, however, if we study the volume control circuit, and trace the audio through the .01-mfd condenser and 75,000-ohm resistor to the low side of the first i-f transformer which is actually the grid as far as audio is concerned, we note that the tube is functioning as an a-f amplifier whose output is fed through an audio transformer to the power tube grid. The .0005-mfd condenser across the audio primary serves to bypass the i-f which would otherwise get all choked up in the audio transformer. A ¼-megohm resistor and .0005-mfd condenser are both shunted across the transformer secondary.

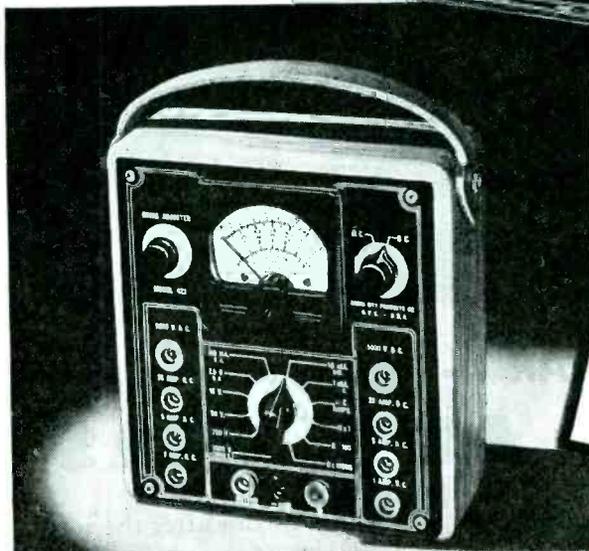
WARTIME SERVICING

(Continued from page 20)

the output voltage will rise due to the lower-than-normal potential drop across the internal resistance of the supply. This may result in oscillation or other troubles. A resistor of about 20,000 ohms rated at 40 or 50 watts, connected between the filament of the stabilizing circuit element in place of 80 and the centertap, will act as a the field. If a low-resistance field speaker is the only one obtainable, it may be connected as shown in the revised drawing, Fig. 6. The voltage divider can be a 15,000-ohm 50-watt type, with adjustable slider resistors to allow proper adjustment of the operating potentials on the tubes. R_1 and R_2 may be 800 ohms 20 watts, and 100 ohms 5 watts, or a 1000- or 1500-ohm voltage divider, with adjustable taps, rated at 25 or 30 watts. The original power supply filter used low-capacity condensers. This was permissible because of the unusual efficiency of the filter chokes. Unfortunately, these chokes may become noisy and cause intermittent operation and fail altogether. However, as long as they were perfect, hum was reduced considerably. This effect is achieved through phase relationship control. That is, if an alternating current flows through section of a of choke L_1 a field will develop about a which will induce a hum voltage in b . This however will be out of phase with the hum field about b , caused by the regular hum current. The result will be a phase cancellation of hum, just as hum voltage may be cancelled in the primary of a push-pull output stage transformer in the plate

(Continued on page 29)

TWO VERSATILE VALUE-PACKED PORTABLE TESTERS



RCP QUALITY • ADVANCED ENGINEERING AND DESIGN

RCP INSULATION TESTER MODEL 665

This V.T. Volt Ohmmeter Insulation Tester provides 29 precision measuring operations in one unit for shop or laboratory. Tests at 500 volts up to 10,000 megohms. Vacuum tube voltmeter with 13 AC and DC voltage scales, from a fraction of a volt to 6,000 volts. Capacitometer ranges from 2.5 mmfd to 2,000 mfd. Vacuum tube ohmmeter has seven ranges to 1,000 megohms. Rugged metal case — thorough shielding — Size: 9¾" x 12½" x 6"; Weight: 13 lbs. With batteries, ready to operate. Code: UTEL.

RCP SUPERTESTER MODEL 422

For general circuit testing, speedier trouble-shooting, 27 individual instruments in one portable unit. Very low and very high ranges. Voltage measurements in both AC and DC up to 5,000 volts. Resistance measurements up to 10 megohms. High voltage not applied to selector switch nor to general test circuits. 3-inch square meter with movement of 200 microamperes or 5,000 ohms per volt sensitivity on DC. 6¼" x 7" x 2¼" — with strap handle. Weight: 2 lbs. Complete with batteries. Code: MERAY.

These are only two out of the complete line . . . the line that built a reputation for quality and value before the war. Today it's packed with still greater technical advancements, better engineering, smarter design . . . the up-to-the-minute instrument line. Want the facts? Write today for Catalog No. 128 of standard commercial models.

RADIO CITY PRODUCTS COMPANY, INC.

127 WEST 26th STREET



NEW YORK 1, N. Y.

MANUFACTURERS OF PRECISION ELECTRONIC LIMIT BRIDGES — VACUUM TUBE VOLTMETERS
VOLT-OHM-MILLIAMMETERS — SIGNAL GENERATORS — ANALYZER UNITS — TUBE TESTERS
MULTI-TESTERS — OSCILLOSCOPES — AND SPECIAL INSTRUMENTS BUILT TO SPECIFICATIONS

SERVICE, OCTOBER, 1944 • 25



**AFTER THE WAR - - - the name to look for
in RADIO ANTENNAS**

Today, BRACH produces only for Victory. But after the war, Brach will be ready with trained craftsmen and still more "know-how" to turn out superior antennas and other radio and electrical products for which dealers and public have been patiently waiting.

L. S. BRACH MFG. CORP.

World's Oldest and Largest Manufacturers of Radio Antennas and Accessories
55-65 DICKERSON STREET • NEWARK N. J.

The Service Man's Best Friend
WARTIME RADIO SERVICE
\$3.00
SUPPLEMENT NUMBER ONE
\$1.00

About 1,200 tube substitutions and much other important information.

We have IN STOCK, adapters to make more than 100 of these substitutions. Quick, convenient, low priced. Ask for list airmail.

CITY RADIO COMPANY
504-6 E. Washington St.
PHOENIX, ARIZONA

POSTWAR SERVICING

(Continued from page 13)

much higher degree of knowledge and skill will be required and considerably more expensive equipment. Then too, while practically no one employs technical service for the installation of a broadcast receiver, nearly everyone will require this service for television.

The opportunities for the Service Men never were brighter, but the ones alive to the trends of the times will do well to dust off the old adage "In unity there is strength."

by **CHARLES A. NICHOLS**

*Postwar Servicing
Packard-Bell Company*

ALTHOUGH the war has brought untold misery to millions, there is a bright outlook for the radio industry in the postwar years. Considerable progress has been made in the electronic field, and everyone in the service business should look forward eagerly to the time when we can all get back to the days of available parts and discriminating customers.

With the knowledge gained in manufacturing and servicing of radio and electronic equipment for war, we should all be anxious to put some of these ideas into civilian use. The era of signal tracing, vacuum-tube voltmeters and oscilloscopes in service work is definitely here.

Frequency modulation and television appear to be on the *must* list for the service technician to become familiar with, if he expects to get his share of business that will be created by the introduction of these two additions to the entertainment field. The future holds untold possibilities in the electronics field, but, as usual, only those who are prepared will reap the harvest. Those who are expecting to do business at the same old stand and in the same old manner are due for a surprise. It's not a bad idea to stay at the same old stand, but it is advisable to plan on doing business in the improved manner. One of these days we will have to go after customers once again, instead of the customer coming to us.

In conclusion, the writer wishes to advocate better service notes, better test equipment and better salesmanship to put the electronic service business in its rightful place and to make its members proud of the part they play.

by **H. A. NEWELL**

*Service Manager
Crosley Corporation*

FORTY-THREE commercial f-m stations and six experimental f-m stations are now in operation. It has been reported that the FCC now

holds applications for 77 additional licenses. More than 500,000 f-m receivers have been sold.

In the band which has been allocated to f-m—and an increase in that allocation is now being considered—it will be possible to set up some 3000 f-m stations. There are less than 1000 a-m stations in operation today. I do not believe that f-m will ever replace a-m. I do believe that most of the more expensive radio receivers and radio-phono combinations will incorporate the f-m band when production is resumed. Undoubtedly, many millions of families will want this added service.

With this greatly expanded high-frequency activity in the offing it is necessary for each of us to look at himself frankly. Are we prepared technically? Are we in a position to become high-frequency technicians rather than *change-the-bad-part* mechanics? Is our shop equipment of a nature that will enable us to take advantage of this new service business?

The time for this analysis is now. Lay your plans. Shop for your equipment. Review your textbooks and manuals.

by **WIN CAMPBELL**

Acting Service Manager
Farnsworth Television & Radio Corp.

It is the writer's opinion that one of the important services to be rendered by Service Men in the post-war era is the installation and proper servicing of f-m and television sets. In the metropolitan area, the question of good performance on either of the above services is dependent more on favorable antenna location than installation. However, as the fringe of the service area is reached, a marked improvement in performance can be secured by the use of improved materials which will be available at reasonable prices after the war. This refers particularly to the lead-in which, in the writer's opinion, has been neglected by Service Men prior to the war.

An important item will be the proper equipment to service both f-m and television sets, and unless proper equipment is made available for the Service Men by the instrument manufacturers at popular prices, a great many dissatisfied customers will result.

by **HAROLD B. DONLEY**

Manager Radio Receiver Division
Westinghouse Elec. & Mfg. Co.

HARD pressed by wartime necessity, radio has crowded the research and development of a dozen normal years into a mere frac-

The APPLIANCE TESTER that is held in HIGHEST ESTEEM



MODEL 900

HICKOK VOLT-AMP-WATTMETER

Here is an electrical Appliance Tester and Circuit Analyzer that incorporates the latest up-to-the-minute improvements. It measures actual load values of volts, amperes and watts. It is only 9½ inches high and weighs only 8½ lbs.

This improved 1944 MODEL 900 is designed for all A. C. appliance testing. It even locates trouble while the appliances are in actual operation. Tests anything from clocks and bell transformers to electric ranges operating on the 220 volt, three wire Edison system. Its No. 9A and 9B leads have standard three wire range connectors for the electric range work.

Write for special bulletin on HICKOK Model 900—the Appliance Tester and Circuit Analyzer that knows no peer.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
10521 DUPONT AVENUE • CLEVELAND, OHIO

The New
DUMONT
TYPE P6
Paper
CAPACITOR

"Durasealed"
for high tem-
perature uses
. . . no END
WAX to run
out.



PAT. PEND.

The NEW Dumont
"Durasealed"

has its ends sealed in Bakelite Resinoid . . . therefore they cannot drip out under any temperature . . . they are highly moisture-proof.

Suitable for operation at 95% to 100% humidity

Write for Descriptive Literature.

BUY
MORE
BONDS

DUMONT
ELECTRIC CO.
HEADS OF
CAPACITORS FOR EVERY REQUIREMENT
34 HUBERT STREET NEW YORK, N. Y.

tion of that time.

And from this great store of *know how* will come the electronics developments which will lift radio from its prewar adolescence to the full vigor of postwar maturity.

This fact alone—delivery for civilian usage of those secrets now carefully guarded to serve our fighting forces—will revolutionize the work of the radio Service Man.

Postwar radio service no longer will be a haphazard pliers-and-screwdriver trade, but the exacting task of a specially trained technician.

The radio Service Man of 194x will be an expert on standard band and short-wave reception. He will have a working knowledge of i-m and television. He will be able to study a tentative installation—particularly antenna requirements—and recommend the best procedure.

Easy going America has been satisfied in the past with just about whatever has been offered in the way of maintenance and repair service.

But in the future—with wits sharpened by the money-saving lessons of enforced wartime conservation—the public is going to be a great deal more exacting. There will be insistent demands that the same care which kept radios in service during the days of *wear-it-out* and *make-it-do*, be available in the postwar era.

We plan to build the finest radio receivers in the world, but unless they are properly installed and unless service is available if and when needed, no owner can enjoy their maximum advantages.

That is why service is a *must* on the Westinghouse postwar radio program.

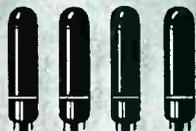
by **M. J. SCHINKE**

Chairman, RMA Service Committee
Service Manager, Elec.-Appl. Div.
Stewart-Warner Corporation

THE common use of more complex electronic equipment after the war, such as frequency modulation and television, as well as spe-

cial industrial and aircraft electronic devices, will present a great opportunity for radio Service Men who have a thorough and comprehensive knowledge of electronic principles, plus the ability to apply those principles in actual service work.

This postwar situation should also be a challenge to any other Service Men who have just enough radio knowledge to handle ordinary radio service. Such men should study now to equip themselves with the knowledge they will need to handle the more difficult work on much of the new equipment that will be made after the war.



4 STANDARD TYPES

of Amperite Regulators replace over 400 types of AC-DC Ballast Tubes now in use.

Amperites are real REGULATORS . . . have patented Automatic Starting Resistor which prevents initial surge and saves pilot lights . . . Ask Your Jobber.

AMPERITE

THE *Simplest*

WAY TO REPLACE

BALLASTS

WRITE FOR REPLACEMENT CHART

AMPERITE CO. 541 BROADWAY, NEW YORK, N. Y.

SERVICE TO SERVICEMEN . . . THAT'S STANCOR'S RECORD

Standardize
ON

STANCOR

Call your nearest Stancor Jobber . . .
or write us for his address

Transformers

STANDARD TRANSFORMER
1500 N. HALSTED STREET • CHICAGO



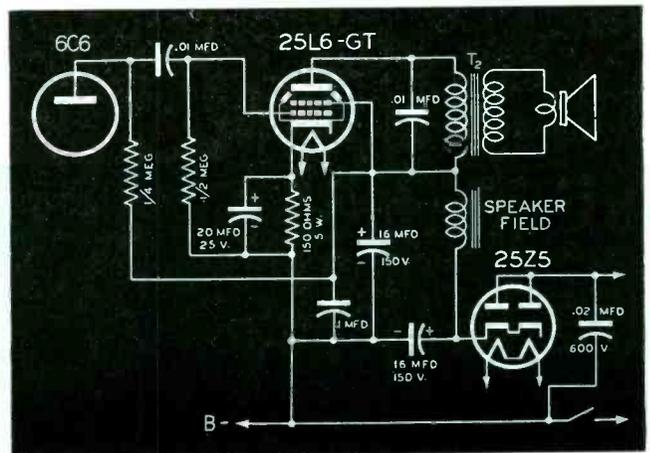
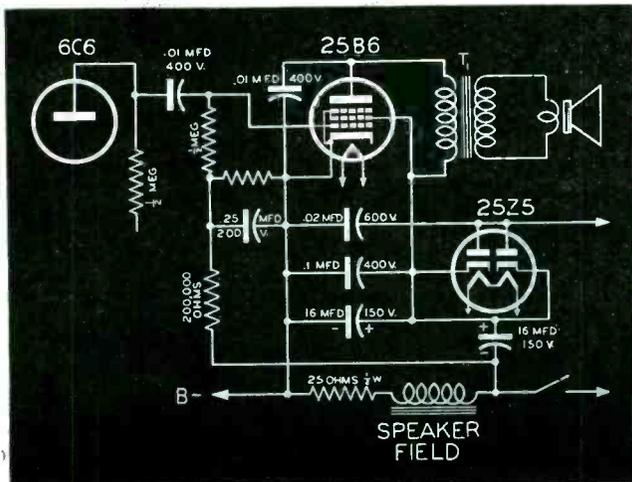
CORPORATION

(Continued from page 25)

circuit. Somewhat similar arrangements have appeared in more modern sets. Incidentally, we have the same action in L_2 of this circuit. If a current of hum frequency flows from 3 to 2 through section c and the condenser, its field will neutralize the field caused by hum current flowing from 3 to $B+$. The net result will be that the hum potential across the $B+$ and $B-$ output terminals will be at a very low value. Using the brute force filter of Fig. 6, similar results are obtained, but only because high-capacity, low-impedance filter condensers are used. An electrostatic shield was used on the original power transformer. If this shield has a connection which opens up intermittently, intermittent tunable hum may be experienced. The trouble can be minimized by connecting a .1-mfd bypass condenser to each side of the line and ground (chassis). This will have the effect of keeping the r-f potential difference between the line conductors and ground at a very low or zero value, thus eliminating the modulation hum.

In the Arvin 508, Fig. 7, a 25B6 output tube is required. If unavailable, a 25L6 may be substituted, Fig. 8. The load impedance of the 25B6 is 1700 ohms for a bias of -16 and plate potential of 105 volts. The 25L6 has a required load of 2000 ohms for a plate voltage of 110 and bias of -7.5 volts. The mismatch is not enough to warrant a new output transformer and the original may be retained. No changes are necessary at the socket, except that the cathode resistor and condenser may be connected, and the plate condenser may be reconnected so as to get the d-c voltage off the unit. The grid resistance decoupling network is removed.

Figs. 7 (below) and 8 (right, below).
Fig. 7. Original output circuit of Arvin 508.
Fig. 8. Revised circuit, using 25L6-GT.



Model GI-R90 Dual-speed home recording and phonograph assembly.



AT WAR NOW . . .

but they'll be back!

Soon, we hope, we can get back into the business of supplying you with those reliable recorders, Smooth Power motors, turntables and record changers, deliveries of which we have had to discontinue because of war obligations.

When that time comes, you can be sure of the same high quality, sturdiness and dependability which have always distinguished the products of General Industries. Beside this, from the varieties and types of products which we have been making for military use, we have derived some very practical ideas that will improve and expand our prewar line of equipment.

So, when you are thinking about postwar electric, mechanical or electronic devices, be sure to include General Industries in your planning. Right now, we can't offer you engineering or production facilities, but we can talk over your requirements in general terms, and get down to facts and figures later. We'll be glad to hear from you.



THE GENERAL INDUSTRIES COMPANY
DEPT. M . . . ELYRIA, OHIO



Proven!
25,000 OHMS PER VOLT
PUSH BUTTON OPERATED
SPEED TESTER
SUPREME MODEL
592



- * Design proven by over 5 years production
- * Dual D.C. Sensitivity—25,000 ohms per volt and 1000 ohms per volt.
- * Matched resistors of 1% accuracy
- * Push button operated—no roaming test leads
- * Open face—wide scale 4 1/4" meter. 40 microamperes sensitivity.
- * 1 Microampere first scale division.

SPECIFICATIONS

D.C. MICROAMPERES:
 0-70-700 microamperes
 D.C. MILLIAMMETER:
 0-7-35-140-350 milliamperes
 D.C. AMMETER:
 0-1.4-14 amperes
 D.C. VOLTS, 25,000 OHMS PER VOLT:
 0-3.5-7-35-140-350-700-1400 volts
 D.C. VOLTS, 1000 OHMS PER VOLT:
 0-3.5-7-35-140-350-700-1400 volts
 A.C. VOLTS, 1000 OHMS PER VOLT:
 0-7-35-140-350-700-1400 volts
 OUTPUT VOLTMETER:
 0-7-35-140-350-700-1400 volts
 DECIBEL METER:
 0 db to plus 46 db
 OHMMETER:
 0-500-5000-50,000-500,000 OHMS
 0-5-50 MEGOHMS
 POWER SUPPLY:
 Battery Operated

With the above specifications the Supreme Model 592 Speed Tester meets today's requirements for general laboratory use, assembly line tests and inspection, radio and other electronic repair and maintenance.

SUPREME
TESTING INSTRUMENTS

SUPREME INSTRUMENTS CORP.
 Greenwood, Miss., U. S. A.

DIODE DETECTORS

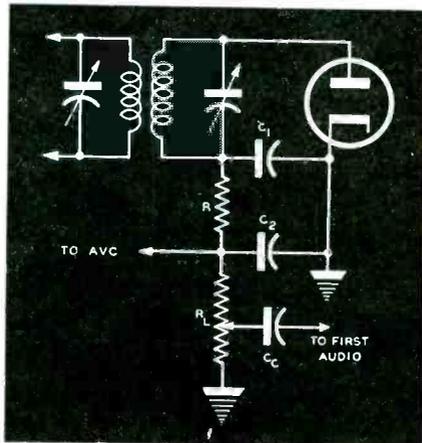
(Continued from page 11)

Since it is known that current will flow in a tube only when the plate is positive with relation to the cathode, Fig. 2b shows this voltage as it appears across R . This voltage is a resultant of the current flowing through R when the applied a-c is positive at the plate. If a condenser is now installed across R , the resultant waveform assumes the shape shown in Fig. 2c. This wave shape is the result of the condenser charging during the positive peaks of voltage, and discharging during the zero voltage periods across the resistor. If the condenser is of the proper proportion, the voltage developed across R could be made to follow the shape of the modulated r-f carrier faithfully.

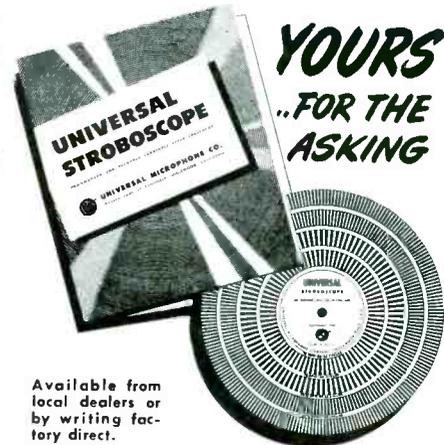
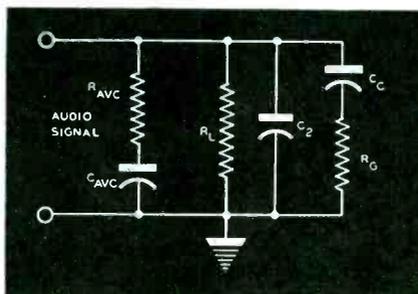
The one problem inherent in diode-detector design is how to prevent signal distortion. Component value is the key to good design, and an understanding of the limits imposed by good results, will show the tolerances to be observed when replacing defective parts.

A typical diode detector is shown in Fig. 3. While there are many varia-

(Continued on page 32)



Figs. 3 (above) and 4 (below). A typical diode detector is shown in Fig. 3. Fig. 4 is a resistive representation of the audio load circuit.



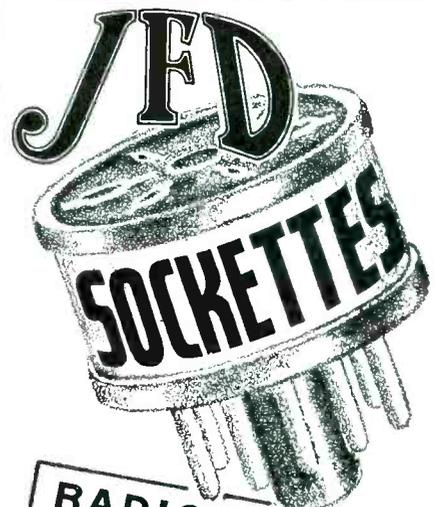
YOURS
..FOR THE
ASKING

Available from local dealers or by writing factory direct.

UNIVERSAL STROBOSCOPE

This handy phonograph turntable speed indicator, complete with instructive folder, is now available gratis to all phonograph and recorder owners through their local dealers and jobbers. As a recorder aid the Universal Stroboscope will assist in maintaining pre-war quality of recording and reproducing equipment in true pitch and tempo.

Universal Microphone Co., pioneer manufacturers of microphones and home recording components as well as Professional Recording Studio Equipment, takes this means of rendering a service to the owners of phonograph and recording equipment. After victory is ours—dealer shelves will again stock the many new Universal recording components you have been waiting for.



RADIO TUBE ADAPTERS



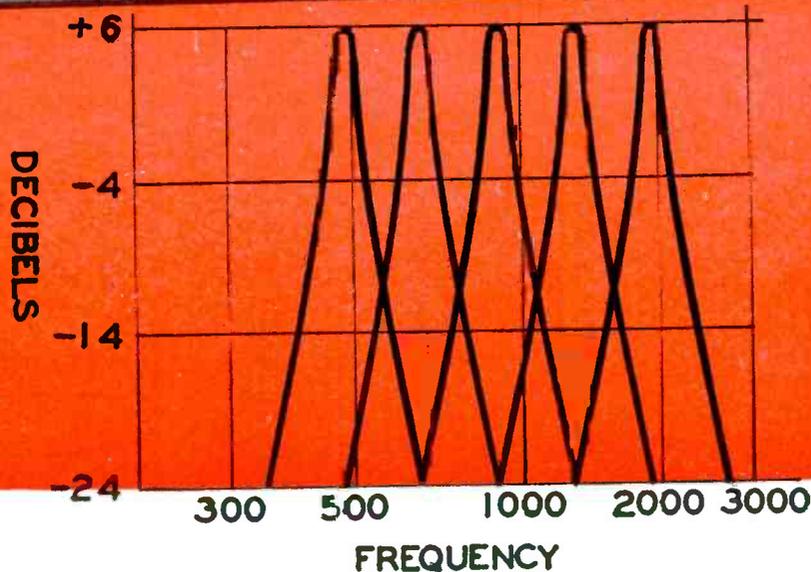
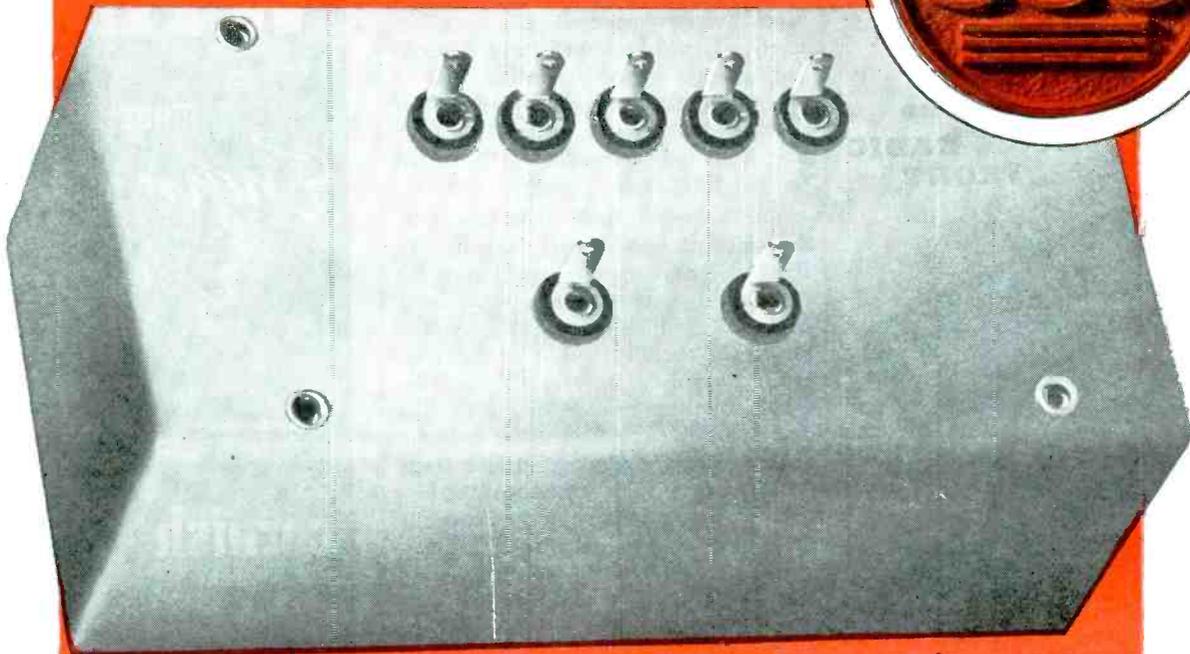
122 different types of completely wired Adapters permit the use of available tubes in place of those now scarce or entirely out of the market. No need to rewire sets—Convert your present stock of slow moving tubes into types that are unobtainable or hard-to-get.

Write for Descriptive Folder.



J F D Manufacturing Co
 4111 Ft Hamilton Parkway
 Brooklyn 19 N Y

MULTI-CHANNEL FILTERS BY...



Multi-Channel Filters lend themselves to remote control apparatus employing frequency selection. The unit illustrated is a five channel band pass filter of the interstage type with the inputs in parallel and 5 separate output channels designed to feed into open grids. This circuit arrangement provides a 2:1 step-up ratio, with a band pass attenuation of approximately 30 DB per half octave. The dimensions of this unit in its hermetically sealed case are 2½" x 3" x 6". Filters of this type can be supplied for any group of band pass frequencies from 200 to 7000 cycles.

May we cooperate with you on design savings for your application . . . war or postwar?

United Transformer Co.

150 VARICK STREET

NEW YORK 13, N. Y.

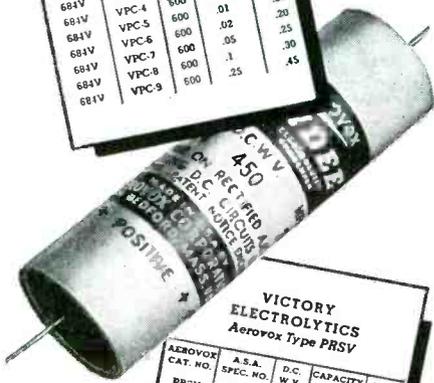
EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y., CABLES: "ARLAB"

Ammunition
for the
HOME RADIO FRONT



VICTORY PAPER TUBULARS
Aerovox Type 684V

AEROVOX CAT. NO.	A.S.A. SPEC. NO.	D.C. W.V.	M.F.D.	CAPACITY	LIST PRICE
684V	VPC-2	600	.001	50.20	.20
684V	VPC-3	600	.002	20	.20
684V	VPC-4	600	.005	20	.20
684V	VPC-5	600	.01	20	.20
684V	VPC-6	600	.02	25	.25
684V	VPC-7	600	.05	30	.30
684V	VPC-8	600	.1	45	.45
684V	VPC-9	600	.25		



VICTORY ELECTROLYTICS
Aerovox Type PRSV

AEROVOX CAT. NO.	A.S.A. SPEC. NO.	D.C. W.V.	M.F.D.	CAPACITY	LIST PRICE
PRSV	VEC-10	25	25	30.60	
PRSV	VEC-2	50	10	.55	
PRSV	VEC-3	150	20	.75	
PRSV	VEC-4	150	20-20	1.30	
PRSV	VEC-5	150	50	1.10	
PRSV	VEC-6	250	20	1.00	
PRSV	VEC-7	450	10	.85	
PRSV	VEC-8	450	10-10	1.40	
PRSV	VEC-9	150	40	1.75	

● These are Victory Capacitors. Available in voltages and capacitance ratings selected to meet a wide range of servicing requirements. Indeed, these numbers, used singly or in groups, may even service about 90% of the usual capacitor replacements, while much critical material and labor are being conserved for the urgent needs of our fighting men. ● Ask our jobber about your wartime servicing needs. Or write us direct for catalog.



AEROVOX CORP., NEW BEDFORD, MASS., U. S. A.
In Canada: AEROVOX CANADA LTD., HAMILTON, ONT.
Export: 13 E. 40 St., New York 16, N. Y. Cable: 'ARLAB'

(Continued from page 30)

tions, most receivers use the system shown. The filter network, consisting of R , C_1 , and C_2 is used to remove the r-f component of the signal without affecting the modulation, or audio component. Since i-f frequencies are of the order of 175 to 456 kc, small capacitive condensers do the job effectively. It will be found that C_1 and C_2 are usually about 100 mmfd and R about 50,000 ohms. The value of R is not critical, but is limited by R_L , in that R should be less than 20% of R_L , for good design.

The value of R_L is determined by the network associated with it. In Fig. 4 we have a representation of the network associated with the volume control R_L , which includes the loading effects of the grid resistor and coupling condenser R_G and C_G , and the avc system represented simply by R_{avc} and C_{avc} . It can be seen that the grid circuit of the following audio stage and the avc system act as parallel circuits to the volume control across the developed audio signal. Since it is desirable to reduce the loading effect that these circuits have on R_L , it is customary to so design R_L that the other circuits have a minimum effect. Where the grid resistor is a high value, say 5 to 10 megohms, the volume control will be about 1 megohm. Where the grid resistor is 1 megohm, the volume control will be about .25 megohm. The lowest value of volume-control resistance that may be used is limited by the a-c resistance of C_1 , in that the former must be at least as large as the a-c resistance of C_1 at the highest audio frequency desired without appreciable distortion.

Fig. 5 shows some typical examples of diode-detector circuits. In Fig. 5a, C_2 has been attached to the arm of the volume control. In this way, the portion of the volume control not being used to develop the necessary audio power to drive the grid of the following tube, is being used to increase the filter action of the filter network C_1 , R , C_2 . In Fig. 5b appears a diode detector, where the loading effect of the diode on the i-f transformer, has been reduced by tapping down on the secondary. This has been done to improve the selectivity of the i-f stage. Diodes reduce the selectivity of i-f stages, because they draw power from the previous tube, thereby reducing the Q , or efficiency rating of that stage. When the diode is tapped down on the coil, its effect on the circuit is minimized. In Fig. 5b, we note that the volume control has been placed in the grid circuit of the following tube, instead of the diode return. This has

CORWICO

WIRES

MADE BY
Engineers FOR Engineers

VICTORY
concentrating upon
for the duration.....

cornish
WIRE COMPANY, INC.
15 Park Row, New York City, New York

CORWICO

FIELD SERVICE ENGINEERS

FOR DOMESTIC AND FOREIGN SERVICE

•

Must possess good knowledge of Radio

•

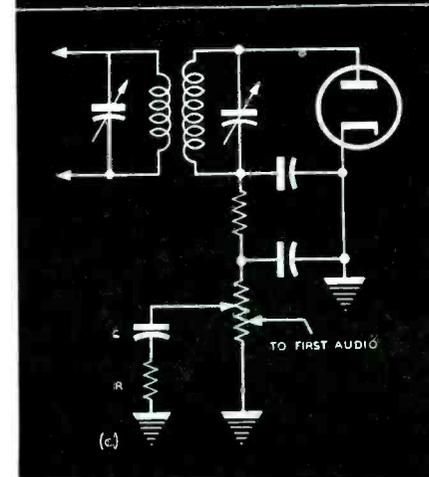
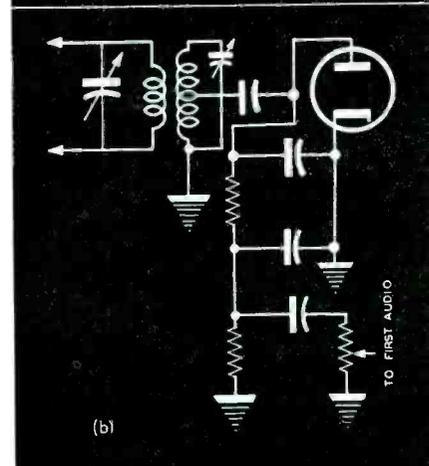
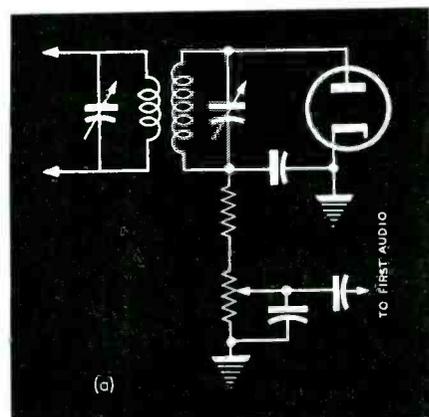
Essential workers need release

•

HAZELTINE ELECTRONICS CORP.
58-25 Little Neck Parkway
Little Neck, L. I.

been done to reduce contact noise in the control arising from the presence of rectified r-f voltage. Fig. 5c shows another method employed in volume control design to improve low-frequency response at low volume. RC is connected to a tap at the low end of the volume control to increase the bass response at low volume. Resistor R is used in series with C to equalize its effect.

The average a-c voltage across the input to the diode is of the order of ten to twelve volts. Measurements of the various a-c and d-c voltages in the diode circuit with any good v-t-v-m will instantly locate the source of trouble, once diode action is understood.



This is the now-famous Electro-Voice "Lip Mike" which began a new era in transmission of voices and the cancellation of ambient noises.

... and this marks the second step in the development of a full line of Electro-Voice Differential (noise-cancelling) Microphones.

Electro-Voice

DIFFERENTIAL MICROPHONE

NEW MODEL 205-S

Designed, developed and built by E-V engineers and technicians

- Provides extremely high intelligibility, even under intense surrounding noises
- A most efficient microphone for aircraft, factories, railroads, police and emergency services
- May be used in all temperatures from -40 to +185 degrees, and is interchangeable with conventional carbon microphones
- Close-talking, blast proof, waterproof and shock-resistant
- Operates satisfactorily in all positions
- Frequency response substantially flat from 100-5000 c.p.s.; high output level: -20 DB (0 DB = 1 volt/dyn/cm²); internal noise level below .001 volt.
- Press-to-talk switch opens microphone and closes relay simultaneously, if desired
- High impact phenolic case, 4" x 2-5/16"; Fiberglass wind noise filter; weighs less than 8 ounces
- Cable length, 5 ft.; panel mounting on the back; available in two models: Model 205-S, and 205-SL with switch lock.

If your present limited quantity needs can be filled by any of our Standard Model Microphones, with or without minor modifications, please contact your nearest Electro-Voice distributor.

Electro-Voice

MICROPHONES

ELECTRO-VOICE CORPORATION • 1239 SOUTH BEND AVENUE • SOUTH BEND 24, INDIANA
Export Division, 13 East 40th Street, New York 16, N. Y., U. S. A. Cable: Arlab

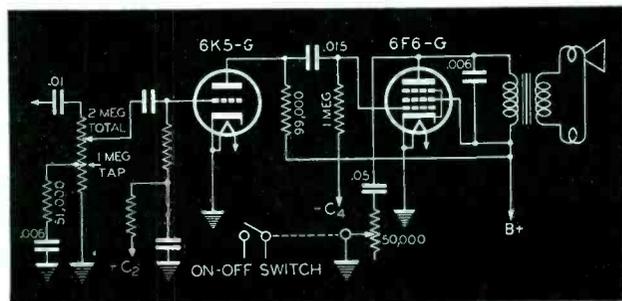
SERVICE HELPS

PHILCO 38-7

This receiver uses a switch-type tone-control system. Under present war-time conditions a replacement switch

may not be available. Circuit may be changed as shown below. A smoother tone control action instead of rough steps is secured. *Willard Moody*

Fig. 5 (left). Examples of diode detector design. In a, a method used by RCA to increase filter effect in detector portion. In b, another method used to reduce effects in volume control due to presence of rectified d-c. In c, time compensation for low volume settings.



We Don't Believe in Flag Waving!



RADIART has not publicized its outstanding contribution to the War Effort. All leading radio parts manufacturers were required to expand their efforts for the Armed Forces. Recently it was necessary to open RADIART Plant #3 to further increase our production.

RADIART Quality has always been supreme . . . and it is being improved by exceptional engineering.

RADIART, through long range foresight, is today leading civilian Vibrator replacement production *within WPB limitations!* When peace comes, RADIART Quality and Service will continue to make RADIART your best source for Replacement Vibrators.

Radiart Corporation

3571 W. 62nd. St.

CLEVELAND 2, OHIO

Announcing a change of name!

Henceforth, the Lafayette
Radio Corporation (Chicago and Atlanta)
will be known as the

CONCORD RADIO CORPORATION



The Lafayette Radio Corporation has, for 22 years, been one of the well-known names in radio and electronics. Our policies and our personnel, our reputation for integrity and outstanding service to our customers have enabled us to become one of the nation's great arsenals of radio and electronic equipment. In announcing the change of name to the *Concord Radio Corporation*, we emphasize that *the name only is affected*. To our thousands of customers, we promise a continuance and broadening of our organization and our policies. With the advent of new and greater horizons in electronics, the *Concord Radio Corporation*, will blaze new trails in engineering achievement and customer services. Watch for our future advertisements, and be sure that your name is on our list to receive postwar literature and catalogs.



CONCORD RADIO CORPORATION
901 W. Jackson Blvd. Dept. S-10
Chicago 7, Ill.

Please rush me the new 16-page "Special Flyer" just published by the Concord Radio Corporation.

NAME
ADDRESS
CITY..... STATE.....

Just off the Press!

NEW, 16-PAGE "SPECIAL FLYER" . . . a last-minute compilation, by the CONCORD RADIO CORPORATION, of hard-to-find components and equipment for industry, service men, training schools, etc. MAIL COUPON TODAY.

CONCORD RADIO CORPORATION *Lafayette Radio Corporation*

901 W. Jackson Blvd., CHICAGO 7, ILLINOIS ★ 265 Peachtree St., ATLANTA 3, GEORGIA

PHILCO S-1826

(See Front Cover)

MANY automobile receivers feature unique tuning and allied control methods. In the auto set shown on the cover this month the sensitivity control is most interesting. This device controls the self-bias of the converter and i-f tubes. Actually it is a rheostat connected between the 7B8 cathode and ground and, through a 150-ohm and .05-mfd decoupling filter, to the 7A7 i-f cathode. A jumper is provided to open this sensitivity control circuit which kills the converter and i-f stages.

The circuit is that of Philco's Studebaker model S-1826. It is a 7-tube and rectifier affair with permeability tuning. The antenna runs through an antenna choke and padder condenser and is directly connected to a 7A7 r-f amplifier grid, which is tuned by an iron-core element. A low value of plate loading resistor, 10,000 ohms, is used. The plate is connected to a tap on the r-f autotransformer, giving a step-up ratio to the converter tube (7B8) signal grid. The 7B8 feeds a 7A7 i-f stage in the conventional manner. All these three tubes are fed a-c, a decoupling filter being used in the r-f stage to prevent unwanted feedback.

The oscillator is a shunt Hartley with a 22,000-ohm plate resistor acting as an r-f choke. The oscillator tuning is accomplished by permeability tuning of an inductor in shunt with the oscillator coil. This is the third element of the 3-gang tuner. Six push buttons set the tuning elements to predetermined positions by means of a solenoid. The solenoid draws quite a heavy instantaneous current. This would cause a deafening click in the speaker if the receiver were alive. To prevent this a muting device is operated simultaneously with the solenoid. This device is simply a switch which grounds the arm of the volume control, or audio input. The switch is adjusted to close a short time before the solenoid switch and to open after the solenoid switch; thus, the make and break surges of the solenoid occur when the set is dead.

The remainder of the receiver consists of a 7B6 diode-triode detector-audio, a 7A4 cathode-type inverter and a pair of 7C5s in push-pull. A degenerative network associated with a 4-megohm tone control feeds back voice-coil voltage to the first audio cathode through a 1,500-ohm resistor. Thus, the feedback circuit contains the entire audio amplifier, the best possible arrangement.

CAMBER ELECTED PRESIDENT OF N. Y. CHAPTER OF REPS

Matthew Camber has been elected president of the New York chapter of the Representatives. John Kopple was named vice president, and William Gold was re-elected secretary-treasurer.

Joseph Sprung has been admitted as a member of the N. Y. chapter.

The California chapter, of which Les Logan is secretary, announced the acceptance of A. J. Hitt as a member. Mr. Hitt is the son of W. C. Hitt, also a member of the same chapter.

Ray Perron & Co., New England representatives announce their removal to 131 Clarendon St., Boston, Mass.

* * *

SCHOTTENBERG, DOYLE AND STARK TO DIRECT ASTATIC SALES

Ray T. Schottenberg, William J. Doyle and Allen J. Stark will direct sales for The Astatic Corporation of Conneaut and Youngstown, Ohio, during the ensuing year.

Mr. Schottenberg will continue as sales manager of the jobber and public address parts division. Mr. Doyle will be in charge of sales to radio set manufacturers, and Mr. Stark will direct sales in the radio cable connector division.

* * *

U-M TO MAKE MICROPHONES AND RECORDING PARTS

The Universal Microphone Co., Inglewood, Cal., will return to the recording field, and continue microphone manufacture, when civilian manufacture is resumed.

The new Universal recording activity, however, will include manufacture of all recording components for firms making their radio chassis for assembly in their own complete recorders and combinations. The line will include cutting heads, recording mechanisms, assemblies and other parts and accessories.

* * *

JOBBER WILL BE IMPORTANT IN POSTWAR ERA, SAYS S. W. BERK

The position of the jobber in the postwar era will change materially for the better, according to Sol W. Berk, manager of Concord Radio Corp., 901 W. Jackson Blvd., Chicago.

He said, "With the war came the problem of obtaining small quantities of radio components fast, and the jobber has been the mainstay of the industry in this situation. Many a manufacturer, faced with virtual stoppage of his experiments, and even his production lines, has turned to the jobber for items which would take months to obtain through former sources. The larger jobber has been able to make deliveries on these immediately, directly from stock.

"This has led to a gradual education of the manufacturer that the jobber is the logical supplier for these items. As a potential source of what heretofore has been termed, *samples*, the jobber bids fair to replace the so-called *short order* departments of many plants. The added cost of doing business with the jobber versus that of buying small orders directly is more than overcome by the speed of delivery.

KEN-RAD

Metal Tubes

SIMPLE AND ECONOMICAL

RUGGED... THE BOY WHO RETURNS WILL TELL YOU

PREFERRED WITH AIRBORNE EQUIPMENT

SELF-SHIELDING... NO SEPARATE METAL ENCLOSURES NECESSARY

COMPACT... PERMITTING A FINER RADIO IN A SMALLER CABINET

PREFERRED BY A MAJORITY OF RADIO SET MANUFACTURERS

Write for your copy of "Essential Characteristics" the most complete digest of tube information available

1934 introduced the first metal receiving tubes. In seven short years prior to Pearl Harbor over seven and one-half million new radio receivers were equipped with this finer Ken-Rad product

- TRANSMITTING TUBES
- CATHODE RAY TUBES
- SPECIAL PURPOSE TUBES
- RECEIVING TUBES
- INCANDESCENT LAMPS
- FLUORESCENT LAMPS

KEN-RAD

EXECUTIVE OFFICES
OWENSBORO · KENTUCKY
EXPORTS 15 MOORE STREET NEW YORK

"Under these circumstances, it is our opinion that the experience of the manufacturers during this war will be the basis of an extended industrial business afterwards."



HATHAWAY JOINS WARD LEONARD

Ken Hathaway, for the past 2½ years with the Radio and Radar Division of

WPB, has been appointed manager of the radio distributor division of Ward Leonard Electric Company. He will establish headquarters at 53 West Jackson Blvd., Chicago, Ill.

5-TOWNS RADIO CLUB FORMED IN L. I., N. Y.

The Five Towns Radio Club, with a membership of distributors, manufacturers, and representatives living in the villages of Hewlett, Woodmere, Cedarhurst, Lawrence and Inwood, in Nassau County, Long Island, was recently formed.

Meetings are held once a month at each member's home respectively, in alphabetical order.

Present members include: Dan R. Bit-
(Continued on page 36)

(Continued from page 35)

tan, D. R. Bittan Sales Co., president; Mike Berns, Roburn Agencies, Inc., secretary; M. B. Bernstein, Camburn Elect. Products; Bill Carduner; H. L. Dalis and Sid Finkelstein, H. L. Dalis Co.; Sid Gould, Recordisc Corp.; Maurice L. Granat and Murray Granat, Philmore Mfg. Co.; Jules T. Levy, J. T. L. Sales Co.; Sol Weingast and Murray Mentzer Precision Apparatus Co.; Charles Newman; Milton Reiner, Radio City Products Co.; Al Rothenstein; and Oscar Roye, Roye Sales Co.

* * *

SUPREME PUBLICATIONS EXPANDS

Supreme Publications has moved to larger quarters at 9 South Kedzie Ave., Chicago.

* * *

NRI CELEBRATES 30TH ANNIVERSARY

The National Radio Institute, 16th and U Sts., N. W., Washington, D. C., celebrated its 30th anniversary recently, with a luncheon for the employees.

Present at the luncheon were J. E. Smith, president; E. R. Haas, vice president; J. A. Dowie, chief instructor; Joseph Kaufman, director of education; and Louis L. Menne, graduate service director.

* * *

BERARD NAMED GENERAL MANAGER OF WARD LEONARD

Arthur A. Berard has been elevated to executive vice president and general manager of Ward Leonard Electric Company. Mr. Berard joined the company in 1920 and was made a director in 1927.

Leonard Kebler, president for 40 years, has been named chairman of the board of directors.

Dawson J. Burns, vice president of the company since 1909, was elected to succeed Mr. Kebler as president.

Frank G. Logan has been elected vice president and manager of research and development.

* * *

SYLVANIA TO SPONSOR 6TH WAR LOAN CONTEST

To promote the sales of war bonds during the sixth war loan, more than 500 war bond prizes will be contributed by Sylvania Electric Products Inc. to retail radio stores and service shops participating in a national display contest.

The contest will be directed by the war advertising council at the request of the United States Treasury. War bond prizes for the best window or lobby displays devoted exclusively to the sixth war-bond drive and featuring a \$100 war bond will be awarded on a state, sectional and national basis.

Retail radio stores participating in the contest, which will begin with the announcement of the opening of the sixth war bond drive by the United States Treasury, will make photographs of their displays and send them to the Sixth War Bond Drive Display Contest Committee, care of Display World, Cincinnati 1, Ohio.

* * *

WARD PRODUCTS WINS "E"

The Ward Products Corporation, Cleveland, Ohio, was recently awarded the Army-Navy "E".

R. N. Wiesenberger, president, received

They Are Tough!

American Capacitors are giving peak performance in front line battle areas . . . they have to be tough! They are precision engineered to meet the most exacting demands. American Electrolytic and Paper Capacitors, incorporating new plastic designs, cover all standard capacitance values and working voltages.

AMERICAN CONDENSER CO.
4410 RAVENSWOOD AVENUE - CHICAGO 40, ILLINOIS
THERE IS AN AMERICAN CAPACITOR FOR EVERY SIZE AND PURPOSE

WORRIED ABOUT YOUR POSTWAR CATALOG?
Jobbers, Distributors and Small Manufacturers—
Bring Out YOUR OWN INDIVIDUAL CATALOG

We can handle the complete job at moderate cost. No charge for consultation or quotation. All work under personal supervision of K. A. Kopetzky (W9QEA)—over 10 years' experience in this field.

MAGAZINES, Inc. — Dept. S—360 N. Michigan Blvd. — Chicago, Ill.

GET THIS HANDY CHEMICAL LABORATORY!

GENERAL CEMENT
RADIO CHEMICAL LABORATORY

A Complete Assortment of Cements and Chemicals

The G-C Radio Chemical Laboratory contains a complete professional assortment of often needed cements, solvents, coil dopes, insulating varnishes, lubricants, contact cleaners, etc. The bottle you want is always instantly available from its place in the permanent indexed rack. Rack can be placed on bench or wall.

LIST PRICE \$8.17 WITH FREE STEEL RACK

• Twenty 2 oz. Bottles
• Indexed Metal Rack
• Brushes in Bottle Caps

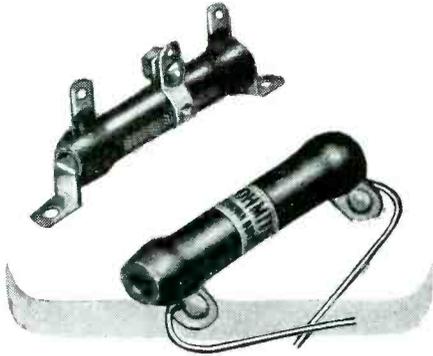
Order From Your Radio Parts Jobber

GENERAL CEMENT MFG. CO.
ROCKFORD, ILLINOIS

OHMITE RESISTORS

*for accurate
trouble-free*

SERVICE

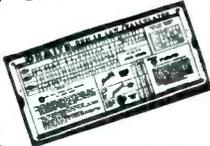


Time-proved, battle-proved, service-proved... Ohmite Brown Devils and Adjustable Divid-ohms are used today in critical war equipment. After Victory . . . these dependable units will again be the favorite of radio servicemen who want and use the best for resistor replacements.

For information about these and other Ohmite Resistors, write for Stock Unit Catalog 18.

SEND FOR HANDY OHM'S LAW CALCULATOR

Figures ohms, watts, volts, amperes—quickly, accurately. Solves any Ohm's Law problem with one setting of the slide. Send only 10c in coin for handling and mailing. (Also available in quantities.)



OHMITE MANUFACTURING CO.
4875 1/2 Flournoy Street • Chicago 44, U.S.A.

Be Right with **OHMITE**
RHEOSTATS • RESISTORS • TAP SWITCHES

the pennant from Major P. F. Murray of the Signal Corps.



At Ward "E" ceremonies, left to right: Major P. F. Murray; H. R. Wiesenberger, vice-president in charge of sales; R. N. Wiesenberger, and Flight Sergeant Alory, who spoke at the ceremonies.

DETROLA PROMOTIONS

R. J. Nixon, Detroit, has been elected treasurer of International Detrola Corporation. He succeeds John Hancock, Elkhart, Indiana, who becomes general manager of the company's machinery plants in Elkhart, and Indianapolis, Indiana.

Other promotions included: R. L. Dillon, Elkhart, assistant secretary and assistant treasurer; John H. Sennott, Detroit, controller; and R. P. Schmelzer, Detroit, assistant treasurer.

The corporation recently moved its executive offices from Elkhart to its Detroit plant at 1501 Beard Street.

PHILCO STORAGE BATTERY UNIT WINS WHITE STAR

The Storage Battery Division of Philco Corporation, Trenton, N. J., has been awarded its fourth white star for the "E" flag.

NEW JOBBER IN BROOKLYN, NEW YORK

Stan-Burn Radio and Electronic Company has opened a parts distributing organization at 558 Coney Island Avenue, Brooklyn, New York. National Union tubes and parts are being featured.

WESTINGHOUSE TO BUILD HOME RADIOS AT SUNBURY, PA.

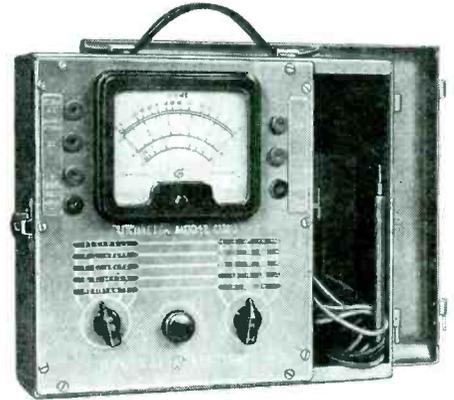
The Westinghouse Electric and Manufacturing Company plant at Sunbury, Pa., now devoted to the manufacture of war communications equipment, will be used for the production of home receivers.

OPERADIO ISSUES DISTRIBUTOR NEWSLETTER

The Operadio Bulletin, a newsletter for distributors, sound Service Men, and industrial music outlets, was published for the first time recently by Operadio Manufacturing Company, St. Charles, Illinois. This first issue contains items on Operadio war production achievements, sales developments of the commercial sound division, electronic trends, and reprints of pertinent magazine and newspaper articles. Editor of the bulletin is Fred D. Wilson, sales manager of the commercial science division.



UNIMETER

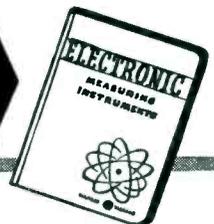


• Completely portable all-around utility instrument, ideally suited for reliable service work. Large meter calibrated to reduce the error possibility in readings makes the G-E unimeter a popular one with servicemen.

Other General Electric units available for testing electronic circuits and component parts are: audio oscillators, oscilloscopes, condenser resistance bridges, signal generators and other utility test instruments.

For complete details about the new General Electric line of SERVICE TESTING EQUIPMENT, please fill out the coupon below. . . .

**FREE
CATALOG**



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

Please send, without obligation to me, the General Electric Testing Instrument Catalog, S-10 (loose leaf), for my information and files.

Name _____

Company _____

Address _____

GENERAL ELECTRIC
Electronic Measuring Instruments
164-C10

RADIO CABINETS & BLANKS

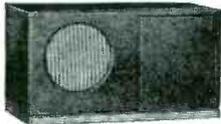
Speaker Cabinets

IMMEDIATE DELIVERY

Cabinets cut to fit Philco, Emerson, RCA, Eada, etc. Speakers cabinets in several sizes. Make money reconditioning old radio sets which are in great demand. Order today. Our comprehensive Catalog opens new opportunities for you.

Dealers, here is your big opportunity. Stock up on a money-making assortment of Radio Blanks for quick replacements. Also Emerson, RCA, Eada, etc. Speakers cabinets in several sizes. Make money reconditioning old radio sets which are in great demand. Order today. Our comprehensive Catalog opens new opportunities for you.

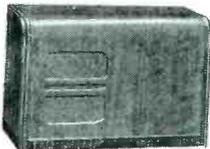
A BIG SPECIAL!



deep x 8 1/2" high. Order Model D-4 at dealer's price, \$3.45.

We were fortunate in making a "big buy" and we are passing the price advantage to you. A beautiful Black Imitation Leather Case with removable dial panel for easy cutting. Inside 16" long x 8 1/2" high.

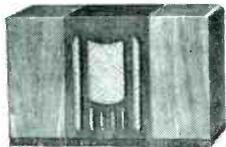
Modernistic Blanks



Beautifully grained walnut, well made. Has speaker opening. Four sizes take any chassis up to 12 1/2". Easily adaptable for reconditioning most any set.

Model No.	Long	Deep	High	Dealer's Price
A	7 1/2"	4 1/2"	4 1/2"	\$2.10
B	8 1/2"	5 1/2"	5 1/2"	2.85
C	10 1/2"	7 1/2"	6 1/2"	3.00
D	12 1/2"	6 1/2"	7 5/16"	3.65

Center Speaker Blank



Handsome walnut finish. Fine workmanship. Most ideal for reconditioning any set adaptable to a center speaker.

Inside: 11" long x 5 1/2" deep x 6 1/2" high. Order Model C-5 at dealer's price, \$3.00.

NOTE: A discount of 10% on orders for 6 or more, any model or assortment.

GUARANTEE: Shipment returnable for full refund after 5 day inspection.

SEND NO MONEY: Rush your order. We ship C. O. D. if desired. No deposit necessary.

WRITE FOR CATALOG: Our complete unlimited opportunities for you today! Fine presents line presents for you today! Have it on hand. Write

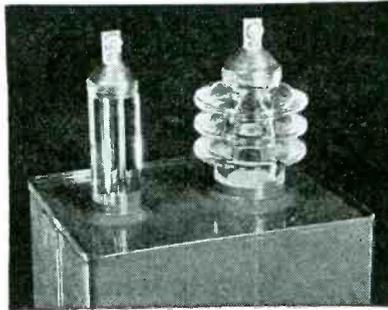
VAUGHAN CABINET COMPANY
3810 N. Clark Street Dept. 510 Chicago 13, ILL.

NEW PRODUCTS

SPRAGUE GLASS-TO-METAL SEALS

Capacitors and resistors using glass-to-metal seals have been developed by the Sprague Electric Company, North Adams Mass. In the case of capacitors, the usual ceramic terminals are supplanted by those of glass. These glass bushings are sealed direct to the metal capacitor container, and do not require adjacent metal rings with matched temperature coefficients of expansion. On koolohm resistors, the resistance unit is encased in a glass tube which is sealed directly to the metal ends.

Seal sizes range from very small up to 3" in diameter. They work equally well on practically any metal including steel, brass, and monel metal. Sprague capacitors and koolohm resistors utilizing glass-to-metal seals are now available in 8,000 different electrical characteristic combinations.



CENTRALAB HIGH-VOLTAGE CERAMIC CAPACITORS

Three new types of capacitors, particularly useful in high-frequency power circuits, have been announced by Centralab.

The new capacitors have been numbered CRL 855, 854, and 853 and are available with axial screw style and axial lead terminals.

All units have the general double-cup design. Plates are pure silver fixed to the ceramic Standard terminals are silver-plated brass or bronze.

Capacitance is determined by the area and thickness of the ceramic center partition or bottom of the cups and by the dielectric constant of the ceramic. NPO units have zero temperature coefficient and maintain a constant capacitance with temperature change. The dielectric constant of this ceramic body is approximately 40. N750 units have a uniform retraceable change with temperature of $-0.0075 \text{ mmf/mm}^2/\text{C}$. This ceramic has a dielectric constant of 90.

* * *

CARTER SMALL DYNAMOTORS

Dynamotors providing 3,000-volts d-c at .05 ampere, to be run from a 12-volt battery primary source, have been developed by Carter Motor Co., 1608 Milwaukee Ave., Chicago.

The unit is 1 1/2" long, 4 1/2" diameter and 5" high and weighs less than 18 pounds without filter. The input to the motor portion of the dynamotor can be had in voltages ranging from 12-volts to 115-volts d-c.

Unit can be furnished with two 1,500-volt, 0.05 ampere outputs, instead of 3,000-volt one.

The first of a series of very small dynamotors, the "multi-output micro-dynamotor" has also been announced by Carter.

The motor has a permanent-magnet field and furnishes outputs totaling up to 100-watts. This wattage may be divided over two or even three different voltages, and also one of the outputs may be a-c.

A typical unit would be one with a 350-volt, 50-milliampere output; 250-volt, 25-milliampere output; and 6.3-volt a-c, 2 ampere output.

In dual outputs the upper limit is 350-volts d-c, but if a single output should be desired, voltages as high as 500-volts are available.

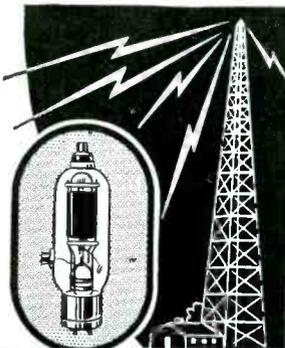
Input voltages are from 5.5 volts d-c through 115-volts d-c.

* * *

ATLAS OUTDOOR SPEAKERS

Type DR-12, a double reentrant permanent-magnet loud speaker, has been announced by Atlas Sound Corporation, 1443-1451 39 Street, Brooklyn 18, N. Y. All internal parts of the horn are die

Radio AND ELECTRONIC DEVICES



BURSTEIN-APPLEBEE CO.
1012-1014 McGee St. • Kansas City 6, Missouri

• **Ted McElroy**

World's Largest Manufacturer of
Wireless Telegraphic Apparatus
COMPLETE CENTRAL OFFICE EQUIPMENT
McElroy Manufacturing Corp.
32 Brookline Avenue • Boston, Massachusetts

TUBES - PARTS

RADIO DEALERS - SERVICEMEN

Send for our list of available tubes and repair parts.
Sylvania, Tung-Sol, National Union.

M. V. MANSFIELD CO.
937 LIBERTY AVE. PITTSBURGH 22, PA.

NEED PARTS?

National can supply you quickly with most of those hard-to-get parts at exceptional prices. Take a look at these bargains—

CONTINENTAL CARBON RESISTOR KIT
No. C6 Assortment. 100 RMA coated 1/2 and 1 watt resistors (2/3's are one watt). Unusual bargain at\$3.35

AERIAL KIT containing aerial wire, rubber coated lead-in, insulators, ground clamp, window strip, etc.Each, 89c

20 MFD 150 WV Tubular Pigtail Electrolytic One Year Guar.Each, 35c; 10 for \$3.30

10 MFD 450 WV Tubular Pigtail Electrolytic. One Year Guar.Each, 43c; 10 for \$3.95

Deluxe assortment of 50 Bakelite Set Screw Knobs for 1/4" Shaft.Kit, \$4.19

50 MFD 150 WV Tubular Pigtail Electrolytic One Year Guar.Each, 49c; 10 for \$4.45

ASSORTMENT OF 147 FIRST LINE 600 WV TUBULAR BY-PASS CONDENSERS CONSISTING OF 64 01-600 WV, 32 02-600 WV, 24 05-600 WV, 27 1-600 WV. One Year Guarantee. List Price, \$33.30. Your cost only \$11.95

Assortment of 200 pcs. Special Radio Hardware including Tube Sockets, Terminal Strips, Grid Caps and Plugs.Kit, \$1.49

20x20/150 WV Tubular Electrolytic. First Line Condenser. One Year Guarantee.Each, 61c; 10 for \$5.60

BALLAST TUBES—K42B, K42C, K49B, K49C, K35B, K55C, L49B, L49C, L55B, L55C. Each, 45c; 10 for \$3.99

100-37, 100-70, 100-77 and 100-79. Each, 59c; 10 for \$5.45

200 tubular Littelfuses, from 1/2 amp. to 30 amps.; assorted as to popular usage. Auto. and Home Radio, Amplifier, and Instrument types included. = 642 Assortment. \$4.95

Continental Bakelite Suppressors—S19A (Straight type with Rajah spring snap-on connector, fits all makes of spark plugs; Terminal nut cable connector).Each, 18c; 10 for \$1.65

GENERATOR CONDENSER—Universal type with six inch lead. .5 MFD 200 WV. Each, 18c; 10 for \$1.65

HI-TEMP RUBBER PUSH BACK WIRE—Solid and Stranded (#20). 100 Ft. Roll, 71c; 10 for \$6.50

Assortment of 46 First Line Tubular Electrolytic Condensers most frequently used, consisting of 1 100MFD 25WV, 2 10MFD 50WV, 15 20MFD 150WV, 8 20-20MFD 150WV, 6 50MFD 150WV, 10 10MFD 450WV and 4 10-10MFD 450WV. One Year Guar. Your cost only \$18.95

Rola 8" Auto Spkr. 6 Ohm Field, Copper Hash Buckler plate. A Beautiful Job. Delco Part No. 7242532.Each, \$1.15; Lots of 16, 99c each

LOCTAL SOCKETS—(Metal Supporting Ring). 10 for \$1.10; 100 for \$9.99

10 MFD 50 WV Tubular Pigtail Electrolytic Condenser. One Year Guar.Each, 28c; 10 for \$2.45

10x10/450 WV Tubular Electrolytic. First Line Condenser. One Year Guarantee.Each, 74c; 10 for \$6.90

Assortment of 25 Muter Candohm Wire Wound Resistors (all are 7 to 15 W, 15 or more are between 100 and 500 ohms).....Assortment, \$4.99

20% deposit required on all C.O.D. orders. Don't forget L-265 or AA-3 Certificates. Orders of \$25.00 or more, accompanied by payment in full, will be shipped prepaid.

Free Bulletin No. 1206 lists hundreds of other radio parts and supplies. Write for it today!

NATIONAL ELECTRONIC SUPPLY

77 W. Washington Blvd. Chicago 2, Ill.

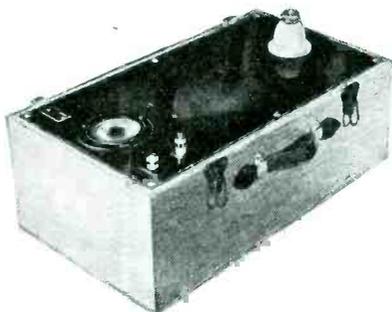
cast. The critical air column exponential expansion areas are said to be held to $\pm .005$.

Bell diameter 7"; overall length 7 1/2"; voice coil in pedance, 16 ohms; power 15 watts. Shipping weight, 6 lbs.

* * *

SHALLCROSS PORTABLE KILOVOLT METER

A portable 2-scale d-c kilovoltmeter, covering 0-2 kv and 0-20 kv, has been announced by the Shallcross Manufacturing Company, Jackson & Pusey Avenues, Collingdale, Penna. The unit, type 772, is assembled in a portable oak cabinet with carrying handle.



* * *

DU MONT WIDE-RANGE OSCILLOGRAPH

A portable oscillograph, type 248, has been announced by Allen B. Du Mont Laboratories, Inc., Passaic, N. J.

The instrument is said to be suitable for lab or production-test purposes. Composed of two units, oscillograph and power supply, connected by a 6-foot plug-in shielded cable. Power supply weighs 80 pounds; oscillograph, 30 pounds. Units each measure 14"x18"x21".

Instrument reproduces either transient or recurrent phenomena. Also accommodates phenomena of inconstant repetition rate. Leading edge of short pulses is not obliterated. Accelerating potential applied to cathode-ray tube is said to be great enough to permit study of extremely short pulses with low repetition rates.

Among the other features of this oscillograph are: wide-band vertical axis amplifier usable to 10 mc; delay network in vertical channel, permitting observation of entire wave shape of short-duration phenomena; timing oscillator for quantitative analysis; trigger output signal for *synchroscope* applications.



Stabilized COMPOSITION ELEMENT CONTROLS



featuring...

- ★ Clarostat *stabilized* element—a glass-like resistance coating permanently bonded to bakelite supporting ring.
- ★ Extreme immunity to humidity, temperature and other climatic variations.
- ★ Split-finger contact rides smoothly over glass-like surface of resistance element. Positive contact at all settings. Minimized noise.
- ★ Minimum wear due to self-lubricated element and special alloy contact. Smoothest rotation.
- ★ Rated at 1 watt. Resistance values of 500 ohms to 5 meg-ohms. Tapers.

★ Results speak. Servicemen and maintenance workers have promptly spotted something definitely better in non-wire potentiometers and rheostats, when using the present Clarostat midget composition-element controls. The *stabilized* element sets new standards of performance. Don't take our word for it. Just try one of these *stabilized-element* controls for yourself.

★ Consult our jobber ...



CLAROSTAT MFG. CO., Inc. - 285-7 N. 6th St., Brooklyn, N. Y.

ORGANIZE YOUR
PAPER WORK

SYLVANIA SERVICEMAN SERVICE

by
FRANK FAX



SYLVANIA offers you ready-made forms, imprinted with your name, at cost, to streamline your paper work.



THREE-IN-ONE SERVICE FORM. A complete job record for your files; customer's invoice, guarantee, and imprinted follow-up cards; all in one handy form, perforated for easy use. 100 for \$1.50; 250 for \$2.50; 500 for \$5.00.

JOB RECORDS. Customer's record and receipt, imprinted, and a complete job record for your files. 100 for \$1.00; 250 for \$1.75; 500 for \$3.00.



CIRCUIT CHANGE WARNING
Card detailing wartime emergency circuit

changes and tube substitutions for your files, to be attached to customer's set for future reference, imprinted and perforated for easy use. 100 for \$1.00; 250 for \$1.75; 500 for \$3.00; 1000 for \$5.00.



BUSINESS RECORD BOOK. A simple week-by-week bookkeeping system, specially designed for your business. Used with Three-in-One Service Forms, it gives you complete business records for tax and other purposes. \$1.00.

Send your order to your Sylvania jobber or to Frank Fax, Sylvania, Emporium, Pa.

SYLVANIA
ELECTRIC PRODUCTS INC.
RADIO DIVISION

JOTS AND FLASHES

DEATH of big affable Dan Fairbanks a severe shock to the entire radio industry . . . nationwide survey shows that 58% of women in the country want radio sets for the kitchen . . . a big potential market for you *servicers* . . . Radio Corp. of America celebrates 25th anniversary this month . . . congratulations . . . Sy Wolin, sales manager of Solar Capacitor Sales Co., proud dad of new baby girl . . . boy baby born late in September to proud parents Mr. & Mrs. Howard (Mallory) Sams . . . congratulations to Electronic Corp. of America on earning Army-Navy "E" award . . . ditto Oak Mfg. Co. and the Packard-Bell Co. . . . Bendix Aviation appoints A. A. Kucher, director of research, vice-president . . . Russell H. Lasche appointed director of engineering and research by Fairchild Camera and Instrument Corp. . . . RMA Parts Show planned for 1945, depending on German collapse, during or before next April . . . time, place, etc., left for future determination . . . Lenz Electrical Mfg. Co. of Chicago celebrates its 40th anniversary . . . sorry to hear of death of Jack Price, long a radio manufacturers representative in New York.

ADVERTISERS IN THIS ISSUE SERVICE INDEX—OCTOBER, 1944

AEROVOX CORPORATION	32
Agency—AUSTIN C. LESCARBOURA & STAFF	
AMERICAN CONDENSER CO.	36
Agency—MICHAEL F. MAYGER	
AMPERITE CO.	28
Agency—H. J. GOLD CO.	
L. S. BRACH MFG. CORP.	26
Agency—UNITED ADV. AGENCY	
BURLINGAME ASSOCIATES	40
Agency—HART LEHMAN, ADVERTISING	
BURSTEIN-APPLEBEE CO.	38
Agency—FRANK E. WHALEN ADV. CO.	
CITY RADIO CO.	26
CLAROSTAT MFG. CO., INC.	39
Agency—AUSTIN C. LESCARBOURA & STAFF	
CONCORD RADIO CORP.	34
Agency—SHAPPE-WILKES INC.	
CORNISH WIRE CO.	32
Agency—HART LEHMAN, ADVERTISING	
DUMONT ELECTRIC CO.	28
Agency—A. ROTHSCHILD	
ELECTRO-VOICE MFG. CO., INC.	33
Agency—SHAPPE-WILKES INC.	
GENERAL CEMENT MFG. CO.	36
Agency—TURNER ADV. CO.	
GENERAL ELECTRIC	37
Agency—N. W. AYER & SON, INC.	
THE GENERAL INDUSTRIES CO.	29
Agency—FULLER & SMITH & ROSS, INC.	
HALLICRAFTERS CO.	1
Agency—BURTON BROWNE, ADVERTISING	
HAZELTINE ELECTRONICS CORP.	32
Agency—EQUITY ADV. AGENCY	
HICKOK ELECTRICAL INSTRU. CO.	27
Agency—WHITE ADV. AGENCY	
HYTRON CORP.	Inside Front Cover
Agency—HENRY A. LOUDON—ADVERTISING	
INTERNATIONAL RESISTANCE CO.	7
Agency—THE LAVENSON BUREAU	
JENSEN RADIO MFG. CO.	19
Agency—BURTON BROWNE, ADVERTISING	
J.F.D. MFG. CO.	30
Agency—MITCHELL ADV. AGENCY	
KEN-RAD TUBE & LAMP CORP.	35
Agency—ALLEN, HEATON & McDONALD, INC.	
McELROY MFG. CORP.	38
Agency—SHAPPE-WILKES INC.	
MAGAZINES, INC.	36
M. V. MANSFIELD CO.	38
JOHN MECK INDUSTRIES	15
Agency—WESTERN ADV. AGENCY, INC.	
MEISSNER MFG. CO.	21
Agency—GARDNER ADV. CO.	
NATIONAL ELECTRONIC SUPPLY	39
NATIONAL UNION RADIO CORP.	Back Cover
Agency—HUTCHINS ADV. CO., INC.	
OHMITE MFG. CO.	37
Agency—HENRY H. TEPLITZ, ADVERTISING	
RADIART CORP.	34
Agency—KENNETH H. KOLPIEN	
RADIO CITY PRODUCTS CO., INC.	25
Agency—REISS ADVERTISING, INC.	
RADIO & TECHNICAL DIV.	
MURRAY HILL BOOKS, INC.	17
Agency—THE HARRY P. BRIDGE CO.	
RADIO CORPORATION OF AMERICA	10, 23
Agency—KENYON & ECKHARDT, INC.	
RAYTHEON MFG. CO.	3
Agency—BURTON BROWNE, ADVERTISING	
JOHN F. RIDER PUBLISHER, INC.	24
Agency—LANSFORD F. KING	
SOLAR CAPACITOR SALES CORP.	Inside Back Cover
Agency—O. S. TYSON & CO., INC.	
SPRAGUE PRODUCTS CO.	4
Agency—THE HARRY P. BRIDGE CO.	
STANDARD TRANSFORMER CORP.	28
Agency—BURNET-KUHN ADV. CO.	
SUPREME INSTRUMENTS CORP.	30
Agency—O'CALLAGHAN ADV. AGENCY, INC.	
SYLVANIA ELECTRIC PRODUCTS INC.	40
Agency—ARTHUR KUDNER, INC.	
TRIPLETT ELECTRICAL INSTRU. CO.	5
Agency—WESTERN ADV. AGENCY, INC.	
U. S. TREASURY DEPT.	8
UNITED TRANSFORMER CO.	31
Agency—SHAPPE-WILKES INC.	
UNIVERSAL MICROPHONE CO.	6, 30
Agency—RALPH L. POWER AGENCY	
VAUGHAN CABINET CO.	38
Agency—PAUL GRANT, ADVERTISING	
WESTON ELECTRICAL INSTRUMENT CORP.	9
Agency—G. M. BASFORD CO.	

Got Any
**LAME
DUCKS?**



Try Our
INSTRUMENT

REPAIR SERVICE

Hard to get new testing instruments? Let our well-equipped Service Shop put your instrument in tiptop condition. For the duration. All makes; all repairs by experts.

PRECAUTION—Before you ship, be sure to tell us make, model and serial number, also age of instrument, and what's wrong . . . thank you.

Authorized Supreme Service Station

BURLINGAME
ASSOCIATES

Service Division 34

11 Park Place New York 7, N. Y.

ACTUAL
SIZE



Select a "SEALDTITE"

9
CAPACITIES
ALL 600 VW

**WHEN YOU NEED
A PAPER TUBULAR CAPACITOR**

To meet the demands for a capacitor that will stand up under *all* climatic conditions, SOLAR has designed the "Sealdtite." It is the only WAX MOLDED paper tubular available. Standardize on "Sealdtite 600" tubular for safety and convenience!

Catalog Number	Capacity Mfd.	Dimensions, Inches		List Price
		Diameter	Length	
S-0203	.00025	3/8	1-3/16	\$.20
S-0211	.001	3/8	1-3/16	.20
S-0212	.002	3/8	1-3/16	.20
S-0215	.005	3/8	1-3/16	.20
S-0221	.01	7/16	1-3/16	.20
S-0224	.02	7/16	1-5/8	.20
S-0230	.05	9/16	1-5/8	.25
S-0240	.1	9/16	2-1/8	.30
S-0257	.25	3/4	2-3/16	.45

Solar **SOLAR** CAPACITORS



SOLAR CAPACITOR SALES Corp., 285 MADISON AVE., NEW YORK 17, N. Y.

SOLE NATIONAL DISTRIBUTORS OF SOLAR CAPACITORS TO THE JOBBING TRADE

Life Testing ON THE GRAND SCALE!



One of the most elaborate cathode-ray tube test racks in this country operates day and night, seven days a week at National Union. For, at N. U., cathode ray tube production is now reaching heights undreamed of in pre-war days. To achieve this production, entirely new testing techniques, on an unprecedented scale, have been developed.

Examples of the newest tried and proven products of National Union manufacture are the four cathode-ray tubes illustrated. All of these N. U. cathode ray types can be produced in a

variety of screen materials, which will have various post-war applications in television and industrial electronics.

Here at National Union are many such ultra-modern products ready for the greater post-war service and replacement needs of your customers. N. U. Tubes for television, FM, AM, receivers, transmitters, and many new household conveniences. Ready from the day our present obligations are fulfilled and reconversion can get under way. Count on National Union.

NATIONAL UNION RADIO CORPORATION, NEWARK, N. J.
Factories: Newark and Maplewood, N. J.; Lansdale and Robesonia, Pa.

NATIONAL UNION RADIO AND ELECTRONIC TUBES



Transmitting, Cathode Ray, Receiving, Special Purpose Tubes • Condensers • Volume Controls • Photo Electric Cells • Panel Lamps • Flashlight Bulbs