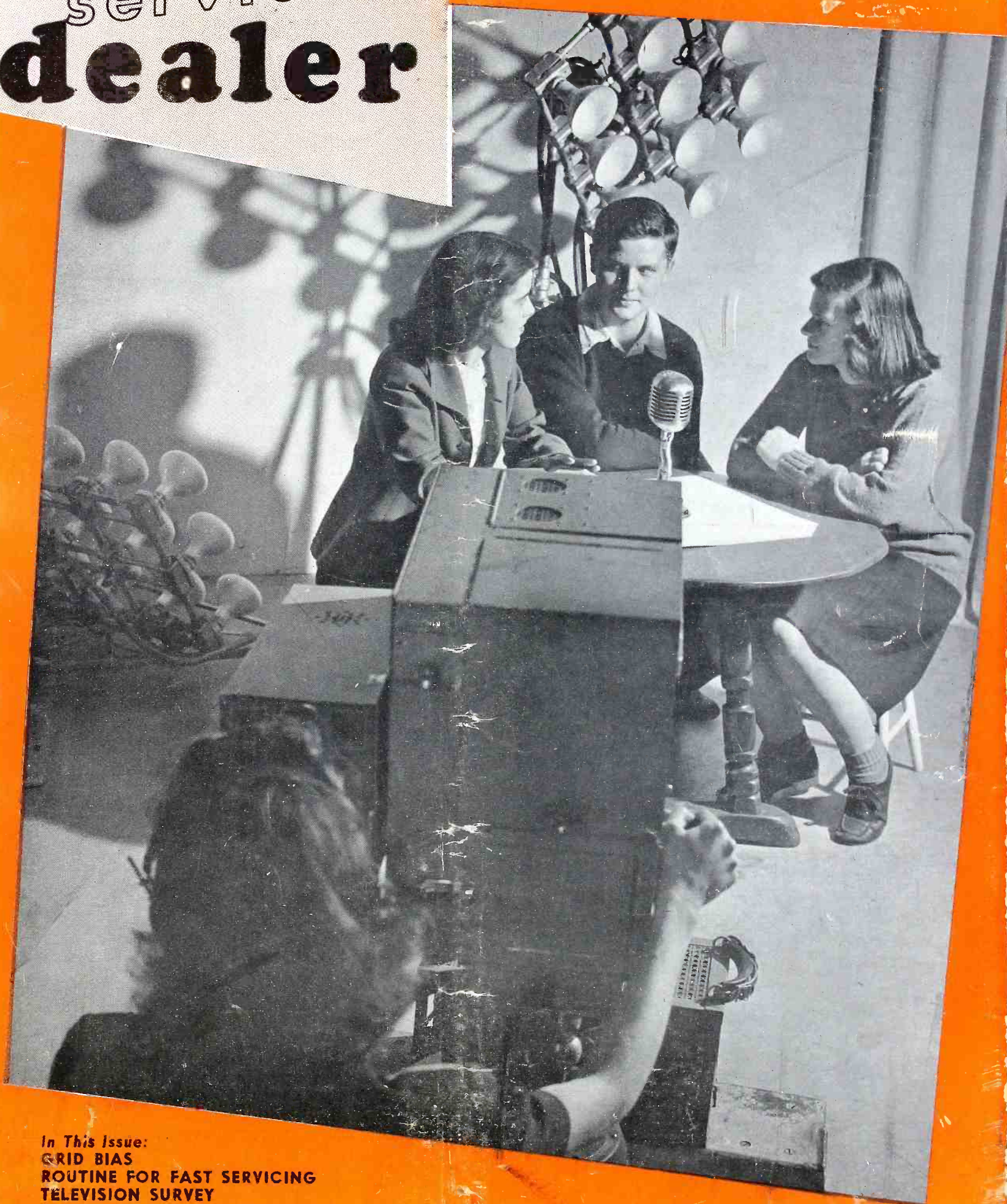


AUGUST 1946

# radio service dealer



*In This Issue:*  
GRID BIAS  
ROUTINE FOR FAST SERVICING  
TELEVISION SURVEY  
APPLIANCE & RADIO FINANCING



# SYLVANIA NEWS

## RADIO SERVICE EDITION

AUG. Published by SYLVANIA ELECTRIC PRODUCTS INC., Emporium, Pa. 1946

**SYLVANIA  
SERVICEMAN  
SERVICE**

by  
**FRANK FAX**



### NEWS OF VALUABLE TECHNICAL AIDS FOR SERVICEMEN

Because of the many ways that Sylvania Electric is able to—and does—help the radio serviceman, you will find that handling Sylvania tubes means *extra* profits for you.

For instance, there is a long list of business and technical aids, compiled specially for you by experts in their fields. Included in this valuable material are two of the latest Sylvania technical helps, the SYLVANIA RADIO TUBES CHARACTERISTICS booklet and the SYLVANIA BASE CHART.

Make sure you have these up-to-the-minute aids to better servicing. They will give you accurate characteristics and base diagrams for all the Sylvania Electric radio receiving tubes. Give your customers the most satisfactory service. Feature the famous Sylvania line of radio tubes. That deal is the best deal for you.

Obtain your copies of the aids shown at the right from your Sylvania distributor, or write directly to me at Sylvania Electric, Emporium, Pa.

**LATEST REVISED TUBE  
CHARACTERISTICS BOOKLET**



**SYLVANIA  
RADIO TUBES  
Characteristics**

**SYLVANIA BASE CHART**

*Now!  
get these valuable  
technical  
aids -*

**HANDY "PIN-UP"  
SYLVANIA BASE CHART**

# SYLVANIA ELECTRIC

Emporium, Pa.

MAKERS OF RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS





## IF-37 FILTERS

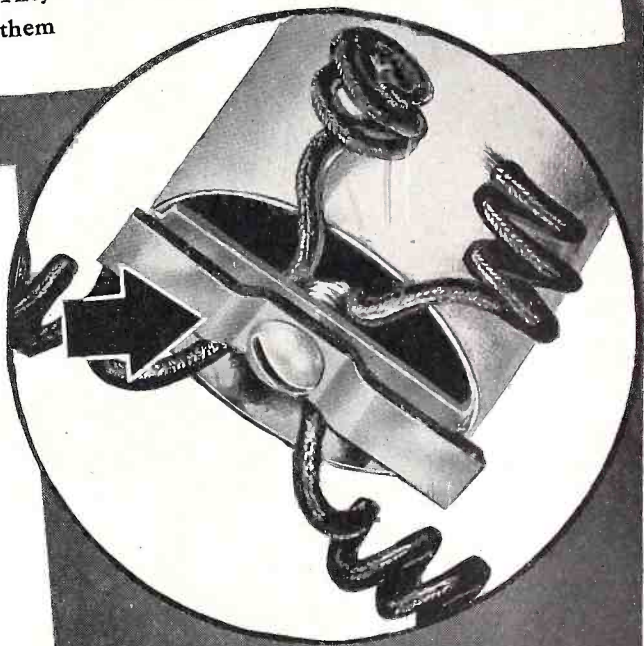
Only \$1.11 each  
NET

# IT TAKES RADIO NOISES OUT OF FLUORESCENT LAMPS

Sprague IF-37 Filters are specifically designed for fluorescent lamp interference suppression. They offer the most effective way to suppress "hard-to-stop" interference conducted down the power line to remotely located receivers. One filter is required for each auxiliary. They are installed simply by connecting them

directly to each fixture across the incoming leads.

*Note to Radio Dealers:* Install Sprague IF-37 Filters on every fluorescent light in your own store to suppress noise for better, quieter radio and television demonstrations!

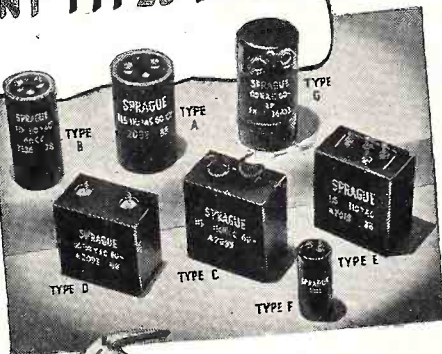


## A NEW SPRAGUE ATOM

Handiest, most convenient dry electrolytic capacitor for vertical chassis mounting!

In Type LM Universal Mounting Replacements, Sprague offers a new Atom dry electrolytic which can be mounted in any position to replace inverted can, spade-lug or similar vertical-mounting capacitors. Equipped with special mounting devices to replace screw type can mounting, LM Atoms fit any chassis hole from 3/16" to 7/8" diameter. Their separate positive and separate negative leads can be connected together to get common positive or negative sections. Because they prevent section-to-section electrolysis, they are especially recommended to replace old common positive condensers. Like all Sprague Atoms, Type LM Capacitors are made with famous Sprague etched foil and are completely sealed and moisture-proofed.

THESE ARE ALL THE  
MOTOR-START CAPACITOR  
REPLACEMENT TYPES I EVER  
NEED!



## MAKE MONEY ON REFRIGERATOR REPAIR JOBS

When you've repaired the radio . . . why not repair the refrigerator, too? Make one trip pay for two jobs! Use these Sprague Universal Motor-Start Capacitors for every motor starting need. The seven shown here are all you'll require. They're always in stock . . . quick, easy to install . . . and absolutely dependable! They always fit—the terminals are right for quick installation. For details on how to select the exact unit needed for any standard motor, write for Sprague booklet: "A NEW COMPLETE STORY ON MOTOR STARTING CONDENSERS." It's free!

WRITE for new  
Sprague Catalog

# SPRAGUE PRODUCTS COMPANY

NORTH ADAMS, MASSACHUSETTS

Jobbing Distributing Organization for Products of the Sprague Electric Co.



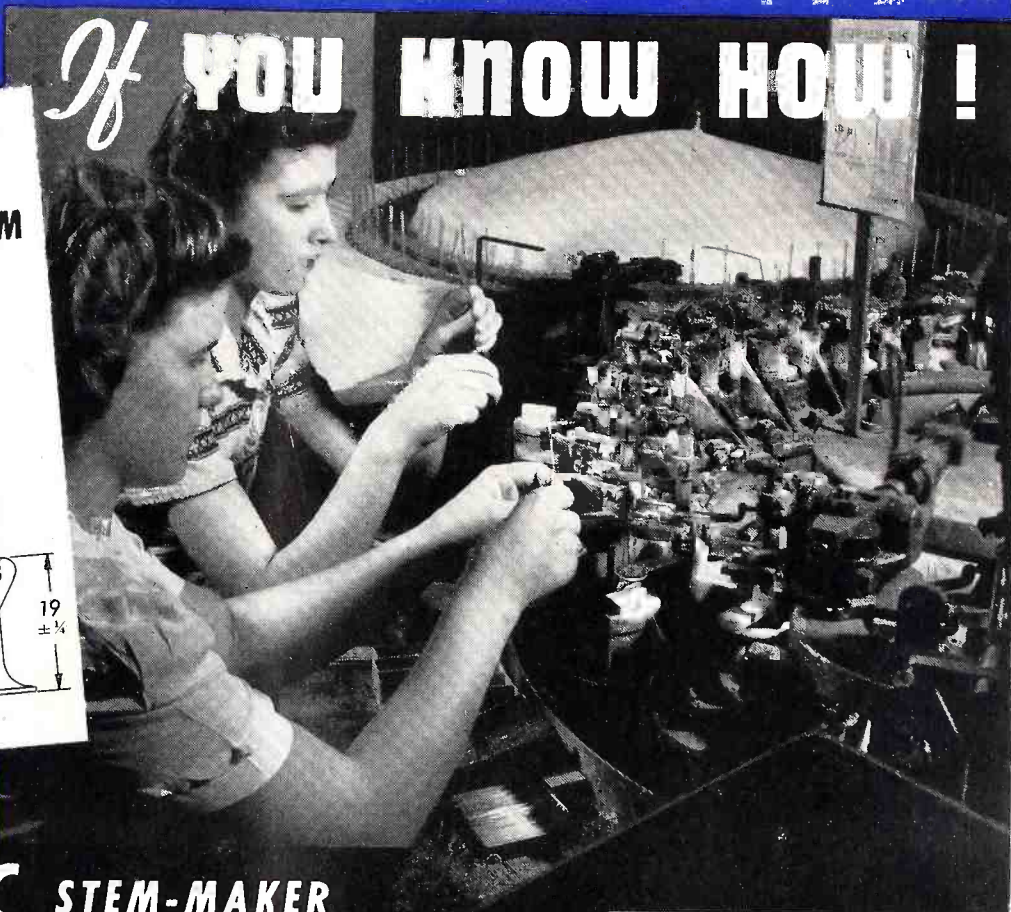
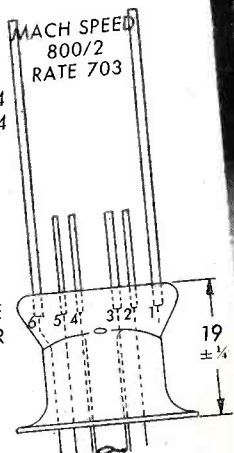
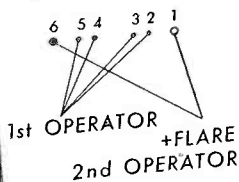
# MAKING TUBES IS EASY...

If YOU KNOW HOW!

**STEM 35Z5GT-45Z5GT  
FLARE 19X24 42A1-A2  
EXHAUST TUBE #18BX101MM**

WELDS:

- #1 3048-163
- #2-5 2013-1612-2054
- #6 3048-1612-2054



## AUTOMATIC STEM-MAKER

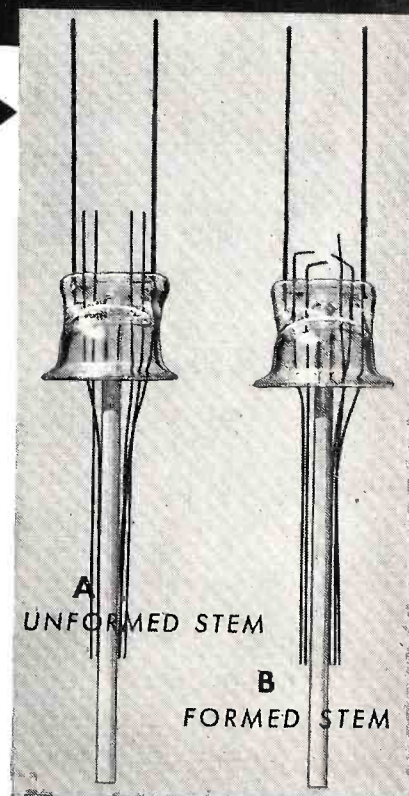
GIVES YOU MORE AND BETTER TUBES

Making a radio tube stem is apparently easy. By gas flames, one merely seals stem wires and exhaust tube into a glass flare. High-speed production, however, raises problems of know-how. Expert adjustment of temperatures and timing is vital. To give you trouble-free performance, there must be absence of glass malformation, strains, cracks—air-tight wire seals—strict adherence to dimensions.

Two girls produce daily 5600 35Z5GT stems on the illustrated stem-maker—essentially a rotating steel turret with 25 automatically indexing heads. Working as a team, they insert into a jig the 6 stem lead wires, and drop over them the glass flare. Each stem wire is fabricated of butt-welded nickel (for support), dumet (for glass seal), and copper (for connection). The exhaust tube is automatically inserted. Gas flames gradually melt and form the flare at 13 consecutive positions—at 2 positions, jaws press and seal stem wires into the flare.

Compressed air blows clear the exhaust tube inlet. The stem is lifted automatically into the rotating annealer. Strains vanish as distorted glass molecules resume normal positions. The annealed stem rolls onto the inspector's table. A stem former cuts, shapes, and nicks its wires to support the 35Z5GT's internal elements.

As you watch these intricate operations, you are impressed by controlled quality at high speed. Again you realize the know-how built into millions of Hytron tubes pouring out to you.



SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921



# HYTRON

RADIO AND ELECTRONICS CORP.

MAIN OFFICE: SALEM, MASSACHUSETTS





# radio service dealer

Member Audit Bureau of Circulations  
Covers all phases of radio,  
phonograph, sound and elec-  
trical appliance mer-  
chandising and servicing

VOLUME 7 Number 8

AUGUST, 1946

## CONTENTS

In & Around the Trade .....	4
With the Publisher .....	6
Men in the News .....	9
This Licensing Ordinance Works .....	11
Business Conditions .....	11
How is Your Grid Biased? .....	12
Self-Service Preferred .....	13
Distortion—II .....	16
Routine for Fast Servicing .....	18
Appliance and Radio Financing .....	20
Sound Amplification .....	22
Merchandise Pre-Views—16 .....	25
10 Million Television Receivers Wanted .....	26
Circuit Court .....	30
Shop Notes .....	35
Retail Tube Prices .....	36
The Cover: Youngsters put on tele- show in Chicago school, in coopera- tion with Radio Manufacturers As- sociation. See also page .....	26

RADIO SERVICE DEALER (title registered U. S. Pat. Off.) is published monthly at Boston Post Road, Orange, Connecticut, by the Cowan Publishing Corp. Executive & Editorial Offices, 342 Madison Avenue, New York City 17, New York. Publication Office, Boston Post Road, Orange, Conn. Subscription rates:—United States and Possessions \$2.00 for 1 year, \$3.00 for 2 years; elsewhere \$3.00 per year. Single copies: 25c. Printed in U. S. A. Entered as Second Class Matter at the Post Office at Orange, Connecticut, under the Act of March 3, 1879. All subscribers should allow at least three weeks for change of address. Copyright, 1946

COWAN PUBLISHING CORP.  
**SANFORD R. COWAN,**  
Publisher

**LEWIS C. STONE**  
Editor

S. L. MARSHALL, Asst. Technical Editor  
H. N. REIZES, Adv. Mgr.  
JEAN M. WHEELER, Circl. Mgr.  
DAVID SALTMAN, Adv. Prod. Mgr.

### Branch Offices

HAROLD J. SUGARMAN, Western Adv. Mgr.  
82 W. Washington St., Chicago 2, Ill.,  
ANDover 1395

JAMES C. GALLOWAY, Los Angeles Adv. Rep.  
816—W. 5th St., Los Angeles 13, Calif.  
Mutual 8335

# YOU CAN PROFIT

*from War Surplus*

## ELECTRONIC EQUIPMENT and COMPONENT PARTS

HERE'S your opportunity to get into the war surplus disposal business...on a profitable basis. Whether you're a retailer, wholesaler or manufacturer, this Raytheon catalog makes it *easy and convenient* to select, order and get delivery on the merchandise you want. It's just like ordering regular commercial merchandise from a wholesaler or manufacturer.

And make no mistake about this: all this material is *salable merchandise*—carefully segregated from scrap-and-

salvage items. It's all electronic gear made for the Army and Navy by America's finest electronic manufacturers. And it's all in the catalog—described—indexed—priced—easy to find and easy to order.

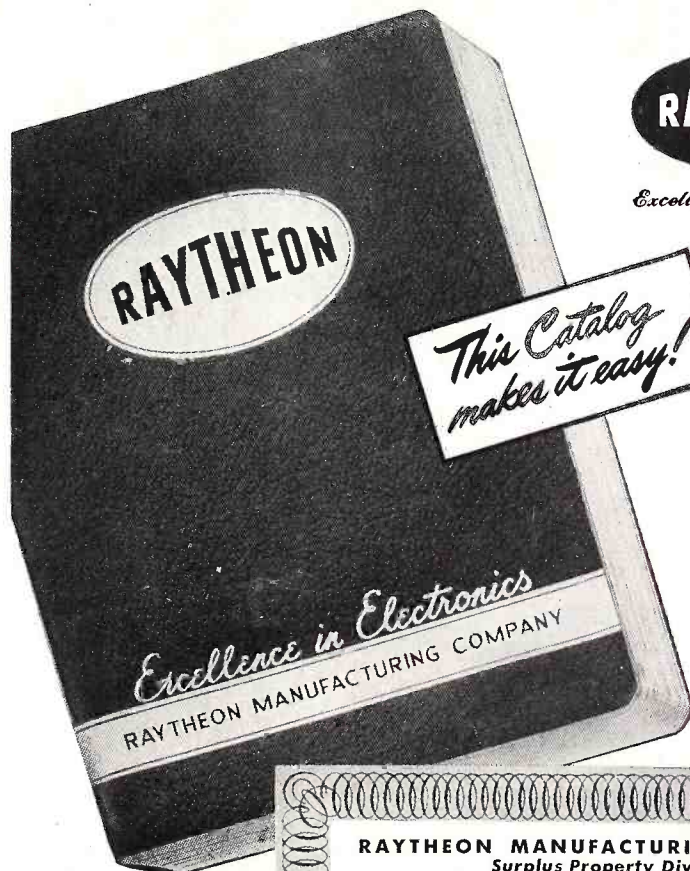
It's the most complete, most usable, most informative catalog of war surplus electronic equipment yet offered! Send for it at once—that's the first step. Then get in touch with Raytheon for technical advice and merchandising plans for speedy action.

### RAYTHEON MANUFACTURING COMPANY

Acting as Agent of the War Assets Administrator Under Contract No. STA-3-46

60 East 42 Street, New York 17, N. Y.

West Coast Office: 2802 N. Figueroa St., Los Angeles, Cal.



*Excellence in Electronics*

**SEND FOR  
CATALOG  
TODAY**

#### RAYTHEON MANUFACTURING COMPANY Surplus Property Division

60 East 42nd Street, New York 17, N. Y. RSD-8

GENTLEMEN: Send your new Catalog of war surplus electronic equipment to

Name .....

Company .....

Street Address .....

City.....Zone.....State.....



# In & Around the Trade

Being a condensed digest of production, distribution and merchandising activities in the radio and appliance trade.



Governor Thomas E. Dewey gets "house prize" of G-E self-charging portable radio receiver, as he visits site of "Electronics Park", new General Electric plant in Syracuse, N. Y. Presentation is made by Dr. W. R. G. Baker (right), vice president in charge of Electronics Department.

## Radio Service Centers

Establishment of centers in New York City, Los Angeles, Seattle, Pittsburgh, Chicago and Butler, Missouri, for the checking, repairing, and servicing of Hallicrafters amateur, home, aircraft and marine radio equipment, is announced by Rollie Sherwood, sales manager of the company. With complete stock of parts for replacement to facilitate prompt and inexpensive maintenance, the centers will be manned by personnel who have been selected on the basis of ability to check, repair and realign all models.

## "Preventive" Service

Nate Hast announces appointment of H & S Distributing Co., of Philadelphia, Pennsylvania, as distributor for Lear Home Radios in that territory. Art Gerbig, sales manager, states that on his sales staff is a radio engineer (or more than one, when necessary).

The duty of this radio engineer is to follow each shipment of Lear Home Radios made to H & S dealers, and check every radio after its arrival in the store. The dealers have instructions not to sell any set before it has received the approval of the trained engineer, whose arrival is so timed that there is no delay between arrival of sets and their availability to the public.

"From my quarter century of experience in selling radios," Mr. Hast said, "I know that most of the ill-will that has been developed against radios is just the result of negligence. No matter how well a set is constructed, the handling that it gets between factory and the customer's hands is terrific. After all, a radio is one of the most delicate of instruments, and cannot stand such rough treatment without occasional breakdowns. Mr. Gerbig's method of overcoming such possible breakdowns will pay off heavily in the additional goodwill that it creates for

the retailer, for the distributor, and the manufacturer and the industry as a whole. I certainly hope that others will take this suggestion to heart and do something like it."

## Western Radio and Appliance "Trade Dinner"

Once again to a "capacity house", as for many years before the war, the semi-annual Western Radio and Appliance "Trade Dinner" will present distinguished speakers of national prominence and an unexcelled entertainment program, according to an announcement by George A. L'Amoreaux, promotion manager of the Western Merchandise Mart, 1355 Market St., San Francisco. This feature event of the Fall Market in San Francisco was held August 7, on the ninth floor of the Mart.

Raymond C. Cosgrove, of Cincinnati, Ohio, the newly reelected president of the Radio Manufacturers Association, and vice president and general manager of The Crosley Corporation, will address the maximum capacity audience of one thousand members of the trade on the subject of "Your Radio Business".

With over 1200 manufacturers listed, and with a printing order for over 25% more copies than ever before, the largest Buyers Book and Directory in the history of the Western Merchandise Mart is being published for the Western Fall Market — held in San Francisco August 5 through 10.

## Olson News

Olson Radio Warehouse announces the second issue of the *Olson News*. A full year's subscription is available to all radio servicemen. All radio men wishing to be placed on the mailing list should forward their name immediately, so that they can be sure of getting every issue without fail.

## Surplus Disposal

Special research laboratories, designed to develop new adaptations for radio and electronics equipment originally produced for the armed forces, have become an integral part of the working organization of more than 200 radio and electronics manufacturing concerns which are implementing the RFC's program for disposal of the materials.

With estimates of the amounts of equipment to be disposed of ranging between 3 and 5 billion dollars, RFC has enlisted the support of 225 manufacturers to act as distributing agencies for the units and to devise new methods for their use.

The necessity for the special laboratories has been pointed up by the fact that much of the radio and electronics



equipment was originally produced to meet complex military specifications, which make them unsuitable in their present form for private industry use. Some of the radio and radar equipment, for example, had specifications calling for a four-foot drop without injury, the ability to withstand the shock and repercussions from 16 inch guns, and tropicalization, none of which are required by civilian consumers.

In the laboratories ways are being developed to apply the units to peacetime uses. Many of the parts already have been prepared for use in previously undreamed of channels. Among the adaptations worked out by industry and RFC technicians are garden umbrella holders, which have been made from antenna mast sections; aids in seeking buried treasure developed from hand-carried mine detectors; curtain or portieres rods that formerly were part of ground rods; flag poles from tubular steel and plywood antennas, and many others.

Already many millions of dollars worth of new and used radio and electronics equipment for use in the peacetime aviation, marine, utility and other industries are in the hands of manufacturer-agents for sale to civilian outlets. Such items as sound equipment for ship call systems, ship-to-shore telephones, two-way ground-to-plane and plane-to-plane communications sets, plane inter-phone equipment, emergency power generators, and a variety of component parts are a few of the units now available for civilian use.

### Experimental Tele Station

For the purpose of aiding designers and manufacturers of new television receivers and to facilitate the rapid conversion of DuMont and other makes of television receivers in the field from the old Channel 4 (78-84 mc.) to the new Channel 5 (76-82 mc.), DuMont television station WABD and its experimental station W2XWV will begin regular broadcasting schedules of test patterns daily on January 2.

Samuel H. Cuff, General Manager of WABD, announced that the test pattern schedule to be maintained for an indefinite period is from 10 a.m. to 12 noon and from 2:30 p.m. to 5 p.m., five days a week, Monday through Friday.

### Hytron Acquires

Announcement is made jointly by Bruce A. Coffin, President of Hytron Radio & Electronics Corp., and J. P. Lieberman, President of Air King

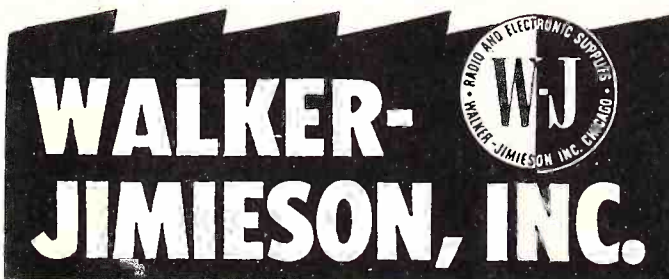
[see page 37]



1. VOLTAGE TRANSFORMER 2. VOLTAGE CONTROL 3. RECTIFYING TUBE

## DEPEND UPON W-J FOR YOUR *Radio and Electronic Supplies*

"GETTING THE GOODS" is a highly developed specialty here at W-J! Our procurement experts are well known, well liked among manufacturers, and well trained in the job they have to do. That's why *W-J Emergency Service* is rapidly becoming the sole source of supply for more and more industrial buyers of Radio and Electronic parts and equipment. If you need speedy, intelligent, *friendly* cooperation . . . an organization well qualified and equipped to serve you better, mail or wire your orders to us. We'll consider them as merchandise needed in an emergency.



DEPT. R. 311 SO. WESTERN AVE., CHICAGO 12, ILL.



Gentlemen: Please send me your new 100 page Reference Book and Buyer's Guide, FREE.

COMPANY: .....

ADDRESS: .....

INDIVIDUAL: .....



# with the publisher.....

## Industrial Radio-Communications

NETWORKS of two and three-way radio telephone systems are being installed in several parts of the country and several impressive ship-to-shore radio installations for the yachting enthusiast are already in operation. They portend good news for the technically competent Service Dealer who is desirous of broadening his field of operations.

In the near future many thousands of radio-equipped trucks, taxis and cars will be commonplace. Of course, there will also be many state and city law enforcement radio-equipped cars. Then, of the eight hundred thousand pleasure craft, not to mention commercial shipping, and the fifty thousand private airplanes which will find some type of radio communications or safety device installation a vital adjunct, a fair share will undoubtedly make a purchase as soon as the equipment is available.

Not only does the Service-Dealer look like the logical seller and installer of such apparatus, but in addition he'll handle the considerable volume of maintenance work involved. Mobile radio equipment installation fees vary from fifty to a hundred and fifty dollars per unit, depending upon the number of units to be installed and the character of the specific installation; and maintenance fees vary from ten to a hundred dollars a year per unit in addition to the cost of required replacement parts.

It's a nice, new, highly profitable business to have in addition to normal retail-servicing of home radios. The trick, of course, is to know your high frequencies and how to lick the always-present "bugs" in such circuits. A thorough knowledge of the workings of transceiver rigs that operate in the 25-162 Mc. range will prove to be valuable.

## Shooting the Breeze

LETTERS reaching this desk in ever-increasing volume complain about the bad judgment of radio distributors who have signed franchises for their lines with newly organized appliance and specialty stores rather than old, established radio outlets. Many distributors are new in this field which accounts for their faulty selection or "bad judgment."

The mortality rate among newly established retailing firms has been very high so a reshuffling of

dealerships is taking place. Service-Dealers should get proper recognition from distributors or the latter will learn "the hard way" about their error.

While radio set production is higher than ever before, it is true but not generally known that the shortage of "name brands" is due to the fact that the bulk of recently-made sets have been exported. Most dealers have a few display models but not enough to allow sales on an immediate-delivery basis. Production of console sets has been negligible—is just starting. Inferior, too highly priced set lines offered by many new manufacturers are fast becoming a drug on the market and now are being offered at slashed prices. It's proof that the public insists on better values.

With the revised OPA becoming effective conditions look brighter. Production of "name brands" for domestic sale will improve. It is time for Service-Dealers to review their franchise commitments. They should select lines that include F-M and phono-combination console models.

## Parts Shortages

THE demand for replacement parts and tubes needed to repair the almost 30,000,000 defective radio sets now in homes around the country has increased far beyond manufacturers' ability to deliver. Consequently jobbers are doing their best to ration available supplies. Test equipment production is improving and that is a boom to Service-Dealers who have been forced to work with obsolete and in-need-of-repairs instruments, and who need modern test apparatus badly. The tube situation is tight as the few manufacturers still have huge back-logs of orders unfilled.

We look for increased prices in all phases of the radio game due in great part to increased production costs because of man-power and raw material shortages rather than to the desire on the part of manufacturers for larger profits. Production costs have sky-rocketed because parts shortages have stopped production runs, and it takes big runs to lessen overhead, reduce costs. At least, under the new OPA, dealers won't have to pay, out of their pockets, for the government's price-control bungling and consequent production slow-down.

*S. R. Lowan*  
Publisher



# 1,000,000 Portable Radio Sets Waiting... ...Plenty of "Eveready" Batteries for Them!

● Every dealer knows that production of new portable sets will be a long time "catching up." Yet . . . of 5,000,000 *modern* portables made since 1939 . . . 2,000,000 were still in service at the last check. And another 1,000,000 were out of use—chiefly because of lack of batteries or need of minor repairs!

You can cash in now on the hundreds of such ready-made prospects who are right in your own territory—because you can get "Eveready" "Mini-Max" "B" batteries and "Eveready" "A" batteries NOW!

Answer this demand . . . get an order to your distributor. Summer and fall are the *best seasons for portables*—and "Eveready" portable radio batteries!

*The registered trade-marks "Eveready" and "Mini-Max" distinguish products of National Carbon Company, Inc.*

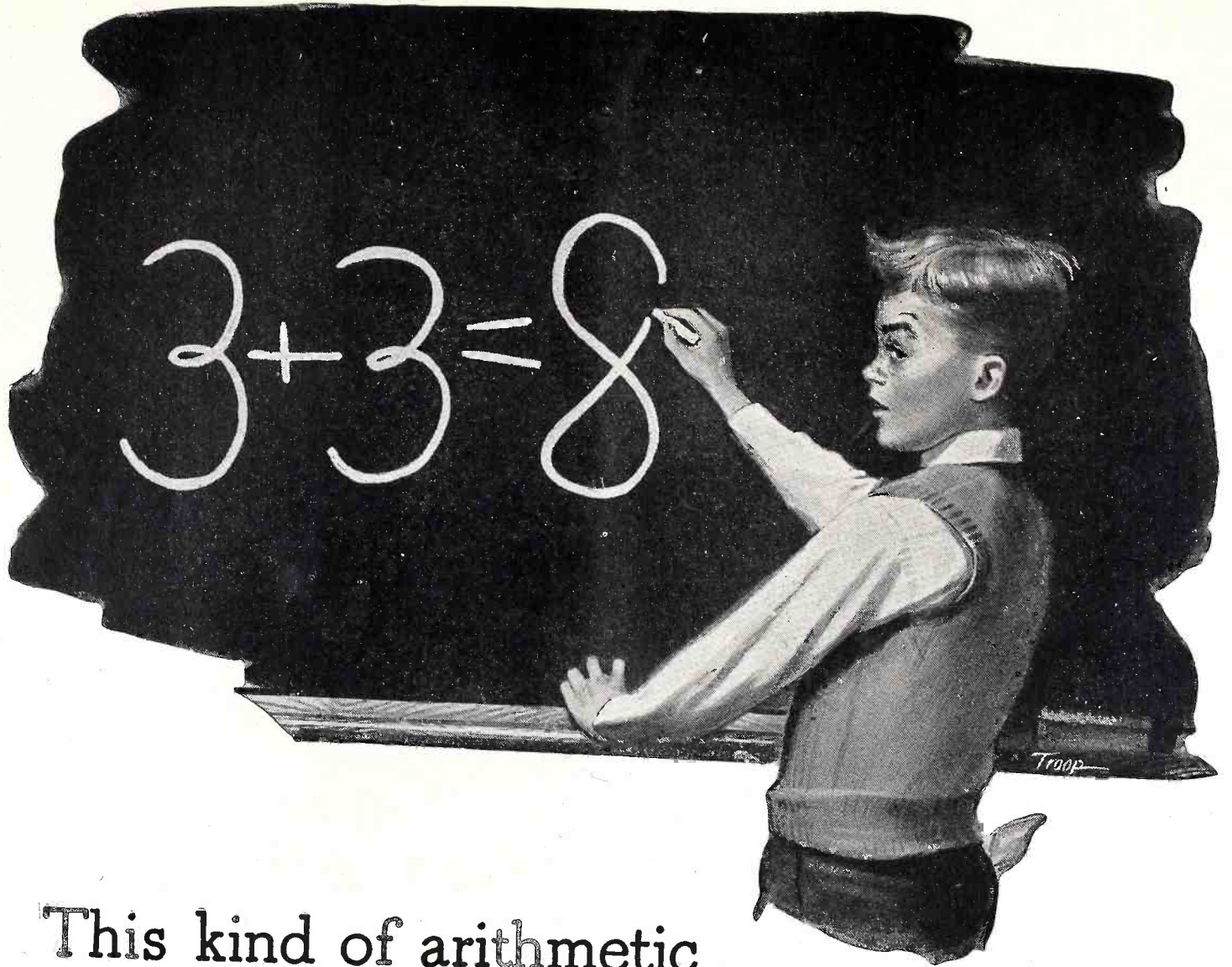
**NATIONAL CARBON COMPANY, INC.**

30 East 42nd Street, New York 17, N. Y.  
Unit of Union Carbide and Carbon Corporation



**DISPLAY THEM . . . CUSTOMERS DO THE REST!**





## This kind of arithmetic may put Johnny through college

Here's how it works out:

**\$3 put into U. S. Savings Bonds today will bring back \$4 in 10 years.**

**Another \$3 will bring back another \$4.**

So it's quite right to figure that 3 plus 3 equals 8 . . . or 30 plus 30 equals 80 . . . or 300 plus 300 equals 800!

It will . . . in U. S. Savings Bonds. And those

bonds may very well be the means of helping you educate your children as you'd like to have them educated.

So keep on buying Savings Bonds—available at banks and post offices. Or the way that millions have found easiest and surest—through Payroll Savings. Hold on to all you've bought.

You'll be mighty glad you did . . . 10 years from now!

**SAVE THE EASY WAY... BUY YOUR BONDS THROUGH PAYROLL SAVINGS**

*Contributed by this magazine in cooperation  
with the Magazine Publishers of America as a public service*





## MEN IN THE NEWS

### RCA Victor Appoints

Appointment of J. David Cathcart, well known advertising and market specialist, as advertising manager of the RCA Victor Home Instrument Division is announced by Henry C. Baker, general sales manager. Mr. Cathcart was formerly assistant director of RCA Victor's Market Research Department. Thomas J. Bernard, former Home Instrument advertising manager, has been appointed to the company's Public Relations Division under John K. West, director, for work on special public relations assignments.

### MacGregor VP of W-C

Webster-Chicago Corporation announced that Donald MacGregor was elected Executive Vice President of that organization — as well as being made a director of the company.

Also elected a director of Webster-Chicago Corporation was John F. Bolger.

### Sonora Appoints

Appointment of Milton R. Benjamin as manager of the record division of Sonora Products, Inc., is announced by Edward Harris, president of the company. Benjamin's experience in the record field has been long and extensive. From 1921 through 1930, he operated a chain of phonograph record stores in the East, and from 1930 to 1935, he was a national distributor and wholesaler of phonograph records.

When, in 1938, the Sonora Electric Phonograph Co. was sold to Joseph Gerl, Benjamin became associated with the Sonora Radio & Television Corp., as its sales representative in New York and New England. His new appointment places him in charge of activity and business with the company's 76 record distributors throughout the United States.

### DuBuque to Lear

All Lear, Incorporated, advertising and public relations activities, including the mechanical products as well as aircraft radios and Lear home radios, will be headed by Jean H. DuBuque, whose appointment to the post of advertising and public relations director of the company is announced by William P. Lear, president.

Production of Lear radios, both for aviation and for homes, is going ahead nicely, and the company's advertising plans are geared to step along with the sales and production picture. Mr.

[see page 46]



Meet Alfred A. Ghirardi—servicing expert and author of the most widely used books in radio technical publishing history.

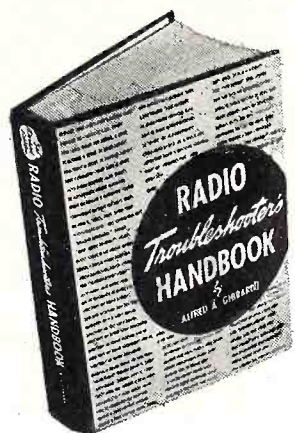
**I'LL TEACH ANY  
AMBITIOUS SERVICEMAN  
TO WORK BETTER,  
FASTER, MORE  
PROFITABLY!**

## ...OR REFUND Every Cent of YOUR MONEY!

Where will you be when servicing competition again gets tough? What will happen when you are called upon to repair the highly complicated F-M and Television equipment? Or industrial Electronic equipment? Whether you have the basic training these, famous books shown here are so well equipped to give—OR WHETHER

YOU DON'T — will tell the story!

Read these two Ghirardi servicing books for five full days. If you're not fully satisfied they'll do everything we claim — AND MORE — return them and every cent of your money will be refunded and no questions asked!



This big manual-size Ghirardi Handbook is worth another man in your shop. Helps do 2 jobs in the time normally required for 1.

## ELIMINATES TEDIOUS TESTING on 4 jobs out of 5

Maybe you've tried servicing short cuts before — NOW try the one method that really works — the one that pays for itself in time saved on the very first job. There's no magic about it. In this big 4-lb., 744-page, Manual-Size RADIO TROUBLE-SHOOTER'S HANDBOOK Ghirardi supplies you with a carefully tabulated compilation of common troubles (and their remedies) that account for about 90% of the service work on almost every model of radio in use today — over 4,800 models of 202 manufacturers. You just look up the Make, Model and Trouble Symptom of the radio you want to repair. Four times out of five, all troubleshooting and testing will be eliminated. More than half your time will be saved. The Handbook will tell you exactly what the trouble is likely to be — and exactly how to repair it. Ghirardi passes on to you the priceless servicing experience obtained from thousands of hours of tedious troubleshooting so that you may save your own precious time and make your work EASIER. In addition, there are over 300 pages of repair data and diagrams, tube charts, tuning alignment and transformer data, color codes, etc. designed to help you repair ANY RADIO EVER MADE better, faster, more profitably. Only \$5 complete — and sold on our UNRESERVED 5-DAY MONEY-BACK GUARANTEE BASIS.

### STOP GUESSING MISTER!

Get where the good money is—by learning how to handle even the most complicated jobs profitably.



## DON'T BE A "HACK"!

Learn PROFESSIONAL Servicing by Modern Scientific Methods

MODERN RADIO SERVICING is Alfred A. Ghirardi's famous COMPLETE 1 VOL. COURSE in professional radio-electronic service work. It gives you the kind of training that will be your "Open, sesame!" to the better money-making opportunities that only thoroughly trained servicemen will be in a position to grasp — including profitable industrial electronic work. It explains all types of radio-electronic test instruments. It shows you how to analyze circuits scientifically; how to use all types of test instruments for troubleshooting; how to test, repair and replace components; how to make substitutions — how to handle every phase of radio repair work from A to Z by approved time-saving MODERN methods. Absolutely "tops" either as a basic course or as a "refresher" course on any type of work that puzzles you. Worth its weight in gold in giving you real Know-How and paving your way for a profitable radio-electronic-television future. 1300 pages — 706 illustrations — 720 self-test review questions. Only \$5. 5-DAY MONEY-BACK GUARANTEE.

## HAVE A LOOK AT THEM-NOW!

Murray Hill Books, Inc., Dept. RSD-86,  
232 Madison Ave., New York 16, N. Y., U. S. A.

[ ] Enclosed find \$..... for books checked; or  
[ ] send C. O. D. (in U. S. A. only) for this amount plus postage. If not fully satisfied, I may return the books within 5 days for full refund.

[ ] RADIO TROUBLESHOOTER'S HANDBOOK \$5 (\$5.50 foreign) [ ] MODERN RADIO SERVICING \$5 (\$5.50 foreign)

[ ] MONEY-SAVING COMBINATION OFFER:  
Both big books—over 2040 pages—only \$9.50 for the two (\$10.50 foreign)

Name .....

Address .....

City & Dist. No. .... State .....

## MONEY-SAVING OFFER

Let the HANDBOOK save time on common service jobs. Let MODERN RADIO SERVICING train you for PROFESSIONAL electronic service work. Get BOTH big books at special Money-Saving Combination price of only \$9.50 for the two. Mail coupon today!



# Does non-productive service time cut down your profits?

## PhotoFact\* Folders Help You Make Up to Twice as Many Repairs a Day

Did you ever stop to estimate how much repair time is spent non-productively? How many hours you have to waste finding defective parts, figuring what replacements to use, trying to get these replacements?

Howard W. Sams & Co., Inc., has thought of it! What's more, in the Sams Radio Engineers' Service, it



### In Each PhotoFact Folder You Get —

1. A cabinet-view photo of the receiver to help you establish identity and control functions.
2. A top-view photo of chassis and speaker to identify component parts and alignment points.
3. A bottom-view photo of chassis and/or accessories.
4. A complete list giving keyed reference to all parts, alignment and schematic diagram.
5. A complete schematic diagram of the receiver.
6. Stage gain measurements listed on the schematic diagram.
7. A complete voltage and resistance analysis chart for rapid check of operational values.
8. Complete alignment instructions on the receiver consistent with the keyed alignment points indicated in top- and bottom-view photos.

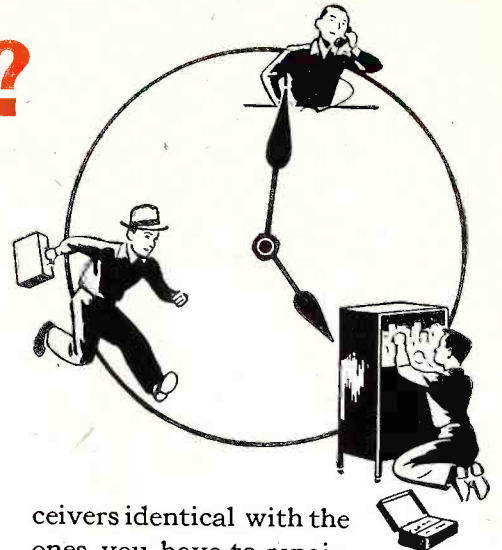
does something unique and different about it! This revolutionary service can easily help you make up to twice as many repairs a day!

### What PhotoFact Folders Are

PhotoFact Folders provide information to help you service radio receivers in the fastest, most accurate way possible. Pictures and facts are presented in such a way that you get the story clearly, completely and concisely.

PhotoFact Folders come in handy sets—30 to 50 at a time—“easy to file” Folders—at a cost of only \$1.50 for each set. They cover all new radios, phonographs, inter-communication systems and power amplifiers as they reach the market.

Original manufacturers' parts as well as standard replacement parts are listed. No ordinary service data is used. Instead, you get the combined “know how” of engineers who have made every measurement, every necessary adjustment, on re-



ceivers identical with the ones you have to repair.

### The Sams Institute

Purchase of all PhotoFact Folders automatically includes membership in the Howard W. Sams Institute. This means that you get the assistance of topnotch specialists in working out economical shop practices, getting more customers, developing accounting procedures, being informed of the thinking and planning of the radio industry!

### Act Today

Demand for PhotoFact Folders is rapidly approaching the saturation point. Paper shortages may make it impossible to send you sets Nos. 1 to 3 at once. But reprints are being made—and you will get additional sets as fast as they are issued. The publishing date of Set No. 3 is August 25. Order Set No. 3 today. Use the coupon below!

\*Trade Mark Reg.

Cut This Out and Mail It to Your Distributor! If you do not know his name and address, send it directly to Howard W. Sams & Co., Inc., 2924 East Washington Street, Indianapolis 6, Indiana, and we will see that your nearest distributor gets it.

CHECK ONE OR MORE SQUARES PLEASE PRINT

Send Set No. 1       Send Set No. 2;       Send Set No. 3

Send complete information and reservation card.

My (check) (money order) (cash) for \_\_\_\_\_ sets (at \$1.50 a set) is enclosed. (If you send cash, be sure to use registered mail.)

Name \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Company Name \_\_\_\_\_

My Distributor's Name \_\_\_\_\_ City \_\_\_\_\_

HOWARD W. **SAMS** & CO., INC. **RADIO PHOTOFACT SERVICE**



by GERALD R. FULLER

The new section 19.20 of the General Ordinance of the City of Madison, Wisconsin, concerning the licensing of radio and electronic servicemen, has been issued. There are those within the city who breathe a bit easier now and pray that the new version of the licensing ordinance will meet with the approval of all concerned and make for smooth sailing ahead for the much harassed Board of Examiners.

The progressive City of Madison has pioneered in the field of licensing radio servicemen with the hope of protecting the hapless house wife from would be radiomen, who have no qualms when it comes to hacking up someone else's radio set, without freezing out qualified men or making for a closed shop. This factor has been the underlying inertia behind all revisions of the now famed section 19.20. Recent unfavorable newspaper publicity brought about the latest, and what is hoped to be the last, revision.

### Development

The ordinance originated as a rider attached to the electrical code. Later it served for years as a separate ordinance hibernating in musty files. However, in 1941 it was revised by lobbying servicemen "to protect the citizens against electrical engineering students from the University of Wisconsin who were constantly experimenting with the neighbors' radios." The then new version of 19.20 became something of a political football with which existing service shops could conceivably control new competition. And during the war years when the city was invaded by radio students and instructors from the nearby Air Force radio school at Truax Field the ordinance proved inadequate in the matter of "protecting the citizens from hack work". This was due in part to the reluctance of those in authority to tackle the military and in part to the elusiveness of the "curbstone mechanics." Critics of the ordinance were quick to point out that it did very little protecting when it came to the housewife and a lot of protecting when it came to the shop owner.

In brief, the 1941 ordinance called for the licensing of all servicemen repairing electrical devices employing a vacuum tube having two or more elements. Without stretching the point

*Editor's Note: Space limitations do not allow publication of text of this ordinance. Copies may be had by writing to chief police radio technician, Madison, Wis.*

# This Licensing Plan WORKS

## Impartial examining board qualifies servicemen in tests on theory and bench work. Vets cautioned.

too for this could include a garage man who made a practice of repairing battery chargers, ignition checkers and the like. The exceptions were: removing and testing tubes, demonstrating radios and electrical devices, an owner repairing his own equipment, and an apprentice working under a licensed serviceman. Moderate fines for each offense back up the ordinance.

A board of six members, composed of two servicemen-employers, two servicemen-employees, the city electrical inspector and the chief police radio technician, administered the ordinance and examined applicants for licenses bi-annually. The board had rather broad powers and insofar as it was responsible for the type and severity of the examination given it was wide open for criticism. Some radiomen reasoned that only one third of the board could rightly be called impartial, and hence a stiff test conceived by the partial two-thirds could flunk out prospective competition.

### Tests

The first blast criticized the board for their procedure in conducting examinations. At first the tests were exclusively written questions on theory. Some applicants protested that they couldn't write, or read, or perhaps spell; but that they could fix radios. Others claimed that testing them on theory was unfair because it was not

necessary to know theory to repair radios successfully. The harassed board agreed and promptly came forth with a simple true and false test on theory which required only the placing of an "X" in the right square; plus a practical bench test which consisted of repairing a run-of-the-mill trouble in an ordinary receiver. The board reiterated firmly that an applicant could fail the written theory quiz completely and still receive his license if he satisfied the board's requirements on the practical examination. Everything ran smoothly for a while. Then, with the return of the veterans from global battlefields, including Truax Field and other G.I. radio schools, a new problem arose.

Heretofore, examinations were held in May and in December of each year. In December 1945 ten men, with the majority being veterans, took the examinations. Of the ten, two passed both tests and received their licenses. Seven of the eight that failed conceded that their G.I. radio experience didn't qualify them to go into the business of servicing broadcast receivers and decided it would be better for them to work under a licensed man for an apprenticeship period as provided in the ordinance. The eighth man, a veteran who worked for a newly opened appliance shop, continued at his job in the capacity of a radio serviceman

[see page 44]

### BUSINESS CONDITIONS

1.) 695,000 new businesses were launched in the last two years in the U. S. During the same period 295,000 business concerns discontinued operation, leaving a net increase of 400,000. The total business enterprises in the country during the early part of 1945 were 3,235,000, or one for every 43 persons, which approximates the pre-war average.

In some regions there is already evidence of saturation in such retail fields as electrical appliances, radios, package liquor, bar and grills, and home furnishings stores.

2.) Total bankruptcies in all kinds of businesses in the country reached a record low figure of 810 in 1945. The number of bankruptcies up to June 1st of this year has shown a tendency to increase with 431 reported to date.



# HOW IS YOUR GRID BIASED?

Introduction of the three element tube several years ago has changed methods of supplying a negative voltage for the grid.

Part I.

by J. B. CRAWLEY

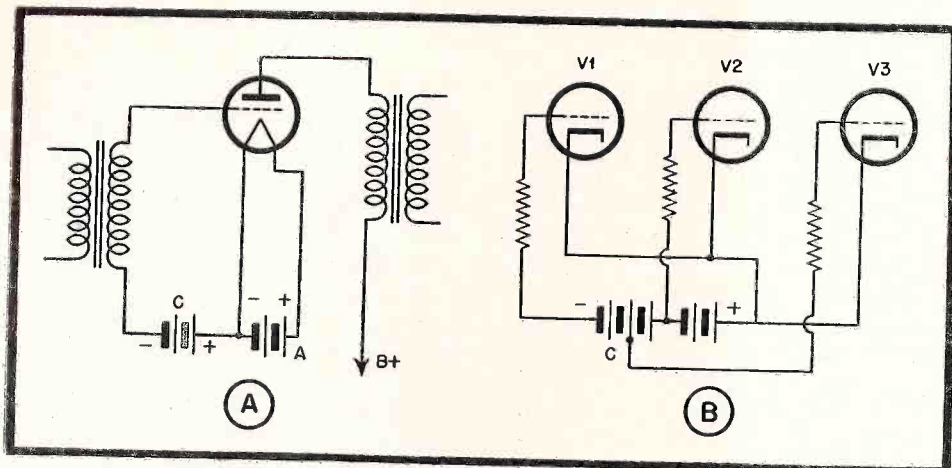


Figure 2

**W**HY is grid bias necessary? Notice the graph in Fig. 1. This is the familiar plate current vs. grid voltage graph. Three things of particular interest are noted.

First, that making the grid  $-9$  volts causes the plate current to drop to zero, so making the grid more negative cannot cause a further decrease in current. This condition is known as *plate current cutoff*.

Second, making the grid voltage zero causes the current to increase to 10.5 ma. Further increase of grid voltage will cause little increase in plate current. This condition is known as *plate current saturation*.

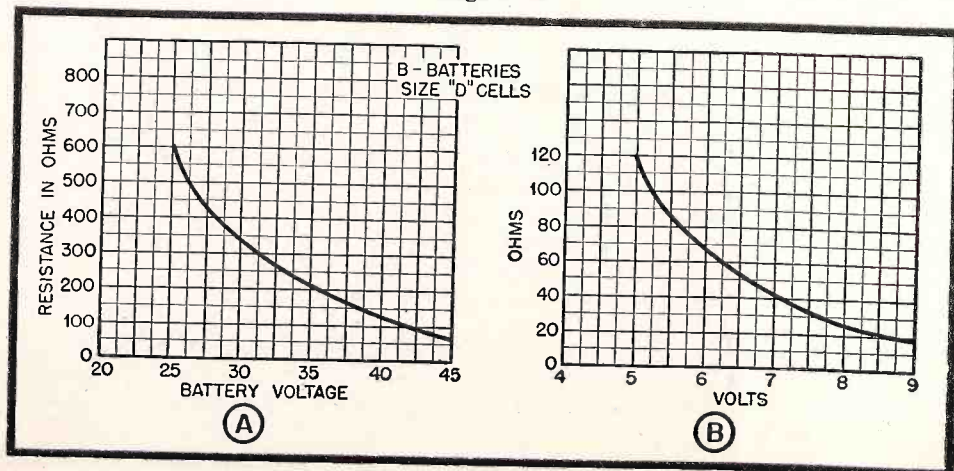
The third point to note is that there is an almost straight or linear part of

the graph between  $-1$  and  $-7$  volts. This region is the part of the tube characteristics used in Class A amplifiers.

The grid voltage for the tube is chosen to lie halfway between the points on the graph where curvature starts. When a signal is applied to the grid it adds to the bias during the negative half cycles and subtracts from the bias on the positive half cycles. If the grid goes more than  $-7$  volts or less than  $-1$  volt distortion will occur. When an input voltage great enough to drive the grid beyond these limits is applied to the tube, the tube is said to be overloaded. Under ideal conditions this is never allowed.

Let us suppose that in the case

Figure 3



above the grid bias for the tube is chosen as  $-4$  volts. An a-c voltage of 6 volts would be required (peak to peak) to drive the tube into the region where distortion would occur. If the bias voltage had been chosen as  $-3$  or  $-5$  instead it would have required only 5 volts peak to peak instead of 6 to produce distortion. This example shows why a correct choice of grid bias must be made if the full capabilities of the tube are to be realized.

Summarizing then, grid bias of some sort is necessary to keep the tube operating in the center of its grid voltage-plate current characteristic.

## BATTERY BIAS

Probably the oldest and simplest form of grid bias makes use of a C battery. The term C bias or C battery got its name when the filament supply battery was called "A", the plate supply "B" and the grid bias battery "C".

In the original system the C battery has its positive terminal connected to the positive side of the filament battery, while the grid returns to the negative terminal of the C battery. (See Fig. 2A.) Often the same battery is used in its entirety to provide bias for several stages while in other cases taps on the battery may serve to bias other tubes (Fig. 2B). Unless certain precautions are taken this practice results in noise, motorboating, squealing, or degeneration. Noise is usually caused by some local action due to impurities in the cells. This local action will cause the batteries terminal voltage to vary slightly and if used in a high gain circuit this variation in grid bias will be amplified as noise.

The other troubles, motorboating, regeneration and degeneration are due to the internal resistance of the C battery. This internal resistance is common to the various stages receiving bias from the battery and signal voltage from each stage will be developed across it. In the example shown in Fig. 2B, the voltage from V2 will be out of phase with that of V1. However, the voltage from V3 will be in phase with that of V1. If the amplifier has sufficient gain, regeneration may result from this common coupling.



Fig. 3 is a graph of how the resistance of a cell varies as its voltage varies. This applies to batteries used in radio work. You will notice that when the battery is new its resistance is about 1/6 the value it becomes when its terminal voltage drops 1/2. It is also evident that the internal resistance is so low in all cases that the effects mentioned above are not likely to happen unless the battery is used in circuits where it must deliver current or circuits having very high gain.

## BYPASSING

To eliminate common coupling a simple bypass condenser is usually all that is necessary. The reactance of the condenser at the lowest frequency to be amplified should be less than one tenth the value of the batteries internal resistance. This calls for a 20 mfd., low voltage, condenser to properly bypass a 4 1/2 volt battery. Sometimes decoupling resistor-condenser filter circuits in each grid are used in place of a large bypass. This method gives better isolation of each stage, but it requires more parts.

## BLEEDER

Every battery has a shelf life expectancy and will lose its voltage even if not put into service. In most radios there is no current drain on the C battery and its life is the normal shelf life expectancy. The B batteries on the other hand must supply current, so their life depends on the current drain of the receiver. This is a disadvantage, first because one is tempted to replace the B batteries without replacing the C. Usually the C will lose voltage before the second B set has discharged and will cause distortion and abnormal drain on the B circuit.

The second reason it is disadvantageous is that the full value of the B batteries cannot be realized. A tube may require -9 volts grid bias for a plate voltage of 180, and -6 volts when operated with 135V. B supply batteries are normally used in broadcast receivers until their terminal voltage has dropped to about 35 volts under load. If four 45 volt batteries are used to give the 180 volts in the case above, this voltage would drop to about 140 volts before the batteries were discarded. If the C bias remained at -9 volts a reduction in gain and distortion would occur in the tube.

In order to overcome this difficulty manufacturers of battery operated equipment use bleeder circuits to discharge the C at approximately the same rate as the B. For example the Philco battery receivers models 37-38, 37-623, and 38-39 use a 900 ohm resistor to bleed the C. Later informa-

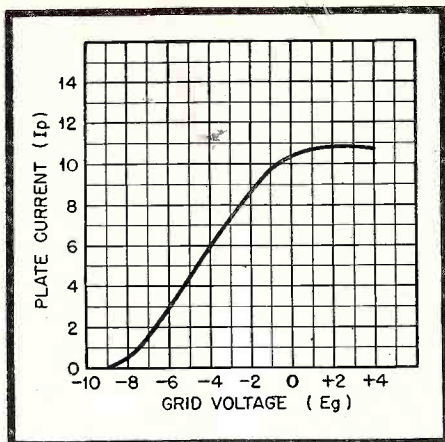


Figure 1

tion contained in service manuals recommended the resistor be changed to 6,000 ohms because "the 900 ohm resistor is discharging the C battery too fast resulting in premature failure of the B batteries."

Obviously the question of how much bleeder is a ticklish one. Too little or too much bleeder will necessitate early replacement of the B batteries.

If cells of the same size or capacity were used in both B and C batteries the problem would not be quite so complicated. In the preceding example,

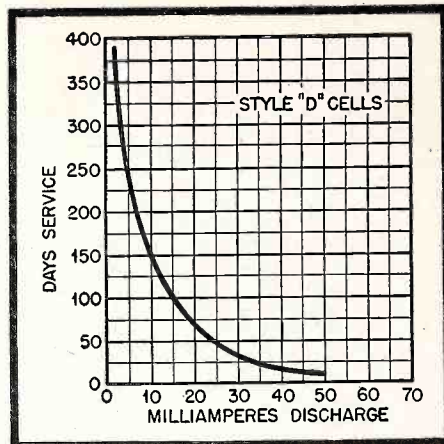


Figure 4

the B battery drops from 180 volts to 140 volts before it is discharged, or 22%. The C should change from -9 to -6 volts, or 33 in the same length of time. If battery life were a linear function of current versus time the problem would be simple indeed. A bleeder would be used that would give a C current of 11 per cent more than the B current. However, battery life expectancy charts (see Fig. 4) indicate that battery life is not a linear function of current so the example given above would not give 100 per

## SELF-SERVICE PREFERRED BY SERVICEMEN

The letter to the servicemen which resulted in this information, read as follows:

"As you probably know, there is a considerable amount of controversy at the present time among distributors as to the serviceman's idea of self-service stores.

"As a buyer of radio parts we would like your opinion and comments. Do you prefer to browse around and select your own merchandise from bins or shelves or do you like behind-the-counter service? What are your remarks on both types of selling?

"Your statements will be forwarded to our distributors as a cross-section of opinion, so we will appreciate your prompt reply."

In tabulating responses to this inquiry, we divided the replies sectionally as well as nationally and found that even though self-service was favored nationally, the East preferred over-the-counter service and the Middle West preferred semi-self-service. Sectional figures were as follows:

East—50% preferred over-the-counter service; 30% preferred self-service; 20% preferred semi-self-service.

South—75% preferred self-service; 25% preferred over-the-counter service.

Middle West—50% preferred semi-self-service; 30% preferred self-service; 20% preferred over-the-counter service.

West—57% preferred self-service; 29% preferred semi-self-service; 14% preferred over-the-counter service.

Dominion of Canada—100% preferred self-service.

Because the comments of your customers in respect to this method of distribution should be interesting to you, they will be recorded here and continued for several months under the heading "Self-Service?". City and state will be used with each quotation as a means of identification.

Morris, Illinois—"I like your behind-the-counter salesmanship much better than self-service. It saves me a lot of time, especially when I'm not acquainted with the department. I know what I want and the salesman can get it much faster than I can."

Oakdale, California—"I cast my vote for self-service stores. This method is labor saving in war-time and economical in peace-time. While browsing, a buyer will often see merchandise he needs and otherwise would never have thought of. An over-worked salesman is often short with a customer who would like to look before buying. I believe self-service has been proved by other types of business in the past."

Cranford, N. J.—"We prefer both types depending on the item being sold. Nearly every time we go to a radio parts store we know what we want in the way of replacement parts for the sets on our bench. For these items we like to give the information to an alert salesman who knows where his stock is located and can give us fast service.

"There are several items that a serviceman must keep handy in his shop such as hardware, knobs, resistors, condensers, solder and wire, etc. In these items we usually like to see a 'special' that we can pick up to put into our operating stock. For these items then, as well as for a new product, we like the open bin sales method.

"Of course the method of obtaining our parts that we prefer above all else is to be able to phone an order to our parts dealer and be sure we would get all that we requested when we requested it. This shopping around cuts into profits when time is money as it is in the radio service business today."

Spartanburg, South Carolina—"Regarding self-service stores for radio parts versus behind-the-counter service, it is my belief that the self-service store is the better of the two.

"There are two major types of buyers in a distributor's store: One type prefers to lay a list on the counter, wait until it is wrapped and walk out. The other, while having one or two items in mind when entering, almost always is reminded of other things that are needed when they are in evidence and thus forcefully called to mind.

"A self-service store offers little or no impediment to the salesman filling an order and at the same time brings before his customers his line of products, both old and new, to the mutual advantage of both parties."

[From Centralab Jobber Outlook, August 1946]



cent accuracy.

The fact that the resistor in the Philco receivers was changed from 900 ohms to 6,000 ohms indicates that either there is no sure way for determining the correct value or else the value is not too critical.

### BIAS SUPPLIES

Offering a distinct advantage to batteries in many instances is the line voltage operated bias supply. There is the disadvantage that it cannot be used in portable equipment or in localities where power is not available. Where it can be used it offers means of obtaining higher voltages, longer life and complete power line operation.

Bias supplies are of two general types: those using power transformers and the universal or so called AC-DC types. The latter type is more popular because it is more economical to build. In deciding which type to use determine if, at any time, the equipment will come in contact with a grounded circuit. If so, a supply using a transformer to isolate it from the power line voltage is necessary. If not, then the a.c.-d.c. type is preferable. Since most bias supplies are not required to furnish large amounts of current, very light rectifiers may be used. For economy's sake receiving triodes with grid and plate tied together are frequently used. Fig. 5 shows such an arrangement.

Filter systems for bias supplies need not be husky since, as mentioned previously, the current demand is not large. A review of filter circuits shows why this is true. In the case of an iron core choke it has an impedance equal to  $2\pi$  times the frequency, times the inductance. At 60 cps, a 15 henry choke would have a reactance of approximately 5500 ohms. A condenser's reactance varies inversely with frequency and is equal to

$$1$$

$$2\pi FC$$

A 20  $\mu$ f condenser would have around 133 ohms reactance at 60 cps. If these impedances were connected in series and an AC voltage applied across the combination, obviously little of the voltage drop would occur across the condenser (about 2%). Such is the case in a filter circuit. For a.c. the choke and condenser look like a series circuit to ground. For d.c. the choke looks like a low resistance while the condenser behaves as a storage tank or reservoir. Since bias supplies supply little current it is not necessary that the choke have low resistance.

Experimenters often use the secondary winding of a driver or interstage transformer that has a burned out pri-

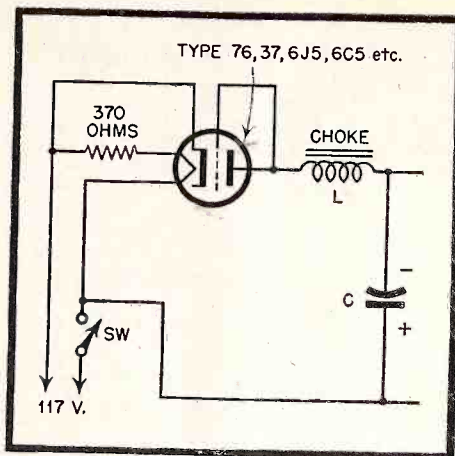


Figure 5

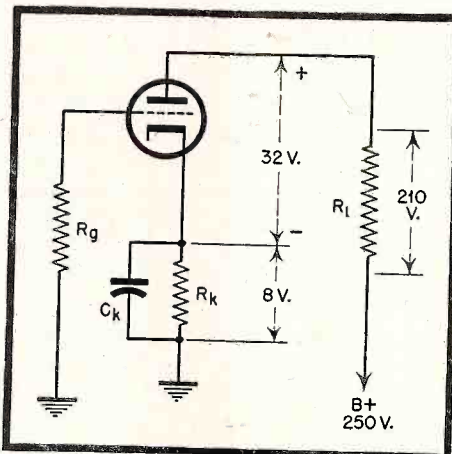


Figure 6

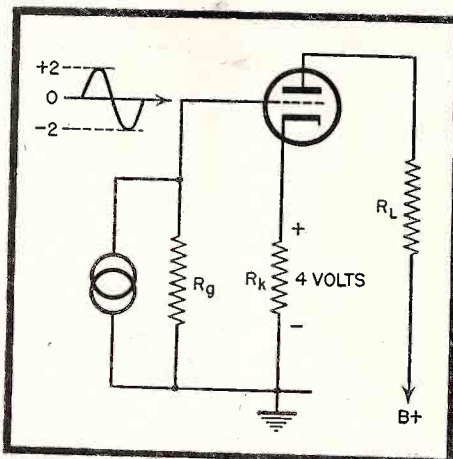


Figure 7

mary. Actually a resistor may be substituted for the choke and is usually desirable because of its small size and low cost. Resistor values will range from 1,000 ohms to as high as 1 meg. depending on current requirements.

### CATHODE RESISTOR OR SELF BIAS

By far the most common system of obtaining a grid bias voltage is inserting a resistor from cathode to ground. In any tube there flows a steady or average current component. If this current is made to flow through a resistance, by Ohm's law there will be a voltage drop of IR across the resistor. Fig. 6 shows the voltage drop in a typical amplifier. A current flows

through the circuit composed of  $R_L$ , the tubes load resistor, the tubes DC resistance, and  $R_k$ . Most of the drop occurs across the plate load resistor, the rest across the tube and the resistor  $R_k$ .  $R_k$  is chosen so that the quiescent plate current of the tube will produce a voltage drop across it equal to the required bias. Notice that the cathode is positive with respect to ground. Since the grid connects to ground (through a resistor) the cathode is also positive with respect to grid. Restated, the grid will be negative with respect to cathode.

This method of bias has met with widespread approval because it:

1—Eliminates the need for batteries or separate bias supplies.

2—Is automatic in nature. This point is of particular advantage in battery equipment. As the B supply lowers the tube current decreases automatically, decreasing the bias to correspond to the low plate voltage. Simplicity and low cost is another contributing factor to the popularity of this form of bias.

In choosing the value of  $R_k$  good results can usually be obtained by following a simple rule. Refer to a tube handbook and record the plate current the tube draws at the plate voltage desired. Record also the recommended bias. The value of  $R_k$  can be determined by the formula

$$R_k = \frac{\text{grid voltage}}{\text{plate current}}$$

If a tube is a pentode the screen current must be added to the plate current in determining the total cathode current.

If greater accuracy is desired it is necessary to plot a load line on the plate voltage, plate current characteristics of a tube. From this load line determine the quiescent plate current and grid voltage to operate the tube near the center of its linear region. Substitute these values in the above formula and solve as before.

Actually neither procedure is necessary since most tube manuals give recommended values for  $R_k$  for various plate voltages and plate load resistors. (For example, see RCA tube manual).

The value of  $R_k$  is chosen on the basis of a steady plate current when actually the tube amplifies by producing variations in this plate current. When a signal is applied to the grid it causes the plate current to vary and produces an AC voltage across  $R_k$  that is in phase with this current change.

Let us analyze one cycle of operation (see Fig. 7). Suppose that there

[see page 33]



Now... ***MORE*** RCA Batteries  
are coming your way!



***MORE*** OF THESE  
FAST-MOVING TYPES

***PLUS*** THESE NEW  
PORTABLE AB PACKS AND  
INDUSTRIAL TYPES



YES—production has been stepped up on RCA Preferred Type Batteries—and nine new, fast-selling AB Packs and Industrial Types have been added to the line. Now you can enjoy bigger sales than ever before, and cash in on the repeat business that will naturally come your way.

And remember—there are no slow movers in the RCA battery line, be-

cause RCA has concentrated production on volume types that will service over 98% of battery-operated receivers. That means fewer types for you to stock.

What's more, the high acceptance value of the RCA trade-mark on every carton makes them easier to sell.

See your RCA Distributor today for full details on the expanded line of RCA Preferred Type Batteries... and watch for more battery merchandisers that will increase your store traffic.

Listen to "THE RCA SHOW,"  
Sundays, 2 P.M., EDT, NBC Network

**RCA Preferred Type Radio Batteries are Radio-Engineered for Extra Listening Hours**



**TUBE DEPARTMENT**

**RADIO CORPORATION of AMERICA**

**HARRISON, N. J.**



# D I S T O R T I O N

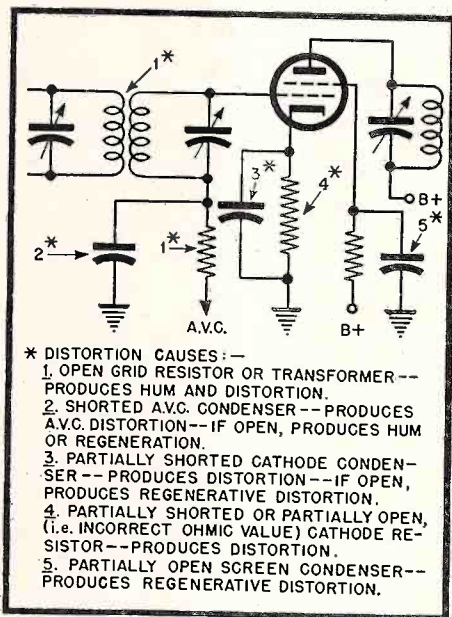
**Equipment and methods required for determining the cause of both hum and distortion. Ordinary voltage and resistance checkups often fail to reveal the trouble.**

**Part 2. (See July Issue)**

to. When the offending stage has been located, the tube should first be checked by replacing it with one known to be good.

The voltages should next be checked for any deviation from their normal values. (A deviation of  $\pm 15\%$  usually indicates trouble — deviations up to this value are usually allowable in designing the receiver, so that the receiver will operate on a wide range of line voltages.) Fig. 5 shows a typical R.F. and I.F. amplifier schematic with some of the most frequent causes of voltage failures that result in distortion.

When the distortion is found to be present through the side-bands as the receiver is tuned through the incoming signal, the voltage condition that



**Fig 5. Typical R-F, I-F Amplifier Stage.**

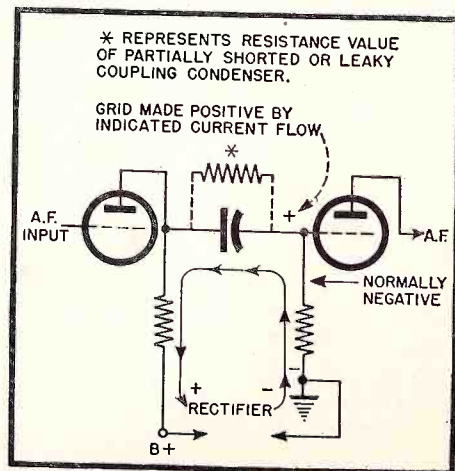
causes the distortion is in the audio portion of the receiver. The best way to isolate the audio stage in which the distortion originates is to listen to the output of each stage, starting with the first and ending at the output stage. The output of each stage can be heard by using earphones one side of which are connected through a 0.1 mf. condenser to the plates of the various audio tubes in the order given. Fig. 6 shows a typical audio system and the test points. The first point to check is at the high side of the volume control (i.e., point "A" or "A<sub>1</sub>", Fig. 6). If the distortion is present at this point, the trouble is either a defective second detector tube or a leaky by-

## Volume Control

The next point to check is at the wiper arm of the volume control (i.e., point "B"). If the distortion is present at this point (but not at point "A") the trouble is the volume control itself. NOTE: Volume controls are a very frequency cause of distortion due to the constant wear that they are subjected to. This wear, in time, causes the resistance of the control to increase sometimes, to the extent that the audio voltage developed across it will be cut to the extent that distortion is produced.

If the signal is undistorted at point "B", the next point of check is point "C" (Fig. 6). If the signal is distorted at this point, the trouble is in the condenser (#1—Fig. 6). This condenser very seldom develops a short but leakage due to atmospheric moisture absorption is very prevalent. The condenser should be disconnected and checked with an ohmmeter, using a scale of at least 1.5 megohms, to verify the fact that it is defective. If the signal is undistorted at point "C", the next point of check is point "D". If the signal is distorted at this point, the tube (#2—Fig. 6) should be checked by replacing it with one known to be good, and the voltages at the tube socket should be checked and the cause of any deviation from normal eliminated. If the signal at point "D" is undistorted, the next point of check is point "E". If the signal is distorted at this point, the same steps as those just given should be taken. In this stage or in any additional stages of this type, if more than one is used on the receiver in question, particular attention should be paid to

**Figure 7. Illustration of current flow through leaky A-F coupling condenser.**



**by C. C. ROBERTS**

## R.F.-I.F. Stages

However, if the condition prevails on both weak and strong station signals, the cause is undoubtedly a voltage condition in some R.F. or I.F. stage. When the distortion has been thus determined as being the result of a voltage condition in some R.F. or I.F. stage, the next step should be to determine the exact stage and the direct cause of the trouble. This can be done by checking the reactions of the trimmers of all R.F. and I.F. stages in the manner given in the article on "Resonance Testing" already referred



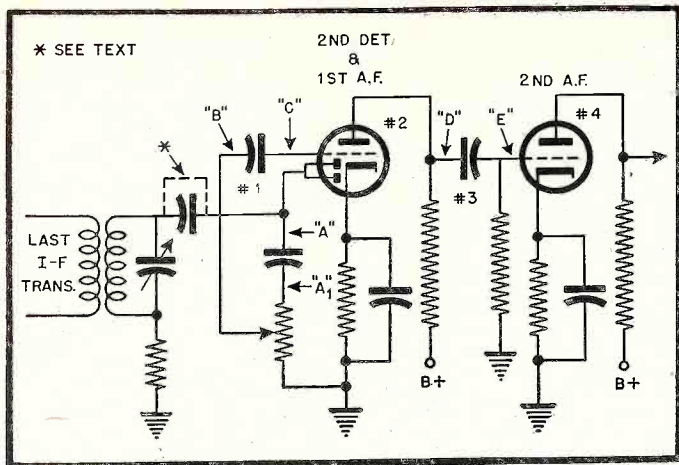


Figure 6. Illustration of earphone signal check on A-F system.

the control grid voltage.

It is a very common occurrence for the coupling condenser (#3—Fig. 6) to break down partially and thus develop a high resistance leak. The effect of such a break down in this condenser is to create a positive voltage that is applied to the grid of the tube (#4—Fig. 6). This positive grid voltage is developed by a current flow through the leaky condenser as shown in Fig. 7. The positive voltage on the grid will cause the tube to operate on a non-linear portion of its curve and, as a result, distortion ensues.

### Output Stage

If the signal is undistorted at point "E", the next point of check is a similar point on the succeeding stage, if there is one; otherwise the procedure is to next check the output stage. The output stage may be either two tubes operated in push-pull or simply a single power amplifier. If the output stage is a transformer coupled push-pull stage and the signal is undistorted at point "A"—Fig. 8, the cause of the distortion is in the output stage.

The cause of the distortion can be found by checking as follows: Both tubes should be checked by replacing them with ones known to be good. The operating voltages of each tube should

be checked. The complete absence of, or an insufficient grid voltage on *one* of the output tubes indicates a defective input transformer. The complete absence of or an insufficient grid voltage on *both* of the output tubes indicates an open or partially open bias supply resistor (#1—Fig. 8) or a shorted or partially shorted bias condenser (#2—Fig. 8) or a short to ground *anywhere* on the B-line. The absence of or an insufficient plate voltage on *one* of the output tubes indicates a defective output transformer. Finally, condensers (#3—Fig. 8) should be removed and checked for leakage.

If the output stage is of the general type shown in Fig. 8-A and the signal is undistorted at point "A", the tubes should be checked by replacing them with ones known to be good and the usual voltage and leakage tests made. However, the trouble in this type of output stage can be further isolated by removing tube (#5—Fig. 8-A), and noting whether the distortion is still present. If it is still present, the voltage checks need be made on only tube #4. If it is not present with tube #5 removed, the voltage checks need be made on only tube #5. Particular note should be paid to the grid voltages of tubes #4 and #5 as it is a very common occurrence for condensers #6

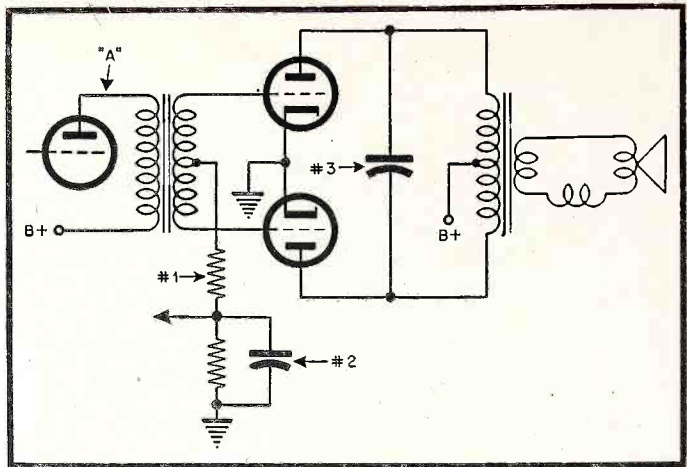


Figure 8. Push-pull output, with transformer input.

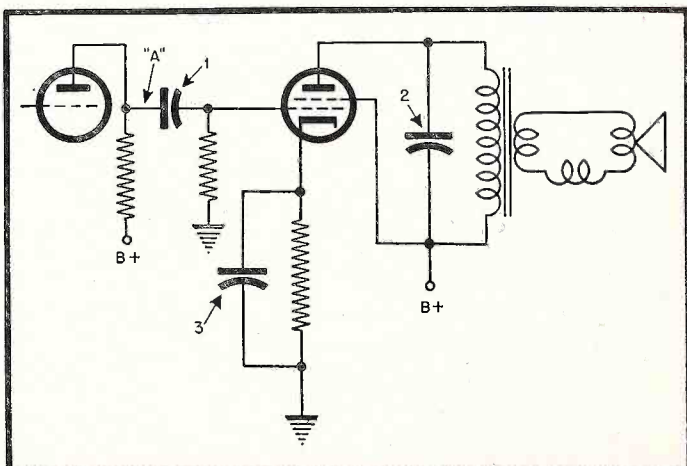
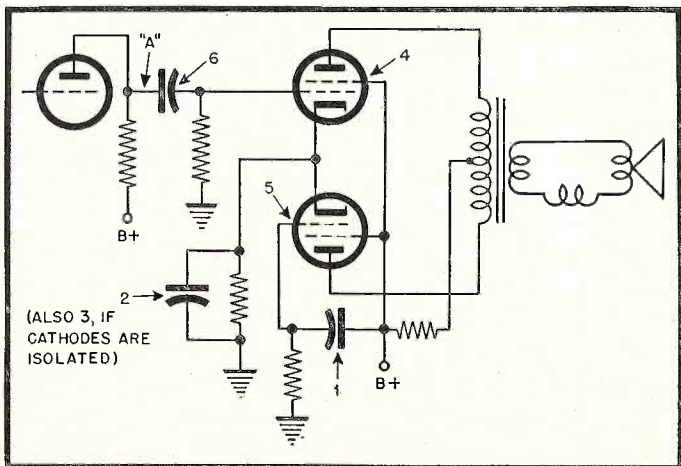
and #1—Fig. 8-A to breakdown and become leaky, thus putting a positive voltage on the grid in the same way as was described for the audio stage. The grid bias on the output tubes can be off, in this type circuit, only because of defective cathode by-pass condensers #2 and #3. If the cathode circuit is common for both output tubes, there will be only one by-pass condenser, as shown in Fig. 8-A.

If the output stage is of the general type shown in Fig. 8-B and the signal is undistorted at point "A", the procedure should be the same as that given in the preceding paragraph. In this case particular attention should be paid to condensers #1, #2 and #3—Fig. 8-B. In general, the single output stage is identical with the output circuit of the preceding paragraph when tube #5—Fig. 8-A is eliminated.

The conditions, tests, procedures and symptoms of distortion in the audio-system that has just been given cover all types of audio-systems. If an audio-system employing phase-inversion stages, base amplifiers, etc. is encountered, the same tests, procedures, etc. can be applied to the additional stages of audio amplification.

No mention has been made in this article of the more obvious causes of [see page 33]

Figure 8-A, left: Push-pull output, with condenser input. Figure 8-B, right: Single tube output.







Time-card rack is used for job tickets and tags. Job number tag is taken off the radio receiver when work is completed.

fair to our customers, for our first-come-first-served policy didn't work out. But after we installed our numerical rotation system, this was all changed. As each man completed a job, and he went into the stock room to get another radio to repair, he had to check the number of the appliance he took with the bookkeeper.

"Another good feature about our rotating system was that some customers would tell me that they knew we wouldn't do their repair job on time, because it was a small one with not much profit attached to it. We squared this with them, by showing the doubtful customer the rotation repair tag

## Routine for **SPEEDY SERVICE**

**B**Y being able to promise customers that certain radios left for repairs will be completed and ready for withdrawal at a certain date, and having that radio ready for delivery, Morris Goldman, owner of M and J Radio Repair, Philadelphia, has been able to build up a reputation of prompt service that has carried him through the hectic repair day rushes.

"Customers were always clamoring for their radios and sets," says Mr. Goldman, "and pestering us long before we had promised them delivery if they were repaired. They were acting as their own expeditors, they wanted to let us know they were after us, so that we would be sure to work on their radios and have it for the day promised. And try as we did to work on all sets in the order that they came into our store, so that we could keep our delivery schedule, many skips were made. It was after several customers had given us hot arguments, that we decided to see what could be done about systemizing jobs and having radios ready for the day promised."

The first step was to work on radios in rotation on the first-come-first-served basis. In starting this policy, Mr. Goldman numbered small tags from one on up the scale, and tagged each radio in numerical order as each one was brought in. No other information was placed on these tags; another tag was attached to the radio, telling the repairmen what to do on the specific job.

As Mr. Goldman has several repairmen working, he decided to keep names off of work tags, so that employees would not show any partiality to any individuals that they may have

known. As soon as a radio was repaired, the repair man had to take the next on in numerical order, as they came. This helped to stop repairmen from picking out certain jobs to do, on the theory that one of the other repairmen would do it. Some of them preferred to do one type of work and always looked for it among the radios that came in. Because of this some sets would be left untouched for several days, while others would be repaired on the day of arrival.

"In trying to discover why certain sets went out ahead of others, although in many cases, the repair job was easier," points out Mr. Goldman, "I found that our workmen liked repairing and tinkering with certain makes and model sets, which were their favorites. This naturally was un-

known. As soon as a radio was repaired, the repair man had to take the next on in numerical order, as they came. This helped to stop repairmen from picking out certain jobs to do, on the theory that one of the other repairmen would do it. Some of them preferred to do one type of work and always looked for it among the radios that came in. Because of this some sets would be left untouched for several days, while others would be repaired on the day of arrival.

known. As soon as a radio was repaired, the repair man had to take the next on in numerical order, as they came. This helped to stop repairmen from picking out certain jobs to do, on the theory that one of the other repairmen would do it. Some of them preferred to do one type of work and always looked for it among the radios that came in. Because of this some sets would be left untouched for several days, while others would be repaired on the day of arrival.

[see page 32]

Service bench is in full view of customers; tests are made as they watch.





# Here's How Radio Industry Says "OK"

## TO FEDERAL'S NEW MINIATURE SELENIUM RECTIFIER

TYPE-403D2625



**N**OW being used in radio receivers, voltage multipliers, speech amplifiers, PA systems, electronic organs, business machines — wherever a low-voltage low-current d-c source is required — replacing type 117Z6-117Z3 and other rectifier tubes.

The "landslide" of orders which followed the announcement of this new rectifier means just one thing — another outstanding contribution which fills a great need in the electronic industry. Now, in hundreds of applications, this 5-plate rectifier stack is proving its value — in money saved, reduced assembly time, new space savings, longer life, instant starting. It measures only  $1\frac{1}{4} \times 1\frac{1}{2} \times \frac{3}{8}$  inches, and will go into restricted spaces where a tube and socket won't fit.

Though miniature in size, this rectifier embodies "full-scale" quality throughout, with **Center-Contact** construction and all of the other features which have made Federal Selenium Rectifiers the standard of quality in the industry. They're available now — in quantity. Write to department F555 for prices and data.

### CHARACTERISTICS:

Type 403D2625 Rectifier

Maximum RMS Voltage.....	130 volts
Maximum Inverse Voltage.....	380 volts
Maximum Peak Current.....	1200 ma.
Maximum RMS Current.....	325 ma.
Maximum DC Output.....	100 ma.
Approximate Rectifier Drop.....	5 volts

# Federal Telephone and Radio Corporation

In Canada:—Federal Electric Manufacturing Company, Ltd., Montreal  
Export Distributors—International Standard Electric Corporation



Newark 1,  
New Jersey



# APPLIANCE & RADIO FINANCING —TO-DAY AND TOMORROW

An interview on trends in instalment financing, with  
A. G. Rude, sales manager, Universal C.I.T. Credit Corp.

by LEWIS C. STONE, Editor

**T**HE electrical household appliance industry has made long strides from the washboard to the automatic laundry machine, from the old gramophone to today's radio-phonograph console with television on the horizon, from the back porch ice box to the modern refrigerator. These advances in home comfort and enjoyment have been achieved through coordinated effort by the various elements of the industry.

Manufacturing research and enterprise, the merchandising aggressiveness and courage of distributors and retailers, the pioneering of sales financing—all have made their contribution toward bringing more conveniences within the reach of more families here than in any other country in the world.

You hear rumblings now of the imminent return to a buyer's market. All of us interested in the home appliance and radio field should welcome that change and hope for its early realization. It is the healthier market condition by far. In a buyer's market real sales effort pays off and indolence and inefficiency fall by the wayside. Such a market doesn't signify prospects' refusal to buy. It does describe a market situation in which customers demand full value received, capable service and in the lingo of the trade, "sales-minded" sales financing.

Normal merchandising has been absent perforce during the war and the greater part of the reconversion period. Normal financing conditions have been absent, also. Let's backtrack over the pre-war years, therefore, in order to appraise properly the role of sales financing in the post-war period coming up.

If the modern development of automobiles and household appliances made possible the growth of instalment sales financing, then certainly the

growth of this new type of mass credit aided materially the steady sales growth of such products. Any "chicken or egg first" argument has no particular significance here. It is interesting, however, to recall the similarity of growth.

Early sales financing was necessarily expensive and experimental like those former crude, hand-built cars of the first clumsy, make-shift mechanical refrigerators which older hands in the appliance field will remember. Sales financing as available to appliance dealers and their customers today is as economical and streamlined as the modern automobile or refrigerator. What were the earlier predictions about instalment sales financing?

### Savings Encouraged by Sales

It was said that such financing was uneconomic. If a family had been unable to save the price of a washing

Large point-of-sale easel displays advise conservation of savings, buying out of income on budget plan.



MR. A. G. RUDE

machine how could they pay for it on time without suffering malnutrition or other dire want. But on the contrary, a wise instalment purchase, instead of foolish spending on inconsequential, was the beginning for many a family of systematic saving and spending.

The biggest misconception about instalment sales financing was that it marked the user as indigent and improvident. Since established in 1908, Universal C.I.T. has financed the instalment purchases of automobiles, household appliances and home improvements of over ten million families, without counting repeat customers. These purchasers have come from all walks of life, all trades and professions. Their records have shown most of them to have savings which for one reason or another they preferred not to disturb.

Many of us use the instalment purchase method as a means of self-discipline. We have the purchase price in the bank but know darn well if it's spent, that we will not have saved that much again in a year or eighteen months. On the other hand, by budgeting the purchase we have both the refrigerator or the new heating plant paid for and the savings still intact at the end of the instalment period.

Another former fallacy about instalment sales financing was that a de-



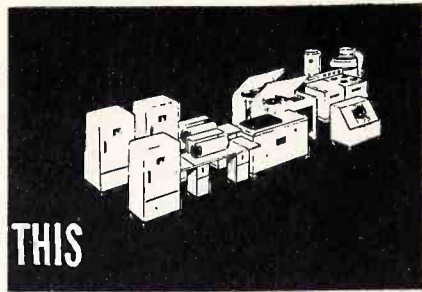
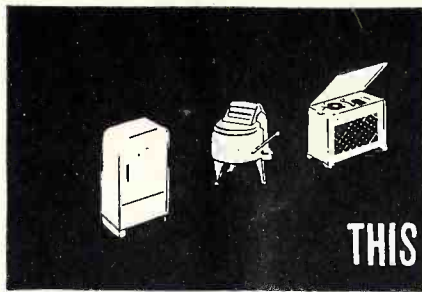
pression would "burst the bubble". Following 1929 there hit this country the first major depression after the "maturity" of instalment sales financing. It might be admitted that even Universal C.I.T. was a little surprised at the inherent strength of its investment in instalment purchase obligations. This company could continue an uninterrupted service to dealers and their customers because this form of credit was proved much less speculative than the "established" credit dealt in by other types of financial institutions. The instalment purchaser of major household appliances and similar family conveniences had to be recognized as a substantial citizen — one who had purchased wisely to his own way of thinking and who intended to keep what he had bought.

So much for the background which points the way to the larger usefulness of planned instalment sales financing in the household appliance field. First of all, sales volume will not depend primarily on how many people have how much savings in War Bonds. Rather, sales will expand as products become generally available and the buying public is convinced by good merchandising that it can depend, as before, on constantly improved values in mechanical household servants.

The buying public will expect real service from dealers. Before the war, between 80 and 85 percent of all major household appliances were sold on time. Recent surveys have indicated the continuance of this sound buying habit. Therefore the progressive household appliance dealer will choose carefully the financing service which he provides for his customers.

### Finance Plan Is a Service

The availability of such financing arrangements will be featured by progressive dealers as an important part of their complete customer service. Terms will be quoted as a matter of



**THIS can be THIS**  
for only **17½¢ a day\***

**A**N AMPLE stock of appliances paves the way for intensive merchandising. More complete displays of appliances stimulate store sales. You benefit through increased opportunities for combination sales. It's easier to "sell up" with a full line on your floor.

Through the Wholesale Floor Plan, you can now maintain a complete stock of appliances at very low cost. The finance charges are only 3% per annum interest, plus a flat charge of 1% for a period of 90 days. You can finance 90% of the wholesale cost.

When needed, up to three extensions of 30 days each can be arranged. A pro rata refund of the interest charge is granted whenever advance payment is made.

**Dealers can increase floor display of variety of lines and models through Wholesale Floor Finance Plan, described in special dealer folios.**

course, bearing in mind that by far the majority of prospective purchasers want to buy major household appliances on time. A known financing service will be a definite drawing card for greater dealer volume.

Instalment sales financing finds its proper niche and will continue to be widely used in budgeting the purchase of major items which have a recognized lasting value — where there is an appreciable equity realized through the months by the purchaser. Instalment terms should not try to outlast the life of the product itself.

It may seem out of place to throw in any word of caution just when things are starting to boom. At the same time, pointing out the mistakes of some merchants before the war may prevent repetition of those errors in the months to come.

In the merchandising of major household appliances financing arrangements are a part of the complete

"package" provided the customer. You know the folly of selling free service to such an extent that the discerning customer grows wary and questions the need for such elaborate service with regard to the product he is asked to buy. Similarly, terms should not be sold to the exclusion of the proper selling of the product and the dealer's own facilities. Successful instalment financing depends on continued customer satisfaction. That means proper selling in the first place with a product and service which live up to representations.

Feature the right financing plan for what it is: a friendly, convenient means of enjoying the new, improved household appliances while budgeting their cost over the early period of use in the home.

It is confidently expected that major household appliances will be high on the buying public's patronage list and

[see page 41]

* EXAMPLE	
On a \$1,000 wholesale transaction daily cost is about 17½¢	
Your wholesale cost (exclusive of delivery charges)	\$1,000.00
Down payment (10% of wholesale price)	100.00
Balance to be financed	\$ 900.00
Cost to you	9.00
1% flat charge (handling and insurance)	
Interest at 1% per month for 3 months (3% per annum)	6.75
Total cost for 90 days or approximately 17½¢ a day	\$ 15.75

**Home demonstrations leading to sales encouraged in provisions of Wholesale Floor Plan. Insurance protects equities of both customer and dealer.**

### Appliances help sell themselves

This Plan will be available for eligible appliances when Regulation W is modified to permit home demonstrations

Before purchasing, many customers prefer to actually test the performance of appliances in their homes. For this reason, you'll find the Home Demonstrator Plan of real sales value. Without any additional charge, Universal C.I.T. provides for one out of four appliances on floor plan to be out on demonstration at the same time. All you need to do is this:

1. On the form provided, notify your Universal C.I.T. local office that an appliance has been sent out on demonstration.
2. Within 7 days contact the customer for his signature on the dotted line.
3. The customer's instalment contract, forwarded to Universal C.I.T. serves to satisfy the wholesale commitment on the appliance and any balance due on the transaction is sent to you by check. Should the appliance not be sold, you simply let Universal C.I.T. know that it is back on the floor.



# insurance

**RETAIL** A sales point having definite customer appeal, is insurance which is procured by Universal C.I.T. to protect, without extra charge, the purchaser's interest—and yours—in appliances financed at retail. Coverage up to the remaining unpaid balance on time sale contracts is provided. Appliances are insured against loss or damage arising from fire, theft, flood, transportation and many other perils.

**WHOLESALE** Also for your benefit, insurance, procured by Universal C.I.T. affords protection similar to that above on appliances financed under the Wholesale Floor Plan. This coverage, cost of which is included in the floor plan charge, safeguards your interests up to the full amount of the laid down wholesale cost. Appliances on home demonstration are included.



# Combination of Directional And Non-Directional Sound Distributor

by **CHRISTIAN A. VOLF**

*Director of Research,  
Robinson-Houchin Optical Co., Columbus, Ohio*

**W**HEN we trace developments of sound reproducers, we fail to find any evidence where old and proven acoustic theories have been given much consideration; instead, many more complicated new theories and applications have been developed by independent research. There are certain fundamentals which govern good acoustical effects. In "Sensations of Tone" by Helmholtz, fundamental formulae covering acoustic principles can indeed be applied to our present day loudspeaker designs with greater success than all the tried experimental shapes and designs that have appeared on the market in the past 25 years.

Helmholtz has suggested that echoes and reverberations of musical sounds are the most important agents to quality as is the importance of the false to the true vocal cords in voice. Helmholtz states that echoes and reverberations should not be absorbed but that we should learn to understand the handling of these factors rather than to destroy them. It can hardly be denied that, in the acoustical arts, major attention has been given to the elimination by absorption of all of these undesired echoes and reverberations while architects and acoustical designers have formulated so many fantastic shapes in order to produce good acoustical results in theaters, large enclosures or for outdoor amplification. It is a known fact that our most perfect acoustic conditions are still to be found in some of our older buildings and none of the new architectural designs have come anywhere near producing as good results as we find in old brick structures.

In steel and concrete structures one should not look for good acoustics regardless of the plasters that may be used on the inner walls. It is not that

the concrete mass is detrimental but the steel girders which form the skeleton of the structure are the deciding factor which tend toward poor acoustics in our modern buildings and churches. Compare the sound effects and distribution from many famous carillons in the European countries; they can be heard for miles away. The same is true with relatively small operated bells in little villages where the churches are more often of brick or wood structure. The chief reason for such good effects is the fact that the bells are not suspended from or anchored to steel girders but are more often suspended from heavy oak plank.

As a matter of illustration, one needs only to observe the carillons from the Riverside Church in New York or the Mellon Church in Pittsburgh. They are among our latest and no doubt most costly belfry towers in the country, yet one has difficulty in hearing the carillons with reasonable fidelity a block away. The reason for this poor acoustical result has little to do with the openings in the belfry or its shape or the height from which they are suspended; it rests chiefly upon the fact that more than 75% of the total output is carried through the steel girders and grounded directly into the foundation of the church proper. As evidence, those who are familiar with the famous carillons in the various European countries can best bear witness to the great difference represented in the beauty of the sounds coming from our famous cathedrals and the carillons in Mechlin, Ghent, Antwerp, Bruges, and Namur which far excel the results obtained in any of our modern architectural church structures employing carillons.

When sound motion pictures were first introduced into our theaters, many new forms and shapes of amplifying horns were developed in order to achieve better and more natural hearing results in the many different sizes and types of architectural enclosures but somehow the problem has never been solved to entire satisfaction. As a matter of fact, it was given up as hopeless more than 12 years ago when it was decided that we should build theaters to accommodate the loudspeakers which from laboratory tests were satisfactory but were total failures when they were to operate under natural conditions. Many theaters have since been built to suit the sound equipment. One of the largest theaters

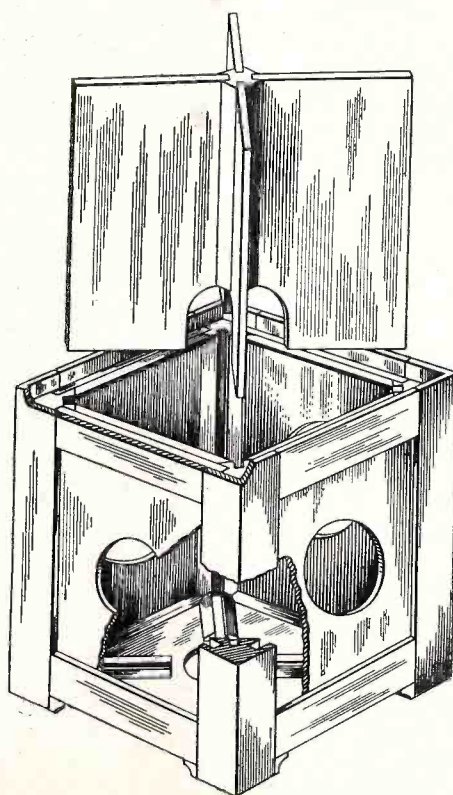


Figure 1





## THE HEADLINER

It's *all*-new inside and out—a handsome electronic triumph in 3 smart finishes—Early American Maple, Blonde Moderne, Polished Walnut.

Easy-to-read, slide-rule dial with back-lighted numerals. Matched ivory controls, full-width grille. AC-DC, 4 tubes plus a rectifier.

A complete superheterodyne with electrodynamic speaker. Radair Antenna. Strobe-Sonic Tone, of course.

You can *hear* the difference!

★ ★ ★

*After World War I, 886 different radio brands were sold. By 1940, 742 were orphans. Be sure you don't sell an orphan—be sure with Stewart-Warner!*

MORE THAN EVER, YOU CAN DEPEND ON

**Stewart-  
Warner**

*Radios*

*Radio-phonographs*

CHICAGO 14



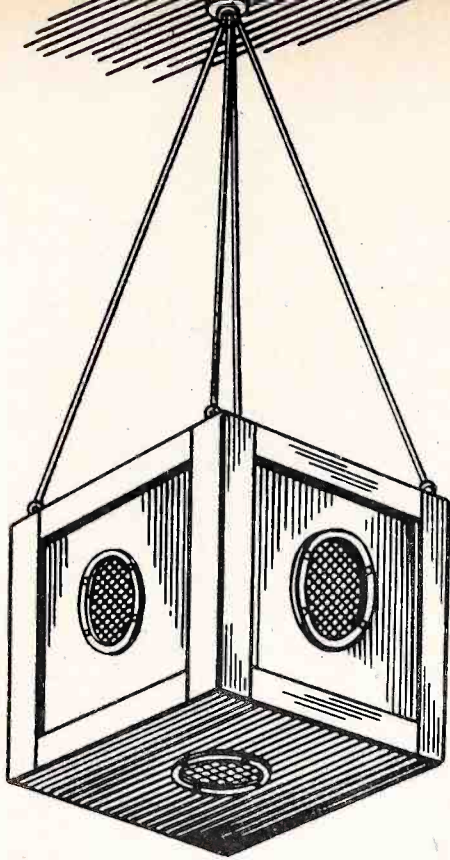


Figure 2

to be built on Broadway, which received so much advance publicity in that it promised to become the last word in perfection in the acoustical arts, turned out to be the biggest flop in sound motion picture theaters. The truth of the matter is, we are still designing theaters to suit the sound system and, when the theater has been completed, we often must then redesign our sound system to suit the new theater. What finally is arrived at is a fair compromise and acceptable system worked out for each individual theater. This procedure is rather costly and could be avoided if we return to well known acoustic principles which have proven to be excellent wherever they are employed.

The foregoing history has merely been cited to convince those interested in the acoustical arts that the selected building material and its mass is of greater importance than the shape within the theater as long as we do not totally disobey certain physical laws of shapes as was the case in the formula embodied in the ceiling of the Radio City Music Hall. The chief objection to that ceiling being that, instead of the ceiling introducing an expansion factor, it introduced sharp reflective surfaces which resulted in many echoes when it was first tried out. It was quite an expensive procedure to overcome, perhaps the worst acoustical condition ever encountered in any theater before it was tolerably corrected with sound absorption materials throughout, and then an abnormal increase of loudspeaker units became necessary to overcome the deadening effects on sound. The mistakes made in such outstanding structures are inexcusable if we follow

through with the mass of knowledge actually available in the science of acoustics.

The present illustrated directional and non-directional resonator and sound distributor challenges anything heretofore introduced toward perfection of good acoustics within large enclosures as well as out of doors sound amplification. Theoretically and in practice, it represents well known acoustical principles and disobeys none of the acoustical laws. The relationship of air column, mass and quality of material as well as form has been fully considered as illustrated in *Fig. 1* from which all structural details can be observed. The dimension constitutes a 24" cubicle air column, the weight mass of this small chamber without any hardware or loudspeaker units installed is exactly 90 pounds. In comparing this weight mass with any other empty reproducing chamber of similar size, it will be found three to four times heavier.

Five loudspeaker units of various dimensions may be installed within the 24" cubicle space and a four-sectional dividing section slides into the grooved segments, thereby separating the back of each unit from the other. The resonating box contains no other electrical equipment. The total unit is preferably suspended from a ceiling height to a level most suitable and in proportion to the total ceiling height as shown in *Fig. 2* or, when employed in connection with motion pictures, is placed either directly above the screen or one unit on each side of the screen—depending on the size of the theater.

The same unit may also be employed as a console cabinet upon which may rest a radio and public address amplifying system as illustrated in *Fig. 3*. In this way it forms a complete pro-

fessional sound recording unit of highest quality.

A six-way switch is built into the amplifier through which each independent unit may be controlled separately or all five jointly. In substance, it may well be defined as a five-dimensional sound system since each loudspeaker unit is sharply directional and yet, when all five units are operating, it introduces no directional characteristics whatsoever. This is particularly true when it has been suspended from the ceiling. One becomes aware of a totally new sound effect—namely that of quantum or mass sound, which theoretically would be the same as the fifth dimension. Helmholtz gave much consideration to the combinational tones in music and it is precisely these qualities that are brought out with astounding realization. Actual tests were made of the sound values and it has been proven beyond a question of doubt that there is no predominance of higher or lower frequency response from any point within the enclosure but an absolute pure blending of the tonal response from the various units when measurements are taken from a reasonable distance from the sound source.

From the practical aspect, the resonator offers not alone a superior acoustical result but simplifies a sound installation in large auditoriums or theaters since it requires only one outlet for each unit and, since the distribution of sound may be considered perfect, it can readily replace an average installation where 25 to 50 loudspeaker units are generally employed toward the same end.

In view of the structural simplicity, there is naturally little technical information necessary; the illustrations may be considered self-explanatory.

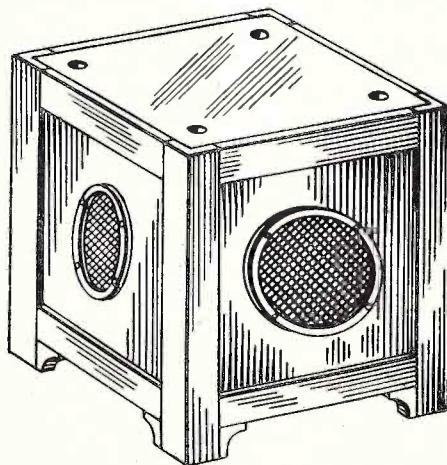
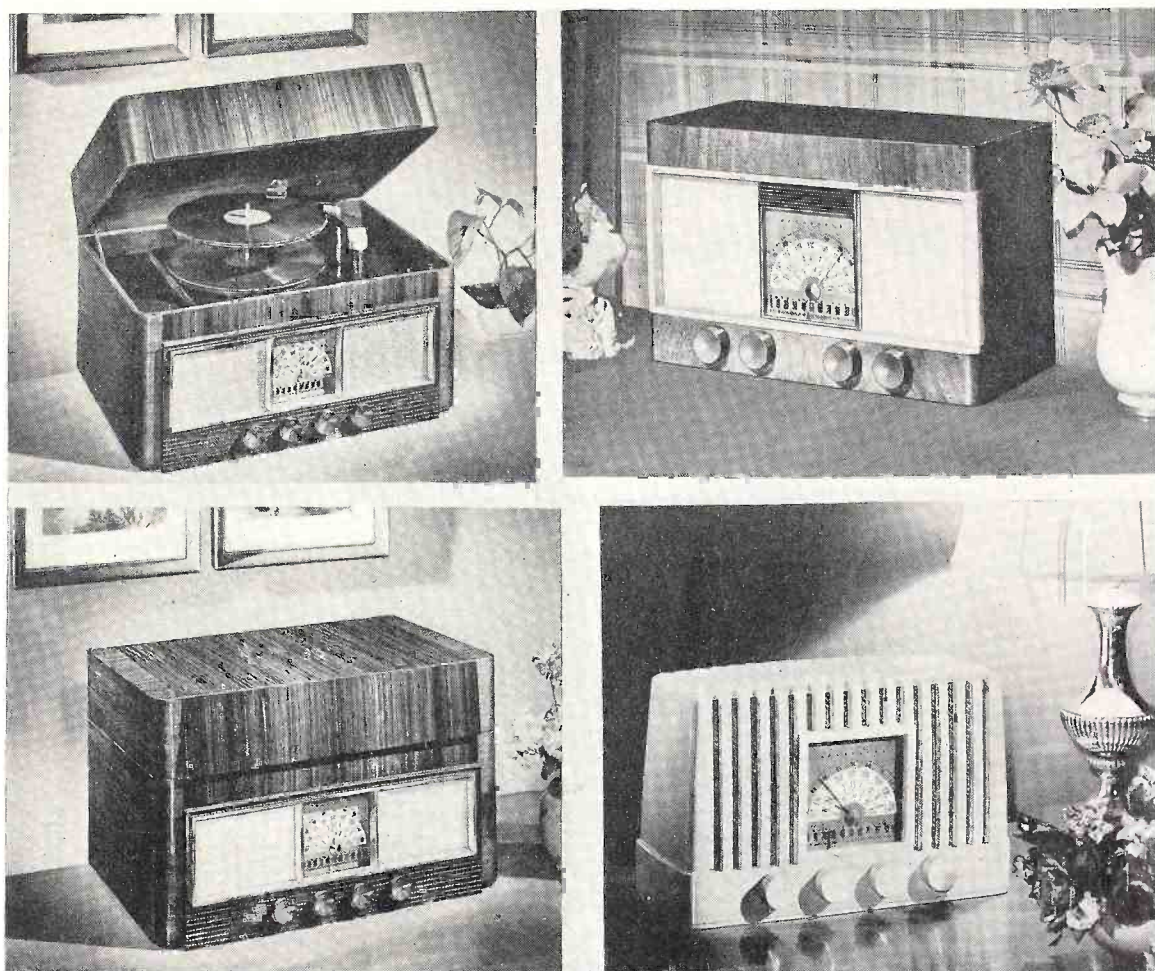


Figure 3—Line drawing of the speaker baffle which may be suspended as in *Fig. 2*, or used as base for p-a system shown right.





## MERCHANDISE PRE-VIEWS—16



Three models of a line of fifteen: Left: Top shows Model EC-300 table phono-radio combination open; bottom, closed. Right: Top is Model EC-103, in mahogany. Bottom: Model EC-102, plastic case in ivory, walnut or ebony.

# SETS IN MODERN

**T**HE Echophone Division of the Hallicrafters Company, Chicago, announces the first group of its home radio sets—two types of table model receivers and a radio-phone combination table model.

Featured in all three models is a duplex dial incorporating a separate linear band spread scale. This was previously used only on communications receivers; it greatly facilitates short wave tuning as it provides, by means of the separate linear band spread scale, wide separation of stations at all frequencies in the tuning range. Utilizing both plastics and woods for modern dress, the new Echophone models emphasize outstanding performance in the regular broadcast bands and the globe-girdling short wave broadcasts, including the intriguing amateur, aircraft, marine and police transmissions.

The influence service veterans are expected to exert in peacetime home radio buying has been an important consideration in Echophone planning. Millions have shed their uniforms and gone back into family circles, carrying with them a brand new conception of radio values, with quality performance high on the list of features to be demanded in home radios, it was explained.

According to company officials, the intimate knowledge gained in communications training centers and in combat handling of radio and electronics equipment with its war-perfected capabilities cannot help but be a vital factor in the veterans' choice of peacetime radios. As the company views it, war experience with radio has created in the postwar home market an entirely new and important segment of radio-wise buyers who will be seeking in

peacetime sets a carryover of many of the wartime developments that assure top performance.

Model EC-102, a five tube, three band, AC-DC table model (see illustration bottom, right), is a handsome plastic-enclosed receiver that will be available in a lustrous ivory finish as shown, or in mottled walnut or distinguished ebony.

Model EC-103 receiver, also a five tube, three band, AC-DC table model (see illustration top, right), will come in a beautiful full dress cabinet of polished Honduras mahogany, with blonde maple framing the speaker grille. Both feature the duplex dial arrangement for electrical band spread tuning.

Both models cover the standard broadcast band of 540 to 1720 kilocycles, and short wave from 2.3 to 7.1 megacycles and from 6.9 to 22 megacycles, providing opportunity for exploring amateur, aeronautical, coastal marine, police and international short wave frequencies. Listed also are the

[see page 41]



# 10,000,000 Television Receivers Wanted

**Survey of consumers indicates that the majority of these families definitely plan the purchase of a television receiver.**

**A** POSSIBLE market potential for home television receivers may reach nearly 10 million sets during the next five or six years providing telecast facilities are made available in all urban areas. This is based on the answers given by home radio listeners, 28% of which are now located within range of existing television transmitters.

26.6% of the urban families interviewed said they definitely planned to buy a television receiver, and 18.5% were considering television but had not definitely made up their minds. In other words, 45.1% or possibly 9,603,000 families are considering the purchase of a home television set. These possible prospects are pretty evenly distributed in different income groups. The only significant drop is in families with normal annual incomes of less than \$1,000.

When asked how much they thought they would pay for a television receiver, 58.9% said they would pay from \$100 to \$249 and 31.0% said they would pay from \$250 to \$500. Only 3.4% said they would pay less than \$100 while 5.9% appeared to be willing to pay more than \$500. The average price for all families interested in the purchase of a television set was in the \$250-\$500 range.

A set designed for four people viewing at one time apparently filled the average need of about 80% of the families. 12.2% said five persons. Only 1.1% answered one person while 8.6% replied over five persons. The



by **FRANK MANSFIELD\***

public is evidently anticipating television images larger than 10 x 15 inches and does not realize how screen size affects the cost of a television receiver.

In spite of the fact that color television exists only in the laboratory state, there appear to be three prospects who want color television to one stating he wants black and white only. Desire for color decreases as income decreases and only one out of five of those who want it say they will pay over \$100 extra for it.

In answer to the question: "will television need a new programming structure?" there's little evidence that television will supplant movies in the public's mind. People think of tele-

vision in terms of a new active medium, particularly for sports, spot news and drama by real people. 33% of the people said their favorite television program is sports; 20.0% drama by real people; and 19.%, news. This differs materially from current radio program popularity and obviously from motion pictures.

Only one in six people said they would insist on a home demonstration of television. Of those who said they definitely plan or will buy, the survey indicated market potentials of 773,000 sets in homes with normal annual incomes of \$5000 and over; 1,633,000 where normal incomes ranged from \$3000 to \$5000; 5,069,000 where normal incomes ranged from \$1000 to \$3000; and 2,128,000 where normal incomes were under \$1000.

## THE SURVEY

We know that the high earning power of the last four or five years tends to make people believe they can and will buy most of the things they think they want. We also know that, due to this high earning power, people believe they will be able to spend much more for the things they want than they did in the pre-war era.

In short, we are faced by a situation in which people with more money than they have ever had, want to buy more than they ever aspired to. Simple arithmetic indicates that all of these intentions can never be carried out. Nevertheless, our function remains only to report what we learn and to interpret only on the basis of these reports.

Hence, rather than to try to find out what the potential television market might be in 1946, or 1947, or 1948, we tried instead to determine:

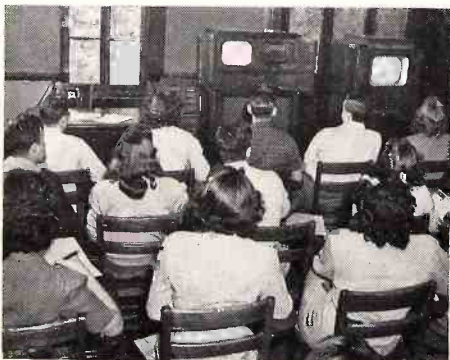
a) *Do people want television despite its limitations?*

b) *How much do they say they are willing to pay for it?*

c) *What do they expect to get from their television set?*

Most of the population must base opinions of television on what they have heard or read about it. A previous study of some 2000 urban families showed that less than one out of six persons had actually seen a television set in operation.

\*Sales Research Department,  
Sylvania Electric Products Inc.



**THE COVER.** Tomorrow's Television Customers—Youngsters in Lake View High School, Chicago, attend special television show marking Silver Anniversaries of radio broadcasting and of American Education Week (last fall). Telecast over television Station WBKB, dramatized role of radio in education during past 25 years, portrayed part of radio and television in education of future. Prepared in cooperation with Radio Manufacturers Association, program was enacted by student members of Central Radio Workshop, Radio Council of Public Schools.



# TELEVISION BUYING SURVEY CHART

[see following page]

## HOW MANY URBAN FAMILIES PLAN TO BUY A TELEVISION SET?

	%	Number
Definitely plan purchase	26.6	5,660,000
May purchase, but not definite	18.5	3,943,000
Do not plan	54.9	11,697,000
	100.0	21,300,000

In other words, 45.1% or 9,603,000 families are thinking of buying a television set. Experience shows that people are excessively optimistic in the discussion of plans to buy things they would like to have.

## HOW IS THE INTENTION TO BUY AFFECTED BY INCOME?

	By Economic Groups			
	A	B	C	D
Definitely plan purchase	37.1	31.5	31.2	15.5
May purchase, but not definite	23.3	23.3	18.4	15.7
Do not plan	39.6	45.2	50.4	68.8

Although the degree of interest slackens as income decreases, it is only in the lowest economic class that we find a significant drop.

These figures show that despite the smaller proportion of prospects in the lower income groups, they make up the major share of the market, numerically. For example:—

Definitely plan and may buy	
A	773,000
B	1,633,000
C	5,069,000
D	2,128,000
<b>TOTAL</b>	<b>9,603,000</b>

Thus, the two top brackets constitute a total of 25% against 75% for the two bottom brackets as far as number of sets is concerned.

## HOW MUCH DO PROSPECTS THINK THEY WILL PAY?

	%
Under \$100	3.4
\$100 — \$149	15.6
\$150 — \$199	20.8
\$200 — \$249	22.3
\$250 — \$299	10.9
\$300 — \$349	11.0
\$350 — \$500	10.1
Over \$500	5.9

The average for all families interested in buying is between \$200 to \$250.

## WHAT WOULD THIS MEAN IF IT WERE TO MATERIALIZE?

Income Group	Dollar Volume
A	\$ 243,171,000
B	436,928,000
C	1,217,191,000
D	519,156,000
<b>TOTAL</b>	<b>\$2,416,446,000</b>

Such a figure is obviously beyond reason. It does

show a strongly favorable public attitude toward television.

## HOW MANY PEOPLE WILL WATCH A TELEVISION SHOW?

One	1.1%
Two	23.0
Three	30.2
Four	24.9
Five	12.2
Over Five	8.6

100.0%

A set designed for four people viewing will fill the average need of about 80% of the families.

## HOW LARGE A SCREEN WOULD PEOPLE LIKE TO HAVE?

Under 6" x 8"	8.5%
6 x 8 to 10 x 15	27.9%
10 x 15 to 17½ x 20	29.5%
Over 17½ x 20	30.7%
No preference	3.4%
No preference	3.4%

100.0%

This, of course, does not take into consideration the relative costs of the various screen sizes. It does indicate, however, that most of the public is looking for a set having a screen larger than 10 x 15 inches.

## WHAT IS THE RELATION BETWEEN SCREEN SIZE DESIRED AND NUMBER OF PEOPLE VIEWING?

	Number of people viewing		
	1 and 2	3 and 4	Over 4
Under 6" x 8"	8.9	9.3	5.8
6 x 8 — 10 x 15	35.2	28.1	18.7
10 x 15 — 17½ x 20	22.9	31.3	32.3
Over 17½ x 20	28.5	28.1	40.6
No estimate	4.5	3.2	2.6

**TOTAL** 100.0% 100.0% 100.0%

Obviously, screen size desired relates directly to size of family.

In spite of the fact that color television still exists only in the laboratory stage, it has received so much publicity that it seemed wise to test the public attitude toward it. The following answers obviously represent the effect of hearsay on the public.

## DO YOU WISH TO HAVE COLOR OR BLACK AND WHITE TELEVISION PROGRAMS?

Want color	71.8%
Want black and white only	26.3%
Don't know and no preference	1.9%

100.0%

Color is a three-to-one selection over black and white. Since the desire for color decreases as income decreases, the indication is that anticipated cost is largely responsible for the 26.3% who do not want color.



# TELEVISION BUYING SURVEY CHART

[from page 27]

## HOW MUCH EXTRA IS COLOR WORTH TO THOSE WANTING COLOR?

	Of those wanting color
Will pay \$200 extra	19.6%
\$150 but no more	2.4
\$100 but no more	29.0
Will not pay \$100	41.7
Don't know and no answer	7.3

100.0%

About half say that they will pay \$100 or more for color on top of the price set for black and white. Since the lowest figure quoted in the survey was \$100 it is impossible to determine the number who would pay \$25, \$50, or \$75.

## WILL PEOPLE WANT A WALL SCREEN?

Want screen part of set	77.1%
Want wall screen	20.9
Either	0.5
Don't know	1.5

100.0%

The answer is a decided "no"—and especially in the lower income groups where space for projection is small.

## DO PEOPLE PREFER OUTRIGHT PURCHASE OR RENTAL PLAN?

Outright	80.8%
Rental	17.3%
Don't know and no answer	1.9%

100.0%

Outright purchase is the choice even in the lowest income groups. Those choosing a rental plan place \$2 to \$3 per week as the price to charge.

## WHAT ENTERTAINMENT IS NEEDED?

Most popular type of program	
Sports	33.0%
Drama by real people	20.0
News	19.4
Musical	7.2
Movie films	6.1
Variety	6.1
Travel	3.8
Educational	3.0
New Product demonstration	1.4

100.0%

There's little evidence that television supplants movies in the public's mind. People think of television in terms of a new active medium for transmitting programs for which it is particularly adapted—sports, spot news, drama by real people, etc. The list differs materially from current radio program popularity and obviously from motion picture.

How much will limitations of the present product affect the prospect?

We gave prospects every opportunity to back down, by citing current problems and asking what effect these would have on their decision to buy a television set.

## CONSIDERING EVERYTHING, DO YOU STILL THINK YOU WANT TELEVISION?

Of those definitely planning to purchase and those possibly purchasing

	%	No.
Yes	47.7	4,582,127
No	23.3	2,240,434
Don't know	29.0	2,780,439

Total 100.0% 9,603,000

In other words, it's pretty hard to break down the interest which has developed.

Our final question gave the prospect of a choice of three alternatives:

Screen Size		Of those still wanting television
		% No.
3½ x 5 screen @ \$175	12.3	561,963
5¼ x 7¾ screen @ \$250	44.8	2,055,267
16" x 20" screen @ \$400	24.8	1,136,699
None	8.0	365,219
Don't know	10.1	462,979

Total 100.0% 4,582,127

When a price tag is placed on screen size, the complexion changes. It seems obvious that prospects expect a larger screen, but will settle for a smaller one at their price.

This would mean in dollars:—

	No. of Sets	
3½"x5" screen	561,963 @ \$175	\$ 98,343,525
5¼"x7¾" screen	2,055,267 @ 250	513,816,750
16"x20" screen	1,136,699 @ 400	454,679,600

Total 3,753,929 \$1,066,839,875

This is still an obvious over-estimate. For one thing, it does not take into consideration availability of television programs. No time limit was put on intent to purchase.

No allowance was made for the fact that only about 28% of the radio homes are situated in areas where television reception is now available.

Responses in these sections of the country without television reception showed no variation in desire to purchase from areas where television reception is known to be available at present.

If we assume that definite intent to purchase television sets under existing conditions will be limited to those areas where television reception is now available and apply the 28% against the previous figures we get:—

	No. of Sets	
3½"x5" screen	157,350 @ \$175	\$ 27,536,187
5¼"x7¾" screen	575,475 @ \$250	143,868,690
16"x20" screen	318,275 @ \$400	127,310,288

Total 1,051,100 \$298,715,165



# KEN-RAD RADIO TUBES



**THIS  
GRAND NEW  
DEALER'S BOOK  
DOES A MAN-SIZE  
JOB FOR YOU!**

**K**  
**KEN-RAD**

*Electronic* TUBES

**ESSENTIAL CHARACTERISTICS**  
Receiving Types  
metal - glass - miniature

GENERAL ELECTRIC

**BOOSTS YOUR** Sales  
Service  
Profits

HERE, IN ONE HANDY VOLUME, ARE:

- ✓ Tube ratings and characteristics
- ✓ Classes of service
- ✓ Basing diagrams
- ✓ Outline drawings with dimensions
- ✓ Interpretations of ratings, pages for notations, etc.
- ✓ —all the data you need to sell tubes, or to make replacements or changeovers when servicing sets

**WRITE FOR YOUR FREE COPY TODAY!**

KEN-RAD'S biggest aid to you is "Essential Characteristics", shown here. No other tube book equals it in down-to-earth *helpfulness*. And how the orderly listing of data saves time! You can find, in a flash, the information you need about a metal, glass, or miniature tube. Whether ratings, type of service, or basing data—all the facts are given. All are authoritative and up-to-the-minute!

"Essential Characteristics" makes you a tube specialist, if you aren't one now. It's the lead-off item in Ken-Rad's long 1946 list of dealer helps. Displays, wall plaque, decal, blotters, stationery—all of them in attractive colors—these round out the picture. *You'll make more money* handling Ken-Rad tubes. Why? Because Ken-Rad gives you *more assistance*—real help that pays off in *profit-dollars!*

178-E7-8880

# KEN-RAD

DIVISION OF GENERAL ELECTRIC COMPANY

OWENSBORO, KENTUCKY



# CIRCUIT COURT

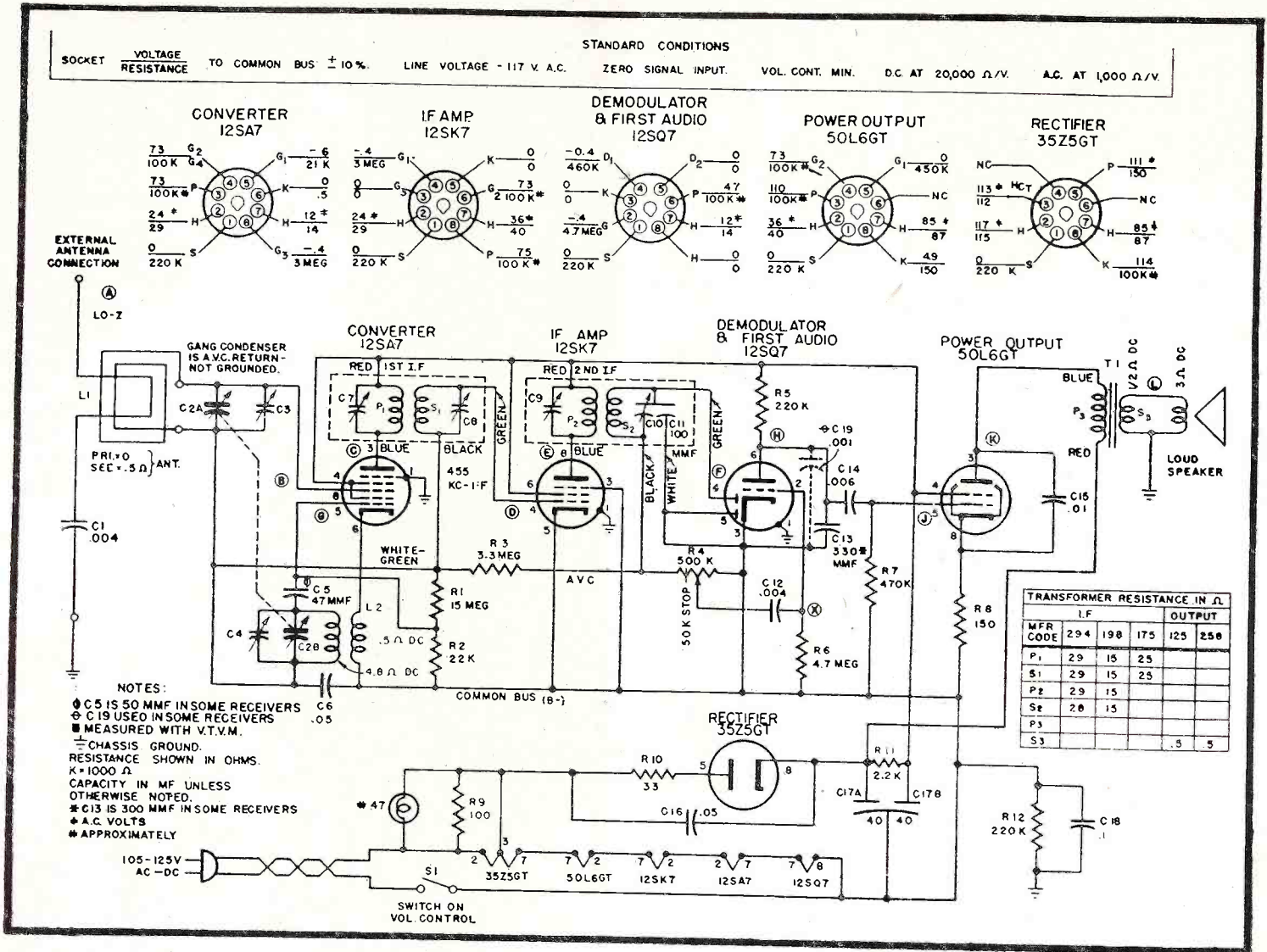


Figure 1. Bendix Series 526

## AVC CONTROLLED STAGES

The increasing use of oscillator-developed initial bias on the AVC controlled stages of the new receivers seems worthy of a detailed description. Considering the simplicity of the circuit, it certainly provides a generous share of advantage.

As an illustration of the over-all layout of a typical circuit in which the feature is employed, the schematic of the five tube AC-DC receiver made by Bendix is shown in Fig. 1. This chassis is used in their 526 series of instruments. The tube lineup is conventional, as are most of the component values.

The single part around which our discussion revolves is the resistor labeled R1. It is this 15 megohm unit which so easily, and inexpensively, gives several distinct advantages.

In Fig. 2 is shown the essential components which indicate the actual result of the use of R1. The oscillator portion of the mixer circuit is shown. This is a

simple triode Hartley oscillator in which the screen acts as a plate, bypassed to ground for RF voltages, and the cathode is returned to ground through a coil to provide feedback voltage.

C5 is the usual grid coupling and blocking condenser. The grid leak is connected from the grid to ground and across this will appear a voltage, developed as a result of the oscillator action, which will have the polarity indicated. With the values shown the developed voltage across R2 will be of the order of 5 to 15 volts. In most circuits the voltage will vary somewhat over the tuning range of the set, but 10 volts is not an uncommon value and for the purpose of discussion will make calculations easy.

In parallel with R2 we find a voltage divider consisting of R1; the AVC filter, R3; and the volume control, R4. Under conditions which provide no input to the receiver, the 10 volts appearing across

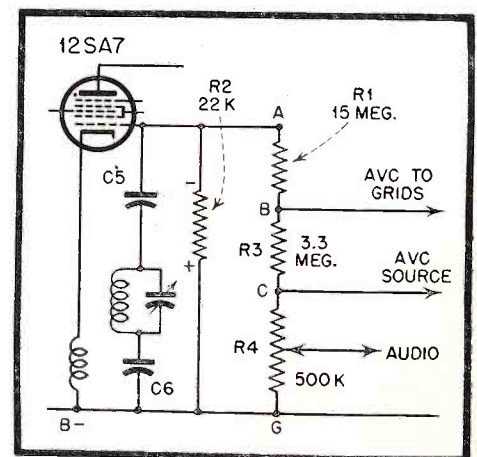


Figure 2

R2 will be divided and show up at the several points as follows: at A, 10 volts, at B, 2 volts, at C, .265 volts and at G is the reference point of 0 volts.

The important point is B which connects to the grids of the mixer and IF tubes. A constant bias of 2 volts is applied in the no-signal condition. Since

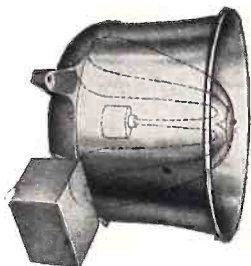
[see page 38]





# RACON

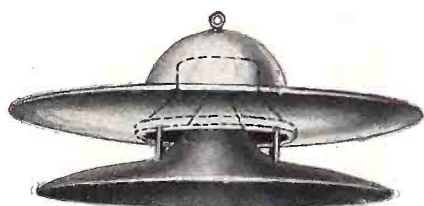
## SPEAKS FOR ITSELF



**MARINE SPEAKER;** approved by the U. S. Coast Guard, for all emergency loud-speaker systems on ships. Re-entrant type horn. Models up to 100 watts. May be used as both speaker and microphone.



**RADIAL HORN SPEAKER;** a 3½' re-entrant type horn. Projects sound over 360° area. Storm-proof. Made of RACON Acoustic Material to prevent resonant effects.



**RADIAL CONE SPEAKER;** projects sound over 360° area. Cone speaker driven. Will blend with ceiling architecture. RACON Acoustic Material prevents resonant effects.



**AEROPLANE HORNS;** super-powerful and efficient P.A. horns for extreme range projection. 9-4-2 single unit trumpets available.

Indoor — outdoor or on shipboard — RACON SPEAKERS, HORNS, and DRIVING UNITS are designed for every conceivable application.

Racon's precision manufacture assures maximum efficiency and high fidelity "true-tone" reproduction even at full power output. All-weather construction design makes Racon speakers impervious to any climatic condition, prevents resonant effects, assuring long, rugged, trouble-free service. Specify and use RACON! All types now available. Write us your requirements now — get our new catalog.

# RACON

## RACON ELECTRIC CO.

52 EAST 19th ST. NEW YORK, N. Y.



## Routine for Speedy Servicing

[from page 18]

**SET OWNER'S WARRANTY No. 9622**  
KEEP THIS WITH RADIO

Owner: \_\_\_\_\_  
Street: \_\_\_\_\_  
Date Job Accepted: \_\_\_\_\_ Delivered: \_\_\_\_\_  
Radio and Model: \_\_\_\_\_  
Cost of Job \$: \_\_\_\_\_  
PARTS USED AND WORKMANSHIP GUARANTEED 90 DAYS

**M & J RADIO REPAIR**  
Phone ALLegheny 2466  
129 So. E2nd St. Philadelphia, Pa.

Owner's Name: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Street: \_\_\_\_\_ Date Accepted: \_\_\_\_\_  
Radio and Model: \_\_\_\_\_ Date Delivered: \_\_\_\_\_  
Material: \_\_\_\_\_ \$ \_\_\_\_\_  
Labor: \_\_\_\_\_  
Total Cost \$: \_\_\_\_\_  
Paid \$: \_\_\_\_\_  
Charge \$: \_\_\_\_\_

**No. 9622**

Remarks: \_\_\_\_\_

tag was taken off, and Mr. Goldman would then know what number job was coming off the rotation line next.

If the jobs did not come out of the repair shop in numerical order, he would investigate, and usually find that the remaining job was taking longer than others or probably awaiting some repair parts that weren't on hand in the shop. But in all cases, Mr. Goldman saw to it that all jobs were being handled in the order that they came in.

"Since installing our rotation system," he says, "we have been very suc-

cessful in having almost one hundred per cent of our repair jobs completed on time. This has satisfied and made better customers, and as far as we are concerned, speeded up our output, by preventing repairmen from spending time by seeking out certain sets on which to work, and also showing our repairmen that we weren't favoring any particular one of them by giving out the repair jobs to them, for all jobs are now handled in rotation, regardless of the model, make and the amount of work to be done."

## Instalment Aid

The Ronald Press Company, 15 East 36 St., New York, announces a new, time-saving Handbook for those who deal with instalment selling and financing. The volume is **INSTALMENT MATHEMATICS HANDBOOK** by Milan V. Ayres, former Analyst and General Manager, National Association of Sales Finance Companies, and Analyst, American Finance Conference.

It will be specifically useful to those who are engaged in instalment selling, to those making direct loans to individuals, to financing companies organized to deal in instalment paper, and to men in banks and other agencies making loans to finance time-payment activities.

The Handbook covers all the regular and special calculations necessary in instalment financing and time-payment liquidations in all companies or organizations operating in such fields. Its comprehensive tables and formulas are particularly timely in view of the expected sharp increase in this type of business as the flood of consumer goods rise. For using the formulas, no extensive mathematical knowledge is needed. The volume shows examples for all formulas.

**For the Man Who Takes Pride in His Work**

### FM and Television Band Coverage on Strong Harmonics. Strong Fundamentals to 50 MC.

Another member of the Triplett Square Line of matched units this signal generator embodies features normally found only in "custom priced" laboratory models.

**FREQUENCY COVERAGE**—Continuous and overlapping 75 KC to 50 MC. Six bands. All fundamentals. **TURRET TYPE COIL ASSEMBLY**—Six-position turret type coil switching with complete shielding. Coil assembly rotates inside a copper-plated steel shield. **ATTENUATION**—Individually shielded and adjustable, by fine and coarse controls, to zero for all practical purposes. **STABILITY**—Greatly increased by use of air trimmer capacitors, electron coupled oscillator circuit and permeability adjusted coils. **INTERNAL MODULATION**—Approximately 30% at 400 cycles. **POWER SUPPLY**—115 volts, 50-60 cycles A.C. Voltage regulated for increased oscillator stability.

**CASE**—Heavy metal with tan and brown hammered enamel finish.

There are many other features in this beautiful model of equal interest to the man who takes pride in his work.



MODEL 2432  
SIGNAL GENERATOR



# Triplett

**ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO**



## GRID BIAS

[from page 14]

is normally 4 volts drop across  $R_k$  when no signal is applied to the grid. When the grid is driven 2 volts positive, the plate current will increase. When the plate current increases, the voltage across  $R_k$  increases. Increasing the voltage across  $R_k$ , we have learned, is the same as increasing the bias voltage or making the grid more negative with respect to cathode. Thus while we are trying to drive the grid positive with an incoming signal, the voltage across the cathode resistor is trying to neutralize this effect.

The result is that the plate current does increase but not as much as it would have, had the cathode voltage remained constant. The action is similar during the negative half cycle. When the grid is driven negative, the plate current decreases causing a decrease in the voltage drop across  $R_k$ . This lowers the bias, partly neutralizing the negative grid drive.

This reduces the gain of the stage as shown in the formula:

$$G = \frac{\mu R_L}{R_p + R_k(1 + \mu) + R_L}$$

Where

$G$  is Gain with an un bypassed  $R_k$

$R_k$  the cathode bias resistor

$R_p$  Tube plate resistance

$R_L$  Plate load resistor.

This reduction is not without benefit since degeneration can reduce frequency and amplitude distortion. It cannot be tolerated in output stages or where the value of cathode resistance is so high it would reduce the gain of the stage to where another stage would be required.

To reduce this degeneration a cathode bypass condenser is connected in parallel with  $R_k$ . There are two methods of explaining the effect of this condenser, both equally correct. From our basic knowledge of condensers we know it is not possible instantly to change the voltage across the condenser. The reason is that a condenser acts as a sort of storage tank

for electrons. If a condenser is charged to, say, 4 volts, it would require a definite amount of time to lower this to 3 volts.

How much time depends on how large the condenser is and how fast electrons are allowed to leak out of the condenser. If a condenser were connected across  $R_k$  as shown in Fig. 7 it would charge to 4 volts. When a signal is applied to the grid of the tube it would cause a change in plate current which would tend to change the voltage across  $R_k$ . However, if the condenser were large enough it would hold the voltage practically constant from one half cycle to the next. Thus degeneration would be prevented.

[To be continued]

## General-Purpose Oscillograph

Granted that there are many different types of oscillographs covering a very wide range of applications, none has a better claim to being the general-purpose instrument than the DuMont Type 208-B. Thousands of these oscillographs were in use prior to and during the war as the earlier Type 208. As the result of extensive war service, however, this 5-inch oscillograph has emerged with many improvements and refinements as Type 208-B. The features and specifications of this post-war oscillograph for all-around use are contained in a bulletin issued by Allen B. DuMont Laboratories, Inc., Passaic, N. J., and will be sent on request.



Masco MA-50 Amplifier 50 Watts of Truly rated power output for big PA systems



Masco Record Changer-Top Amplifier Improved and Modernized



Masco De Luxe Phono-Top PA Equipment



Masco RC-1 Portable Automatic Record Changer For twelve 10" or ten 12" records

Ask your jobber about these illustrated items of

# MASCO SOUND EQUIPMENT

reprinted from our recent ads



Masco MPA-3 All Electric Phonograph Reproducer



Masco Intercommunication Equipment Master-to-Remote and Master-to-Master 6 and 12 position



Masco MAP-15 True-Tonal Musical Instrument Amplifying System



Masco De Luxe High-Fidelity Amplifier For Records, FM and Television

# MASCO

**MARK SIMPSON MANUFACTURING CO., Inc.**  
32-28 49th Street, Long Island City 3, N.Y.

## SOUND SYSTEMS and Accessories

RAvenswood 8-5810-1-2-3-4

## DISTORTION

[from page 17]

distortion such as speaker rattle or binding voice coils or microphonic tubes, etc. as this type trouble causes little expenditure of time to the average radio serviceman. For that reason, the major discussions concerned the more difficult aspects of the subject.



# Shop Notes

## MOTOROLA MODEL 100

Intermittent operation in this receiver can be traced to one or more of the following:

- (1) Loose coil cans. This condition can be remedied by spotting all coil cans to the chassis with solder.
- (2) Loose R. F. or I. F. coil connections. Check for this condition carefully with a sharp pointed tool like a scriber.
- (3) Loose bypass condenser thimbles. Spot these to the chassis with solder.

(4) Defective tone control condenser located in the rear of the receiver housing. Replace.

- (5) Defective antenna receptacle.
- (6) Defective LA tube bias resistor.

### TONE CONTROL CIRCUIT

In some electric phonographs it is sometimes desirable to incorporate a tone control circuit for the purpose of attenuating the "lows" due to the fact that the instrument is too bassy. Such a circuit is illustrated in Fig. 1.

With the tone control in position "A", the tonal response is what it was originally. As the tone control is advanced to position "B", the "lows" are gradually attenuated. Of course the volume will be reduced somewhat as the tone control arm moves to position "B". However,

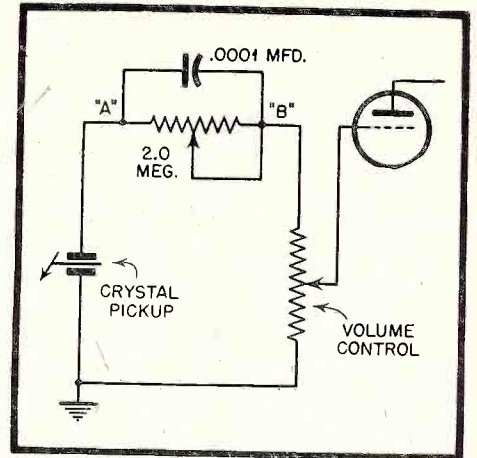


Figure 1

this drop in volume can easily be compensated for by advancing the position of the volume control arm.

### AUTO RADIO VIBRATORS

The spacing between the contacts of auto radio vibrators is a factory adjustment, and it should not be attempted by the service man. The reason for this is that the reeds of the vibrator are tuned to a certain frequency which is an integral design consideration used in matching the associated circuit components consisting of the power transformer and buffer condenser. Therefore, if the vibrator points become worn due to usage, the complete vibrator should be replaced.

If the points are pitted, a circuit overload should be checked for; and when cleared, a new vibrator should be installed.

When replacing component parts of a vibrator power supply, exact duplicates should be used. This refers particularly to the buffer condenser, power transformer and vibrator.

### AUTO RADIO IGNITION NOISE

Sources of interference encountered in auto radio receivers are as follows:

- (1) Radiation from ignition primary system and its leads
- (2) Radiation from ignition secondary system and its leads
- (3) Radiation from distributor breaking points and its leads (including metal members connected thereto)
- (4) Radiation from free metal members which pick up initial radiations due to (1), (2), or (3).

This interference may enter the receiver by means of the common "A"

## SERVICE DEALERS

Every issue of "RSD" carries Service Data on the popular new radio receivers now being manufactured. These Data Sheets fit into standard manuals — should be kept until new manuals are available — every technician wants this service!

"RSD" publishes more authentic articles on new servicing methods and new test equipment than other magazines. Trouble shooting is made easier — time is saved — more jobs can be done at greater profit.

Merchandising guidance is given to Service Dealers — from the 1-man shop owner to the biggest establishment. It's important to know how other successful Service Dealers conduct their business.

### YOU GET YOUR MONEY'S WORTH EVERY MONTH

During the past two years "RSD" has published over 305 pages of exclusive technical data . . . or about as much as the two contemporary trade papers combined. "RSD" also published over 200 pages of general interest and semi-technical material during the past two years — more than any other trade paper carried on these subjects. Besides — "RSD" carries more advertising from more manufacturers catering to Service Dealers. Subscribe to "RSD" today.

**USE THIS COUPON — FILL IN — RETURN IT TO US AT ONCE WITH YOUR REMITTANCE ATTACHED.**

#### RADIO SERVICE DEALER

12 issues \$2—24 issues \$3 in U.S.A. & Canada.  
Elsewhere \$3 per year.

342 Madison Ave., New York 17, N. Y.

Gentlemen: Please send the next . . . . . issues of RADIO SERVICE DEALER. Our remittance in the sum of \$. . . . . is enclosed.

Name . . . . .

Address . . . . .

City . . . . . Zone . . . . . State . . . . .

Firm Employed By: . . . . .

Position or Title . . . . .



circuit, the antenna and its lead-in, or through imperfectly shielded components in the receiver itself.

Elimination of source interference is effected by the following routine operations:

- (1) Bonding of all loose solid and flexible members
- (2) Tightening of all body bolts and nuts
- (3) Use of by-pass condensers across generator, and between "A" lead connection on ammeter and ground
- (4) Use of dome-light filter when using roof antenna
- (5) Locating the under-car plate antenna or the whip antenna on the side removed from the "A" battery receiver lead
- (6) Shielding the antenna lead-in
- (7) Ascertaining that all metal housings and shields of the receiver are effectively grounded.
- (8) Cleaning and adjusting breaker and points and contacts
- (9) Installing a breaker point filter
- (10) Reducing the receiver noise to signal ratio by replacing poor tubes and realigning receiver
- (11) Installing hub-cap springs
- (12) Installing a distributor suppressor
- (13) Utilizing adjustable interference reducing circuits such as the Magic Eliminode in Motorola receivers.

#### PHILCO COMBINATION 41-611

Hum which can be varied by increasing or decreasing volume control position. This usually indicates a defective audio tube or an open or broken shield in the audio circuit.

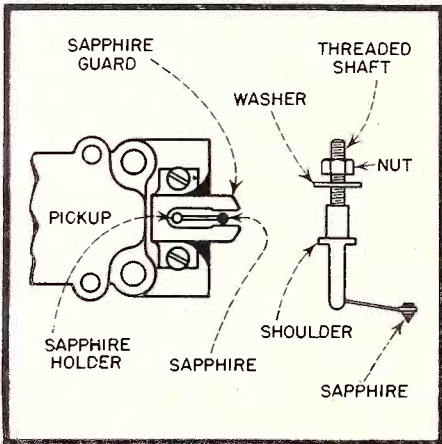


Figure 2

#### RCA MODEL NO. 960015

#### Replacement of Sapphire (Fig. 2)

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the viscoloid until the sapphire holder assembly comes free.

Use of a drop or two of acetone will facilitate the removal of the nut and shaft. Do not use as the crystal may break.

Insert threaded shaft of replacement sapphire holder through viscoloid and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful not to strip the threads or break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws.

Before using, check to see that the sapphire projects far enough (approx.

.020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder. Never bend the sapphire support wire.

#### Aireon Appoints

Walter A. Bowers has been appointed treasurer of Aireon Mfg. Corp., R. C. Walker, president, has announced. Mr. Bowers came to Aireon from Lawrance Aeronautical Corp. of Linden, New Jersey, where he was vice president and treasurer.



# Only RIDER MANUALS

## Cover THE 60 Million Receivers

Sixteen years of specialized publishing have produced for servicemen the only single source to which they can turn for authoritative servicing data on sixty million receiving sets now in American homes. The fourteen volumes of Rider Manuals cover the sets issued up to April 1942—the ones most likely to develop faults and come to you for diagnosis and repair.

Therefore, efficient operation of your servicing shop requires that it be equipped with all fourteen Rider Manuals.

These standard works continue their unchallenged leadership in the field of radio servicing reference books because of their reliability, their accuracy and their completeness. In them you will find receiver schematics, voltage data, alignment data, resistance values, chassis layouts and wiring, trimmer connections and other vital material.

Volume XV is now in preparation and will extend still further the services performed by preceding volumes. It will be bigger. It will contain especially prepared clarifications to be found nowhere else. It will offer this expanded servicing informa-

tion in such a way that it will save a serviceman hundreds of hours each year—many times the cost of the manual.

In the meantime be sure you have all fourteen volumes. You will enjoy their benefits for years to come!

#### NOW IN FOURTEEN VOLUMES

Volumes XIV to VII.....	each volume \$15.00
Volume VI .....	11.00
Abridged Manuals I to V (1 volume) .....	17.50
Record Changers and Recorders.....	9.00

#### GET ON THE MAILING LIST

First Post-War Issue Now in the Mails

#### "SUCCESSFUL SERVICING"

This monthly publication, dedicated to the financial and technical advancement of the radio and electronic maintenance man, is yours for the asking. Just . . .

#### MAIL COUPON

JOHN F. RIDER PUBLISHER, INC.  
404 (d) Fourth Ave., New York 16, N. Y.

Name.....

Address.....

City.....

State.....

## JOHN F. RIDER PUBLISHER, INC.

404 FOURTH AVENUE, NEW YORK 16, N. Y.

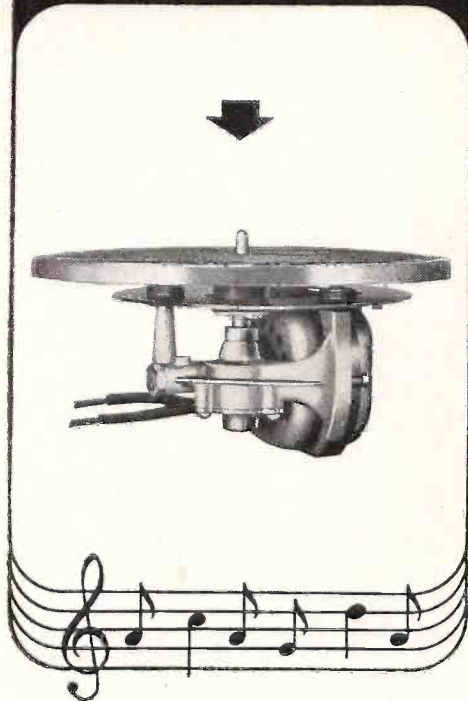
Export Division: Rocke-International Corp. 13 E. 40th Street New York City Cable: ARLAB



# SMOOTH SPEED

with

*Smooth Power*



You can be sure of unvarying speed for your phonograph mechanisms when you equip them with GI *Smooth Power Motors*. Test any unit from our wide line, in laboratory or in service, and you'll find it runs with accurate uniformity at its rated speed.

But you want other qualities, too, such as quick pickup, quietness and all 'round velvety smoothness of operation. You get all these in GI motors for phonographs, recorders or record-changers.

*For Smooth Speed, standardize on Smooth Power.*

**THE GENERAL INDUSTRIES co.**

DEPT. MS

ELYRIA, OHIO

Type	Retail Price	Type	Retail Price	Type	Retail Price	Type	Retail Price	Type	Retail Price	Type	Retail Price
OOA	\$ 2.35	2A3 (2A3H)	\$ 1.95	6D6	\$ 1.00	6Y6G	\$ 1.60	14AF7 (XXD)	\$ 1.00	40B1	\$ 1.30
OIA	2.00	2A4G	2.35	6D7	2.35	6Y7G	1.60	14B0	1.00	47	1.10
OA4G	1.95	2A5	1.00	6D8G	1.60	6Z4 (84/6Z4)	1.10	14B8	1.95	46	2.85
OZ4	1.60	2A6	1.00	6E5	1.10	6Z5 (6Z5/12Z5)	2.35	14C5	1.95	49	1.30
OZ4G	1.60	2A7	1.10	6E6	1.95	6Z7G	1.95	14C7	1.95	50	2.35
IA1/SE1	1.10	2A7S	2.35	6E7	2.35	6ZY5G	1.30	14E6	1.30	50A5	1.95
IA3	1.30	2B7	1.30	6F5, G	1.10	7-	1.30	14E7	1.60	50B5	1.60
IA4P	1.60	2B7S	2.35	6F5GT	1.00	7A4	1.30	14F7	1.95	50CoG	1.95
IA4T (IA4)	1.60	2E5	1.30	6F6	1.10	7A5	1.30	14H7	1.95	50LoGT	1.10
IA5G	1.60	2G5	1.60	6F6G	.90	7A6	1.30	14J7	1.95	50Y6G, GT	1.10
IA5GT	1.10	2S 4S	2.35	6F6GT	.85	7A7	1.30	14N7	1.95	50Z7G	1.30
IA6	1.30	2V3G	2.85	6F7	1.60	7A8	1.30	14Q7	1.60	52	2.85
IA7G	1.60	2W3, GT	1.30	6F7S	2.35	7AG7	1.60	14R7	1.60	53	1.60
IA7GT	1.30	2X2, 879	2.35	6F8G	1.30	7B4	1.30	14S7	1.95	55	1.10
IA8S	1.95	2Z2, G84	2.35	6G5 (6U5/6G5)	1.30	7B5	1.30	14W7	2.35	55S	2.35
IB1	1.10	3-	1.30	6G6G	1.30	7B6	1.30	14Y4	1.95	56	.80
IB4P (IB4/951)	1.30	3A8GT	2.35	6H4GT	1.95	7E7	1.30	15-	1.95	50A5	2.35
IB5 (IB5/25S)	1.30	3B5GT	1.60	6H6, G, GT	1.10	7B8	1.30	18	1.95	50S	2.35
IB7G, GT	1.30	3B7 (3B7/1291)	2.35	6J5, GT	1.30	7C5	1.30	19	1.30	57	.90
IC1	1.10	3D6 (3D6/1299)	2.35	6J5G	1.00	7C6	1.30	20	2.85	57AS	2.35
IC5G	1.60	3E6	2.35	6J6	1.95	7C7	1.30	22	2.35	57S	2.35
IC5GT	1.30	3LE4	2.35	6J7	1.30	7E6	1.30	24A	.90	58	.90
IC6	1.30	3LF4	1.95	6J7G, GT	1.10	7E7	1.60	24S	2.35	58AS	2.35
IC7G	1.30	3Q4	1.60	6J8G	1.60	7F7	1.60	25A6	1.95	58S	2.35
IC8	2.35	3Q5G, GT	1.60	6K4	2.85	7F8	1.95	25A6G, GT	1.10	59	1.60
ID1	1.10	3S4	1.60	6K5G	1.10	7G7 (7G7/1232)	1.95	25A7G, GT	1.60	70A7GT	2.35
ID5GP	1.30	4-	1.30	6K6G	1.10	7H7	1.95	25AC5G, GT	1.60	70L7GT	1.95
ID5GT, G	1.30	4A1	2.35	6K6GT	1.00	7J7	1.95	25B5	2.35	71A	.90
ID7G	1.60	4A6G	1.95	6K7, G	1.10	7K7	1.95	25B6G	1.95	75	.85
ID8GT	1.95	5-	1.30	6K7GT	1.00	7L7	1.95	25B8GT	1.95	75S	2.35
IE1	1.10	5T4	1.95	6K8, G, GT	1.30	7N7	1.95	25C6G	1.95	76	.90
IE4G	1.30	5U4G	1.00	6L5G	1.10	7Q7	1.30	25D8GT	1.95	77	.90
IESGP, G, GT	1.60	5V4G	1.60	6L6, G, GA	1.95	7R7	1.95	25L6	1.60	78	.90
IE7G	2.35	5W4	1.10	6L7, G	1.60	7S7	1.95	25L6G	1.30	79	1.60
IF1	1.10	5W4G, GT	.90	6NS (6ABS/6NS)	1.60	7V7	2.35	25L6GT	1.10	80	.70
IF4	1.30	5X4G	1.10	6N6G	2.35	7W7	2.35	25N6G	2.35	81	1.95
IF5G	1.30	5Y3G, GT	.70	6N7, G, GT	1.60	7X7 (XXFM)	1.95	25S (1B5/25S)	1.30	82	1.30
IF6	1.60	5Y4G	.75	6P5G	.85	7Y4	1.30	25Y5	2.35	83	1.30
IF7G, GH, GV	1.60	SZ3	1.10	6P5GT	.80	7Z4	1.30	25Z5	1.00	83V	1.30
IG1	1.10	SZ4, GT	1.30	6P7G	2.35	8-	1.30	25Z6	1.30	84/6Z4	1.10
IG4G, GT	1.30	6-	1.30	6Q6, G (6T7G)	1.30	9	1.30	25Z6G, GT	1.00	85	.90
IG5G	1.30	6A3	1.95	6Q7	1.30	10	2.85	26	.75	85AS	2.35
IG6G, GT	1.60	6A4 (6A4/LA)	1.60	6Q7G, GT	.90	12A	1.00	27	.70	89	1.00
IH4G	1.00	6A5G	1.00	6R6G	2.85	12A5	2.35	27S	2.35	VR90-30 (OB3)	2.35
IH5G	1.30	6A6	1.60	6R7	1.60	12A6, GT	1.95	30	1.00	90 (X90)	2.85
IH5GT	1.10	6A7	1.00	6R7G	1.10	12A7	1.95	31	1.00	V90	2.85
IHO6	1.30	6A7S	2.35	6R7GT	1.60	12A8GT	1.00	32	1.30	100-70	1.30
IJ1	1.10	6A8	1.30	6S7, G	.90	12AH7GT	1.00	32L7GT	1.95	VR105-30 (OC3)	2.35
IJ5G	1.95	6A8G, GT	1.00	6SA7	1.00	12AT6	1.60	33	1.30	117L7GT	2.35
IJ6G	1.30	6AB5/6NS	1.60	6SA7GT	1.10	12B7 (14A7/12B7)	1.95	34	1.30	117L7/M7GT	2.35
IK1	1.10	6AB7 (6AB7/1853)	1.95	6SB7Y	1.95	12B8GT	1.60	35 (35/51)	1.00	117M7GT	2.35
IL4	1.60	6AC5G	1.30	6SC7	1.30	12BA6	1.60	35A5	1.30	117N7GT	2.35
IL4A	2.35	6AC5GT	1.10	6SD7GT	1.30	12BE6	1.60	35L6G	1.30	117P7GT	2.35
IL6A	2.35	6AC7 (6AC7/1852)	2.35	6SF5, GT	1.00	12C8	1.95	35L6GT	1.00	117Z3	1.00
ILB4	2.35	6AD6G	1.60	6SF7	1.30	12F5GT	1.00	35W4	1.00	117Z4GT	1.60
ILC5	2.35	6AD7G	1.60	6SG7	1.10	12H6	1.10	35Y4	1.60	117Z6G, GT	1.60
ILC6	2.35	6AE5G	1.60	6SH7, GT	1.30	12J5GT	1.00	35Z3	1.30	VR150-30 (OD3)	2.35
ILD5	2.35	6AESGT	1.60	6SJ7, GT	1.10	12J7G	1.30	35Z4GT	1.00	182B (182B/482B)	1.95
ILE3	1.95	6AE6G	1.30	6SK7	1.00	12J7GT	1.10	35Z5G	1.30	183 (183/483)	1.95
ILG5	2.35	6AE7GT	1.30	6SK7GT	1.10	12K7GT	1.00	35Z5GT	.85	485	1.95
ILH4	2.35	6AF5G	1.30	6SL7GT	1.60	12K8	1.60	35Z6G	1.30	950	1.95
ILN5	2.35	6AF6G	1.60	6SN7GT	1.30	12K8GT	1.30	36	1.00	OB3 (VR90-30)	2.35
INS6	1.60	6AG5	2.35	6SQ7	1.00	12Q7G	1.30	37	.85	OC3 (VR105-30)	2.35
INSGT	1.30	6AG7	2.35	6SQ7GT	1.10	12Q7GT	.90	38	1.00	OD3 (VR150-30)	2.35
IN6G	1.30	6AK6	1.95	6SR7	1.10	12SA7	1.00	39/44	1.00	XXD (14A7)	1.60
IP5G, GT	1.60	6AL5	1.60	6SS7	1.00	12SA7GT	1.30	40	1.60	XXFM (7X7)	1.95
IQ5G, GT	1.60	6AO6	1.60	6ST7	1.60	12SC7	1.30	40Z5 (45Z5GT)	1.10	XXL	1.60
IQ6	2.35	6AT6	1.30	6SZ7	1.60	12SF5, GT	1.10	41	.85		
IRIG	1.10	6AU6	1.60	6T5	2.35	12SF7	1.30	42	.85		
IR4 (IR4/1294)	1.95	6B4G	1.95	6T7G (6Q6G)	1.30	12SG7	1.30	43	1.10		
IRS	1.60	6B5	1.95	6U5 (6U5/6G5)	1.30	12SH7, GT	1.30	45	.80		
IS4	1.60	6B6G	1.10	6UGGT	1.30	12S7, GT	1.10	45Z3	1.10		
ISS	1.60	6B7	1.30	6U7G	1.00	12SK7	1.00	45Z5GT (40Z5)	1.10		
ISAOGT	1.60	6B7S	2.35	6V6	1.95	12SK7GT	1.10	46	1.10		
ISB6GT	1.60	6BA6	1.60	6V6G	1.30	12SL7GT	1.60	46A1	1.30		
IT1G	1.10	6BE6	1.60	6V6GT	1.10	12SN7GT	1.30				
IT4	1.60	6B8	1.95	6V7	2.35	12SQ7	1.00				
ITSGT	1.60	6B8G, GT	1.30	6V7G	1.30	12SQ7GT	1.10				
IU4	1.60	6C4	1.30	6WSG	1.95	12SR7, GT	1.30				
IV	1.00	6C5	1.10	6W7G	1.60	12Z3	1.00				
IY5	2.35	6C5G, GT	1.00	6X5	1.60	12Z5 (6Z5/12Z5)	2.35				
IWS	2.35	6C6	1.00	6X5G	1.10	14	1.95				
IY1	1.10	6C7	2.35	6X5GT	1.00	14A4	1.95				
IZ1	1.10	6C8G	1.60	6Y5	2.35	14A5	2.85				
Z-	1.30	6D5G	1.60	6Y5G	2.35	14A7 (14A7/12B7)	1.95				

[Courtesy Sylvania Products, Inc.]

## RETAIL PRICES — RADIO RECEIVER TUBES

THE above price list includes obsolete and current tubes. According to Sylvania Electric Products, Inc., who issued this list recently, the tube prices listed are based on OPA pricing schedules. Tubes that OPA did not list were priced on the basis of the last price on record. For the time being there will be no changes in the above prices.

This provides a listing as nearly complete as possible so that it will serve as a convenient pricing guide not only for the commonly required tubes, but also for a miscellaneous variety of less frequently used types. Although a number of the types listed are considered obsolete and will never be manufactured again, they have been included for the convenience of dealers and servicemen who occasionally make replacements from stocks which they still have.

On the opposite extreme, several new types of tubes have been listed for which no renewal demand has yet developed. Some of these new types are not in production, but it is expected that they will be released for replacement sale this year. Additional price lists are available from Sylvania distributors or direct from the company.



## In Trade

[from page 5]

Products Co. Inc., of Brooklyn, that Hytron has acquired all the outstanding capital stock of Air King. Mr. Lieberman will continue as president of Air King which will operate as a division of Hytron.

This brings together two of the oldest companies in the radio industry, one specializing in radio receiving tubes and the other in radio sets. Air King was founded in 1920, one year before Hytron's business was organized. The alliance, according to Messrs. Coffin and Lieberman, will permit integration of the manufacturing facilities of the two companies and thus make possible greater efficiency of manufacturing operations and distribution.

Hytron will have production capacity for 100,000 radio tubes daily and Air King, with approximately 900 employees, has a capacity of 5,000 radio sets daily. The two companies will have eight modern plants. Air King is planning to manufacture a complete line of a-m, f-m and television receivers. The management of each company has stated that the sales policy will remain the same.

### West Coast Association

The annual meeting and election of the Los Angeles Council of the West Coast Electronic Manufacturers Association was held recently. Officers elected include: Lew Howard, general manager, Peerless Electrical Products Co., as chairman; D. A. Marcus, general manager, Electronic Specialty Co., as vice-chairman; and James L. Fouch, president of the Universal Microphone Co., re-elected treasurer.

Two officers automatically became members of the executive committee of the local council with four others also elected. Los Angeles also elected the following to serve on the committee: George L. Carrington (Altec-Lansing Corp.); Robert Newcomb (Newcomb Audio Products Co.); L. B. Brittain (Brittain Sound Equipment Co.); with Howard Thomas, Jr., (Packard, Bell Co.), retiring chairman, making the seventh member. Discussion was given to holding an electronic trade show in the fall.

### Garod Radio Folder

Garod Radio Corporation has just released a new illustrated consumer folder covering table models, console combinations, farm radios, and portables in their new 1946 line. The plastic table radios include some of the latest innovations in color styling. [see page 40]

## CRESCENT Automatic RECORD CHANGER



MODEL C-100

- Physical Size: 15 $\frac{3}{4}$ " x 12 $\frac{1}{2}$ "
- Plays Twelve 10" or Ten 12" Records
- Noiseless
- Child-proof Mechanism
- Crystal Cartridge
- Reject Button
- Finished in Neutral Beige Crackle

Leatherette Base  
As Illustrated Above  
Model H-100

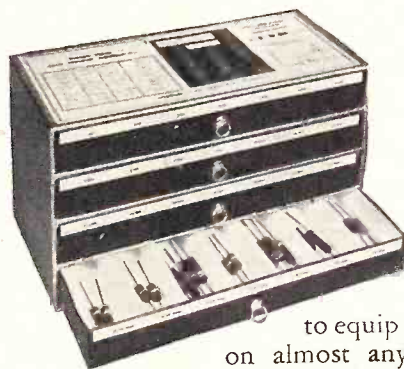
Brown Finish, Made to Fit  
Model C-100 Record Changer,  
6" High, with Grille for 5"  
Speaker.

Your Cost Each \$4.25

RECORD CHANGER ONLY **\$17.95**  
Your Cost Each

Orders are now being accepted  
for immediate delivery—no  
waiting. Terms: 2% check  
with order. Or 25% deposit,  
balance express C.O.D.

**HOLLANDER RADIO SUPPLY CO.**  
549 West Randolph Street Chicago 6, Illinois



### Better, Faster Service with These 3 IRC Balanced Resistor Assortments— Packed in FREE Resist-O-Cabinets!

You know that modern appearance and fast service pay off. That's why you'll want one or all three IRC Resistor Assortments—factory packed in sturdy cardboard Resist-O-Cabinets—

to equip you for quick, easy resistor replacements on almost any job. Bases of Resist-O-Cabinets are arranged so that several cabinets may be stacked to increase stock capacity.

1. Universal Assortment. Balanced resistor assortment... 59 IRC Type BT Insulated Metallized Resistors and "universal" 10-Watt Power Wire Wound Types AB and ABA. The ABA (adjustable) type makes possible every range from a few ohms up to 10,000 ohms.

2. 1/2-Watt Assortment. 100 Type BW-1/2 and BTS Resistors. A complete assortment of most used ranges in the popular 1/2-Watt Insulated Metallized and Insulated Wire Wound Types.

3. 1-Watt Assortment. 83 Type BW-1 and BTA Insulated Resistors. Every service engineer should have all of these top-quality 1-watt resistance ranges at his fingertips.



**INTERNATIONAL RESISTANCE CO.**

401 N. BROAD ST., PHILADELPHIA 8, PA.

In Canada: International Resistance Co., Ltd., Toronto, Licensee



# A LABORATORY QUALITY OSCILLOSCOPE For the Service Man . . .

Portable, sturdy, compact—the CRO-5A is an ideal unit for rapid, accurate, high quality service work. Check the utility and features which you have always wanted in the instrument on your bench.

- For better laboratory and production testing . . .
- For routine Service work . . .
- For studying any variable which may be translated into electrical potentials by means of associated apparatus . . .
- Designed with tubes for maximum amplification with minimum noise . . .
- Exceptionally stable trace even under adverse power line variations . . .
- Frequency response—essentially flat from 20 cycles to 350 KC . . .
- Completely self-contained . . .

Write to General Electric Company, Electronics Department SRS-6407, Syracuse 1, New York.



**GENERAL ELECTRIC**

177-E2

*Looming  
up  
BIGGER  
all the  
TIME!*

**S  
N  
C**



*The*  
**TRANSFORMERS**  
with INbuilt Quality for  
OUTstanding Performance  
**SNC**  
**MANUFACTURING COMPANY**

WEST LAKE ST., GLENVIEW, ILL.

Export Agents - Scheel International - 4237 N. Lincoln Ave. - Chicago, Ill. U. S. A.

## CIRCUIT COURT

[from page 30]

the cathodes of the tubes are connected to ground, or B—, this initial bias assures that no less voltage can appear on the grids. When a signal is received, and if it produces a voltage across the diode load greater than 2 volts, the bias will rise and provide AVC in the usual way.

Advantages of the inclusion of R1 are increased tube life, less noise between stations and increased freedom from instability due to the gain rising too high with no signals.

Other manufacturers use the same or similar schemes, sometimes with somewhat different values, but the result is similar.

### STROMBERG-CARLSON IF CIRCUIT

Interference from stations whose transmitting frequency, or harmonics whose signal, falls close to the IF used in a receiver is a problem in many areas. This is particularly true where the receiver

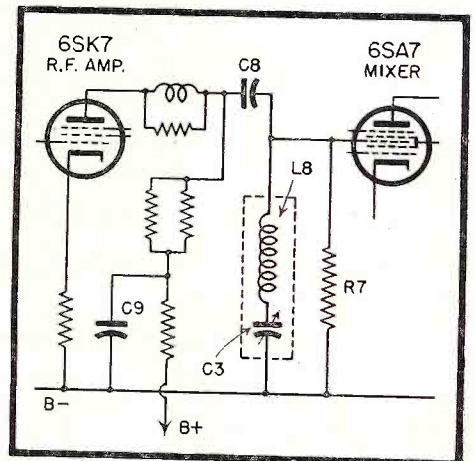


Figure 3, Stromberg-Carlson

has good sensitivity. Some of the pick-up of such interference can be eliminated by careful shielding of the components carrying IF voltages, but an additional attenuation is possible if a wave trap tuned to the unwanted signal is incorporated.

The Stromberg-Carlson receiver shown in Fig. 3 makes use of a series trap at the input of the mixer stage. At its resonant frequency, such a trap looks like a virtual short circuit across the input of the mixer. Little or no effect will be noticed at the frequencies over which the receiver is made to operate. The trap is more effective at this point in the circuit than in the grid of the RF stage because of the untuned coupling used at this particular point.

Alignment instructions advise adjustment of the trap after the IF stages are aligned, and with the signal generator connected to the antenna terminals, using a very strong signal. A very sharp null will be found at the correct setting of C3. This procedure is normal for such circuits.



## RADIO PRODUCTION AND PRICES

Following a recent meeting with the O.P.A., representatives of the Radio Manufacturers Association came to the conclusion that prospects for decontrol of the radio industry, either in whole or in part, are uncertain. This is largely due to the fact that the Office of Price Administration has not yet issued its own regulation or established a policy as to whether the industry may apply for decontrol in segments, as in cases involving individual parts makers, or those involving manufacturers of complete sets.

Price relief under the extended O.P.A. act is doubtful. The only immediate effect of the act on the radio industry will come with the issuance at an early date of new discounts on radio sets selling in the middle and higher price lines. Jobber-dealer discounts will be as of March 31 of this year; moreover the price increase of 8 per cent granted to manufacturers during June will finally be passed on to the customers.

Increases in tube prices are expected soon, and fixed capacitors have been upped 10.2 per cent. As these increases were being considered before the new O.P.A. act was passed, they were based on earlier pricing formulas, and their effect on the final selling prices of home receiver set assembled jobs is at present not known.

As to set production, it is currently on a monthly rate exceeding the output before the war. But relatively few sets will get to the selling floors of dealers until the pricing formulas are put on record by O.P.A., or a formula for decontrol is developed. For the latter eventuality, the sooner — the better.

### Stromberg-Carlson Distributors

Allan R. Royle, sales manager, sound equipment division, Stromberg-Carlson Company, announces that the DeMambro Radio Supply Company of Boston, Mass., is the latest area distributor to join the Stromberg-Carlson roster. Joseph A. DeMambro, president, signed the 52-year-old company's sound equipment distributor franchise covering the full line of sound, amplifying and intercommunications equipment produced at the local plant. Mr. DeMambro was accompanied on a trip through the plant by two of his organization's sales staff, Gardner Hanson and George Mason.

### Record Brush Here Again

The RCA Victor record brush, a top promotional item which was temporarily discontinued due to war time shortages is now back on the market.

## HERE'S THE PORTABLE *NEW* OSCILLOSCOPE LIGHT, FLEXIBLE, INEXPENSIVE AND COMPLETE

### The **POCKETSCOPE**



- So **SMALL** in size (4" x 6<sup>3</sup>/<sub>8</sub>" x 10")
- So **LIGHT** in weight (5<sup>3</sup>/<sub>4</sub> lbs.)
- So **COMPLETE** in performance
- So **INEXPENSIVE** in price
- Plus **WIDE-ANGLE VISION**: on shelf, on floor, on bench
- Plus **RETRACTABLE LIGHT SHIELD**: for increased visibility

A 2" "pocket-size" scope incorporating the cathode ray tube, vertical and horizontal amplifiers, linear time base oscillator, synchronization means and self-contained power supply.

### FOR DELIVERY:

Contact your nearest jobber. If he doesn't have the **POCKETSCOPE** available, contact us direct.

**WATERMAN PRODUCTS CO.**  
INCORPORATED.  
Phila. 25, Pa.

**WATERMAN PRODUCTS**



**FREE**

## Have You Seen The Solar System?

It's a bi-monthly magazine of authoritative information on new developments in the capacitor field. Simply fill in the coupon below if you'd like to receive this easy-to-read

technical publication regularly at your home or at your office.



1689

Solar Manufacturing Corporation  
285 Madison Avenue, New York 17, N. Y.

RSD

Gentlemen: Please send me the SOLAR SYSTEM regularly, starting with the current issue.

Name.....

Address.....

City..... Zone No..... State.....



## In And Around The Trade

[from page 37]

Two-tone cabinets of bakelite, durez, plaskon, and catalin are available in maroon and white, red and white, blue and white, and green white. Single colors include ivory and walnut. All of the console combinations in period and modern styles include the new "Hide-A-Way" automatic phonoplayer which permits close to an hour's recorded entertainment from a completely enclosed cabinet. Copies of this folder are available from the manufacturer, 70 Washington St., Brooklyn 1, N. Y., or from the local Garod distributor.

### Standard Test Equipment Comeback

The day is past when servicemen would come in to a wholesaler dis-

tributor and ask for just a "piece" of test equipment, taking whatever they could get, regardless of brand, name or anything else except that it was the kind of test equipment the servicemen need badly. Nowadays, the serviceman is more likely to pass up the "any-brand" piece of test equipment. He'll ask for a specific type, of a specific, known brand. And of late he has been able to get what he asks for in nearly every case.

Shows what a free spell of production time will do for the radio test equipment industry. The well known standbys in the test equipment field are here again. And servicemen are quick to show where their preferences are in the way they are buying and insisting on these standbys. Service-

men are shopping around again, getting the best buys for their money. (So says our friend Vic Jenkins.)

### \$1,000 Prize Contest for Radiomen

The Walter L. Schott Company, Beverly Hills, California, producers of the WALSCO line, is inaugurating a prize contest open to all radio technicians, servicemen, "hams", etc. \$1,000 worth of prizes such as typewriter, wrist watch, automobile tires, set of Rider's Manuals, 1 year Subscription to RADIO SERVICE DEALER, and many other valuable prizes will be awarded for suggestions for new items to be added to the WALSCO line. All that is required is a short description or sketch of items needed by servicemen or technicians and not already available in practical form.

This contest started August 5th and closes September 30. All entries must be submitted on blanks which are available at all radio parts jobbers.

### Low-Priced CR Tube

A newly-developed cathode-ray tube is announced by the Allen B. Du Mont Labs., Inc., of Passaic, N. J., as the basis for low-priced television receivers now appearing on the market.

Called upon by television receiver manufacturers for a practical yet economical cathode-ray tube of adequate screen size, good definition and brilliance, Du Mont came through with the new Type 7EP4. This 7" tube provides for a normal screen image of 5¾" wide by 4¼" high, which is adequate for entertaining a group of several lookers-in. If desired, the screen size can be increased to 6⅛" wide, with satisfactory results. The images are of high luminosity so that the room does not have to be darkened unless so desired for maximum concentration.

The 7EP4 tube is 15½" long. The accelerating potential is 2500 volts, therefore calling for a power supply that is relatively low in cost.

### Stromberg-Carlson Sound Systems

The Stromberg-Carlson Company announces that heavy initial shipments of amplifiers and portable sound systems have been made to its 83 sound equipment distributors located throughout the nation. Promotional material will include a set of six counter cards, several window backgrounds, window decals, an electric sign, a hand carved wooden sign, a display island for floor selling, full line catalogs, and five different two-color brochures covering sound system installations for

[see page 42]

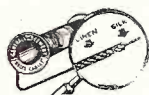
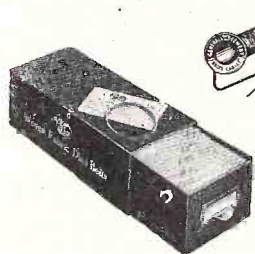
## SPEED UP REPAIRS WITH THESE G-C AIDS!

G-C is HEADQUARTERS for RADIO PARTS and SERVICE AIDS



All Types of Radio Cements, Chemicals, Coil Dopes, Compounds.

G-C leads the field in supplying Radio - Electronic Manufacturers and Service Men with Parts, Tools, Radio Cements, Chemicals and Compounds. Insist on Genuine G-C Quality.



Speedex Wire Strippers



Dial Cables, Dial Belts, Packaged Hardware, Cabinet Repair Kits

Alignment Tools Ne-O-Lite Testers

Order from Your Jobber — Send for G-C Catalog



**GENERAL CEMENT MFG. CO.**  
ROCKFORD, ILLINOIS

### PRODUCERS of:

- Variable Resistors
- Selector Switches
- Ceramic Capacitors, Fixed and Variable
- Statite Insulators
- Silver Mica Capacitors

# Centralab

Division of GLOBE-UNION INC., Milwaukee



## SETS IN MODERN

[from page 25]

advantages of maximum sensitivity and selectivity, bass compensation for fullness of tone, tone control and built-in antennas.

The duplex dial with linear band spread scale is a feature, too, of the table model radio-phono combination, three band Model EC-300 (see illustration left, top and bottom), which incorporates an improved automatic record changer, plus standard broadcast and short wave tuning ranges as in the other two table models, and has all their circuit features.

The automatic record changer is described as a rigged and foolproof mechanism which plays a full complement of records for about an hour of continuous entertainment, accommodating twelve 10-inch records or ten 12-inch records. The pickup arm is equipped with a crystal pickup cartridge using a long-life needle.

There will be fifteen other Echophone models, including the high quality, deluxe console radiophograph types that will incorporate all the latest in design improvements, including FM (covering the new 88 to 108 megacycle band), and provisions for television — with luxury cabinets in both modern and traditional styling. There are plans to make matching cabinets available, containing a separate television video and sound system which can be added by the owner to make a complete sight and sound ensemble.

Distribution of the Echophone line will be handled through the conventional distributor to dealer system with protected territories. Emphasis will be placed on the appointment of prestige outlets in key cities.

## FINANCING

[from page 21]

that sales financing, as it has been developed over the years, will play its part in successful product merchandising. Universal C.I.T. has backed that confidence with elaborate preparations for personalized service to household appliance dealers everywhere. They now have over 300 local offices throughout the country, and a sales and service force of specialists working out of these offices. Their financing plans, both for dealers' wholesale accommodations and consumer sales, have been developed to anticipate dealers' post-war financing requirements.

**RAYTHEON**  
MANUFACTURING COMPANY

*Excellence in Electronics*  
RADIO RECEIVING TUBE DIVISION  
NEWTON, MASSACHUSETTS CHICAGO

"...and put Raytheon tubes in my set please." That's the customer specifying "Raytheon"—a name he knows to be synonymous with quality and dependability. Stock Raytheon tubes to keep your customers happy; to keep your business growing.

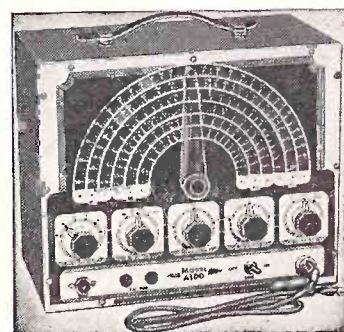
## Available at Last! YOUR FIRST POST WAR APPROVED ELECTRONIC SIGNAL GENERATOR

Scale readings from 100 K.C. to 52 M.C. with ultra stability. Housed in Grey Crackle Heavy Gauge Steel Cabinet with Large, Easy to read Dial Scale.

Complete with tubes, cables (including co-axial output lead), and complete operating instructions.

Your price . . . . .

**\$47<sup>00</sup>**



### SPECIAL!!!

"Nationally-known Name" Crystal Tone Arms. Light weight—high output—excellent frequency response. List price \$6.10. Your price \$2.69.

#### 3 TUBE PHONO AMPLIFIERS

with tone and volume controls. Less tubes \$4.50.

PHONO MOTORS & TURNTABLES  
78 R.P.M.—\$3.75.

We have in stock a complete line of radio tubes for immediate delivery. Quantity limited. All orders accepted subject to prior sale.

### Special Values!

#### Attractive WALNUT Replacement CABINETS

Attractive Walnut Replacement Cabinets for table model radios. Inside dimensions 14 1/4" x 7 1/4" x 6". \$3.49 each. \$3.35 in lots of 5 or more

#### Standard 4 PRONG

#### Universal Replacement Vibrators

**A Real Buy! While they last \$1<sup>49</sup>**

We carry a full line of Auto Radio accessories, including Aerials, Control heads, fuses, connectors and fuse holders.

Write for our new, post-war catalog

**RADIO PARTS COMPANY** 612 W. RANDOLPH  
Dept. D  
CHICAGO 6, ILLINOIS





*Superior*

## RADIO DIAL BELTS

ITS ROUGHNESS ASSURES SMOOTH PERFORMANCE

Made of buna S rubber (#3 thin single) with smooth rubber cover on outside and rough finish on inside. Standard equipment with set manufacturers — resistant to atmospheric changes — more pliable and rougher — insuring positive grip on shafts and pulleys. Its popularity has made it the largest selling Radio Dial Belt in the U.S.A.



This Metal Container FREE

**FREE** Just pay for the belts and get this metal container

B25A Servicemen's Assrt. 25 Belts  
 B50A " " 50 "  
 B100A " " 100 "

Use the Belts the Manufacturers use in their original equipment.

Ask your jobber for this handy, durable ALL METAL service-man's sliding drawer cabinet.

**J · F · D · MANUFACTURING CO.**

4111 FT. HAMILTON PARKWAY · BROOKLYN 19, N. Y.

# FREE!

**OLSON gives you the famous EVERSHARP PEN and PENCIL SET**

*It's guaranteed forever. It's yours without charge, to prove that OLSON RADIO WAREHOUSE gives the radio service-man more for his money and something besides!*

**HOW TO GET YOUR SET:** With every purchase made from us, we will send you "Olson Pointers" (profit-sharing certificates) according to the dollar value of goods shipped. Thus, an \$18.45 purchase brings you 18 "Olson Pointers"; \$4.70 worth of parts brings you 4 "Olson Pointers", etc. When you have saved 100 "Olson Pointers", send them to us and you will receive the Eversharp Pen and Pencil Set FREE, packed in a beautiful gift box!

OLSON gives you value: our prices are lower.  
 OLSON gives you service: we ship same day order is received  
 OLSON gives you quality: we sell nationally known products.  
 OLSON appreciates your business; we thank you with premiums.

*Do you get our BUYING GUIDES regularly? Use the coupon below.*

**OLSON RADIO WAREHOUSE**  
 73 E. MILL ST., DEPT. 40, AKRON, OHIO

I want to start saving "OLSON POINTERS."  
 Send me your Free BUYING GUIDES regularly.

MAIL TODAY

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

### In Trade

[from page 40]

hospitals, hotels, churches, schools, and industries.

Franchised distributors of the extensive line have been given exclusive territorial rights, according to A. R. Royle, sales manager of the sound equipment division. Distributors have chosen their own dealers, he said, and Stromberg-Carlson is geared to help them put into effect a complete merchandising program.



### New Hammer

A new hammer for mechanics with an unbreakable "CASTEX" (hard plastic) double-head that will not mar flat surfaces of metal has been announced by the Schmidgall Manufacturing Company, 307 Cass St., Peoria 2, Illinois. The "KANT-MAR" fills a special need in machine shops, tool rooms, repair shops, electrical shops, automotive and all types of industrial and service organizations. The head is die cast, non breakable, fire proof, acid proof, non conducting material. The base of the head is accurately machined from special light weight aluminum alloys, securely fastened to the head but interchangeable. The handle is high grade hickory.

Each hammer is guaranteed for life and is registered with the manufacturer, who will put it in good condition at any time for 50¢ to help cover handling and shipping charges. Made in three sizes. The 1 1/4" size sells for \$2.50 list. Further details may be had by writing the manufacturer.

### Hoffman Service Manual

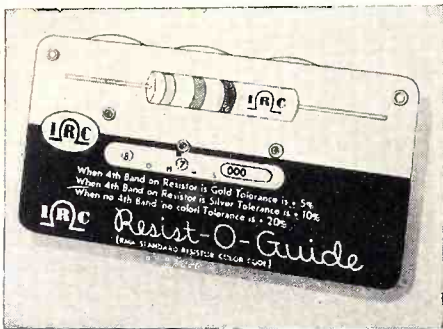
Hoffman Radio Corp., Los Angeles, has started to publish its Service Manual in loose leaf form and to cover all products of the firm. By mid-June eleven will be ready. Revisions will be made frequently with supplementary leaflets.

Typically arranged, with schematic diagrams and line drawings, they are edited by the firm's technical publications section, and include information on descriptions, specifications, tube complement, normal operating voltage,



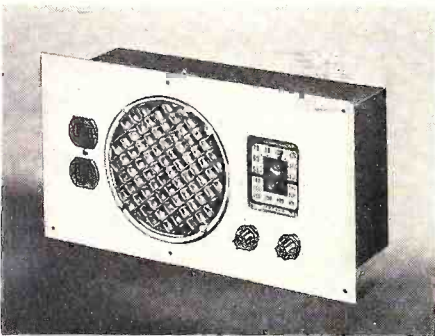
normal operating currents, alignment procedure and other pertinent data.

The technical data on record changers, distributed for radio-phono combinations, will be in publications arranged and published by the makers of the changers used.

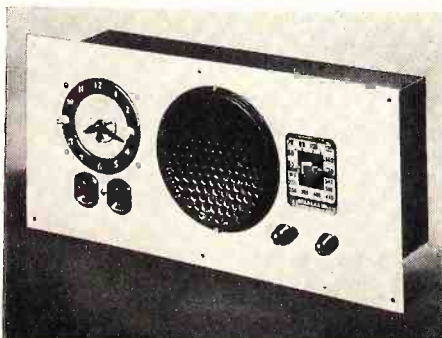


### POCKET RESISTANCE RANGE INDICATOR

International Resistance Co., Philadelphia, announces Resist-O-Guide, a practical aid in resistor range identification for radio servicemen and others. The Guide is used by turning its three wheels to correspond with the color code on any composition type resistor—the standard RMA range is automatically and accurately indicated. Or turn the wheels to any desired standard range, and you are immediately shown the correct color coding. Resist-O-Guide is available from IRC distributors.



Two models of wall type radios made by American Communications Corp., 306 Broadway, New York. Above, Model A6K, \$42.65 including Federal Tax. Includes duplex receptacle for table appliances. Fits between studs flush into walls. Below, Model 6K, \$58.75 (includes tax) also has Telechron alarm clock with automatic switch which turns radio on and off. Both sets are 6-tube super-het. Available in range of colors to match home interiors.



## FOR SAFETY'S SAKE

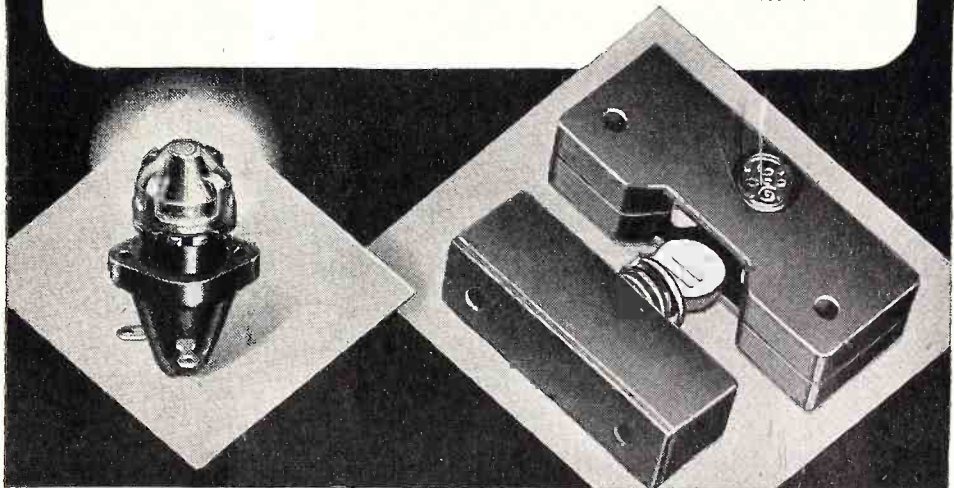
Safety first for personnel is of the utmost importance. This protection can be guaranteed through the use of

G-E Interlock Switches on radio transmitters, X-ray and therapeutic machines, burglar alarms, and signal controls for fire doors.

Safety first for equipment is important, too. G-E Indicator Lamps give visual evidence of what is going on inside equipment, and circuit troubles can be corrected before they become serious. Write: *Electronics Department, General Electric Company, Syracuse, New York.*

# GENERAL ELECTRIC

166-E1



**READY NOW!** 8 giant-size pages packed with long-awaited Radio and Electronic Parts, Supplies and Equipment—new merchandise, just received—now *in stock* for IMMEDIATE SHIPMENT! See hundreds of items for every Radio and Electronic need—for building, repair, maintenance—for engineer, manufacturer, service man, amateur—top-quality, standard-made parts—including Condensers, Resistors, Meters, Controls, Switches, Relays, Transformers, Test Equipment, Tools, Amplifiers, Record Players, Record Changers, and many other new and scarce items—scores of them at money-saving bargain prices—all ready for shipment at once from CHICAGO or

**Immediate SHIPMENT!**

## RADIO PARTS ELECTRONIC EQUIPMENT

### New CONCORD Bulletin-FREE

Hundreds of Bargains—Scores of New Items

ATLANTA. Mail coupon below TODAY for your FREE copy of new CONCORD Bulletin.

**Did You Get CONCORD'S NEW COMPLETE CATALOG?**

Showing the latest and greatest selection of guaranteed quality Radio Sets, Phono-Radios, Radio Parts, Supplies, Equipment, Amateur Gear, Kits—plus the new Multi-amp Add-A-Unit Amplifiers—exclusive with CONCORD. If you do not have the new COMPLETE CONCORD Catalog, check coupon below.



CONCORD RADIO CORPORATION  
901 W. Jackson Blvd. Dept. K-88, Chicago 7, Ill.

Please rush my FREE COPY of the new Concord Bulletin of Radio Parts.  
 (Check if you also want new Complete Concord Radio Catalog)

Name .....

Address .....

City .....

State .....

# CONCORD

## RADIO CORPORATION

LAFAYETTE RADIO CORPORATION  
CHICAGO 7 ATLANTA 3  
901 W. Jackson Blvd. 265 Peachtree Street



**Order from LAKE!  
You'll Make No Mistake!**

**RADIO CABINETS & PARTS**

**NOW AVAILABLE!**

**Postwar  
2 Post  
RECORD-  
CHANGER**



With luxurious brown leatherette portable case, 15" L. x 15" W. x 10" H.

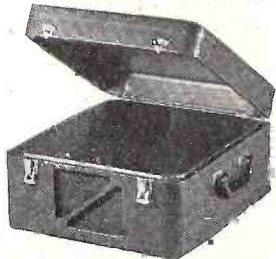
D. Latest electronic developments make this modern record-changer the finest on the market today!

List price ..... **\$49.95**  
Dealer's net ..... **29.97**

**DE LUXE RECORD-CHANGER and  
AMPLIFIER CASE**

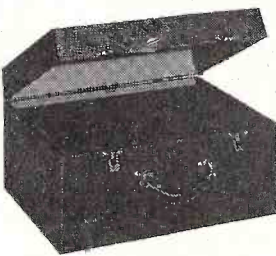
De luxe changer case with ample room for amplifier. Overall dimensions: 20" L. x 16" W. x 10" H. Sturdily built of 3/4" plywood, de luxe brass hardware throughout. Inside dimensions: 15 1/2" L. x 14 3/4" W. x 9 1/2" H.

Net ..... **\$12.95**



**DeLuxe  
PHONO  
CABINET**

Covered in luxurious, genuine brown leatherette, has deluxe brass hardware throughout, made completely of plywood with brown plastic handle, has padded top and bottom. Motor board 14" x 14 1/2". Overall dimensions 18" L. x 15" W. x 8" H. Your net price .... **\$8.95**



Portable Phono-graph Case of sturdy durable plywood, in handsome brown leatherette finish. Inside dimension 16 1/2" long, 14" wide, 9 1/2" high. Has blank motor board. As illustrated. Specially priced at

**\$6.95**

Also blank table cabinets of walnut veneer in the following sizes, with speaker opening on left front side: (\*Note: \*7 has center speaker grill)

#1 — 8 1/4"	L x 5 1/2"	H x 4"	D <b>\$1.95</b>
#2 — 10 1/4"	L x 6 3/8"	H x 5"	D <b>\$2.70</b>
#3 — 13 1/4"	L x 7 5/8"	H x 6 1/4"	D <b>\$3.25</b>
#7* — 10 1/4"	L x 7"	H x 5 1/2"	D <b>\$2.50</b>

\*Speaker Opening in center of front side.

All types of radio cabinets and parts are available at Lake's Lower prices. A large stock is listed in our catalog.



**SERVICEMEN—RETAILERS**  
Join our customer list today  
Dept. E

**Order our New Catalog Today!**  
Get on our mailing list!

**Lake Radio Sales Co.**  
615 W. Randolph Street  
Chicago 6, Ill.

**License Plan Works**

[from page 11]

without the supervision of a licensed man. The owner of the store was promptly brought into court after being given the opportunity of employing a licensed veteran to head his shop. The owner, as promptly, called nasty names and the newspapers took up his cry that it was unfair to make veterans who had failed the test wait six months before taking the test again, especially if the veteran lost his job for the period of waiting.

**Fairness**

The board members rubbed their collective chins and beat a hasty retreat to the common council. In February of this year a new revised 19.20 was drafted. The new ordinance calls for the licensing examinations to be held the first Monday of each month, providing that there are applications on file; the establishment of two classes of licenses, one covering radio and the other covering the servicing of inter-comms and the like where the operating frequency involved is below 100,000 cycles per second; a new board of five members; plus several minor items that make for better enforcement of the ordinance.

March 11, 1946 saw the first examination to be held under the new ordinance. The test still consists of a simple written quiz on theory and a bench test involving a shorted condenser, an open ballast or the like. The five board members supervising the examinations now are: one shop owner-employer, one class A licensed employee, a radio engineer from the faculty of the University of Wisconsin, the city electrical inspector and the chief police radio technician. It should be noted that the majority on the board are presumably strictly impartial.

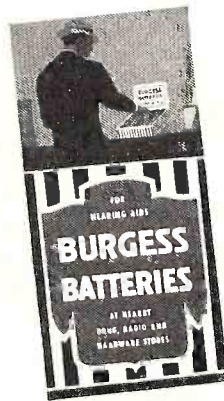
As Ray Groenier, the chief police radio technician, put it, "The new examination is as simple and fair as we can possibly make it and still have a protective ordinance. The average veteran who failed this last examination feels that we are doing him a favor by preventing him from rushing blindly into a business for which he lacks the experience necessary to succeed. There is nothing in the ordinance that prevents a man from working a few months in an established shop to obtain practical experience. And we heartily encourage the veteran with no pre-war radio experience to follow this latter path and try servicing a few home receivers before making up his mind to go into the

**THIS BURGESS  
ASSORTMENT  
REVOLUTIONIZED  
HEARING AID  
BATTERY SALES!**

**ONLY  
5 CUSTOMERS  
GIVE YOU  
60-DAY  
TURNOVER**



This Burgess display assortment puts hearing aid batteries where they belong—on the counter in your store—for fast, self-service sales! It sells new customers, builds a steady replacement business, involves little selling time. Makes a small counter space a profit department. Ask your Burgess distributor about this new profit line today.



**Burgess  
Pre-sells  
with  
Nation-wide  
Advertising**

Monthly ads in *The Saturday Evening Post*, *Collier's*, *American Magazine*, *Better Homes and Gardens*, *Liberty* and leading farm papers start hearing aid users into your store. Other ads in *Hearing News* and *Volta Review* build more sales for you.

**BURGESS  
BATTERIES**

**BURGESS BATTERY COMPANY**  
Freeport, Illinois



## Radio Books For Radio Servicemen

### "INSIDE THE VACUUM TUBE"

A goldmine of information for the student, amateur, serviceman or engineer.

425 PAGES PRICE \$4.50

### "UNDERSTANDING MICROWAVES"

Provides a foundation from which the reader can proceed to understanding of various microwave developments of the past five years.

400 PAGES PRICE \$6.00

### "RADAR"

For students, hobbyists and laymen . . . \$1.00



### and THESE STANDARD WORKS

THE CATHODE RAY TUBE AT WORK . . . . .	\$4.00
FREQUENCY MODULATION . . . . .	\$2.00
SERVICING BY SIGNAL TRACING . . . . .	\$4.00
THE METER AT WORK . . . . .	\$2.00
THE OSCILLATOR AT WORK . . . . .	\$2.50
VACUUM TUBE VOLTMETERS . . . . .	\$2.50
AUTOMATIC FREQUENCY CONTROL . . . . .	\$1.75
AN-HOUR-A-DAY-WITH-RIDER SERIES — on "Alternating Currents in Radio Receivers," on "Resonance & Alignment," on "Automatic Volume Control," on "D-C Voltage Distribution." Hard bindings . . . . .	\$1.25 each

## JOHN F RIDER PUBLISHER, INC.

404 - 4th Ave. N.Y. 16, N.Y.

Specializing in books for advancement of the radio servicing industry.

### \$1.00 PAID FOR SHOP NOTES

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

repair business."

Of the nine men who passed the theory test and went on to the bench test seven passed both and received their licenses, thus making the March examinations a red letter day for the erstwhile critics who felt that their efforts had been rewarded at last.

### Splatter-Proof Heat Ray Lamp

For a variety of home applications, a new 250-watt infrared Heat Ray lamp having a red heat-resistant glass bulb which is resistant to breakage when subjected to the shock of cold water spray and which operates from an ordinary standard voltage household light socket is announced by the Westinghouse Electric Corporation.

In addition to use as a spot comfort heater where drops of water or other liquids may come in contact with the hot bulb and thus cause breakage in ordinary lamps, the new lamp can be used for the drying of small laundered articles, hair, and fingernail polish, and as a source of radiation where infrared has been prescribed or recommended for therapeutic purposes.

Maximum overall length of the 250-watt R-40 bulb Heat Ray lamp is 6 $\frac{7}{8}$ " while the diameter is 5". The bulb has a self-contained, hermetically sealed-in reflector.

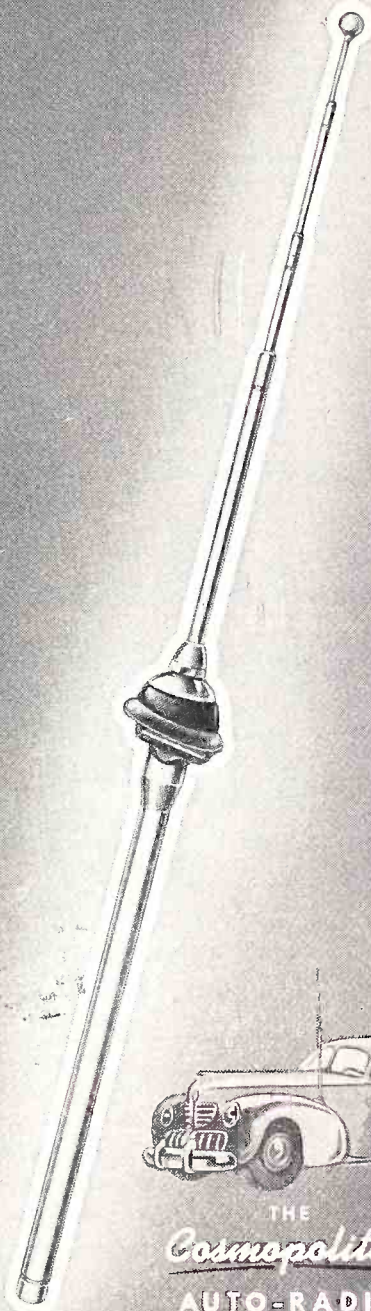
### Milo—New Jobber

The new Milo Radio & Electronics Corp. will specialize in radio and electronic components, featuring leading brands of test, sound and recording equipment. All efforts will be directed toward industrial accounts, amateurs and servicemen. Supplementing the staff of trained sales technicians will be Louis H. Grossberg and Milton Putterman — both well known in distributing and manufacturing circles in the greater New York area. Beginning January 1st, 1946, Milo Radio & Electronics Corp. will be located at 200 Greenwich Street, New York City.

### C-R Tube Bulletin

A comprehensive selection of various types and sizes of cathode-ray tubes especially adapted to television reception is presented in a bulletin, "DuMont Cathode-Ray Tubes for Television," just issued by Allen B. DuMont Laboratories, Inc., of Passaic, N. J. The bulletin illustrates and lists several 5", 7", 10", 12" and 20" tubes of both the electrostatic and the magnetic deflection categories, together with the more significant characteristics. It also announces a 15" magnetic deflection tube now in development stages. In each instance the useful picture area is given. A copy of the bulletin may be had for the asking.

# Antenn-gineered by SNYDER



THE  
*Cosmopolitan*

AUTO-RADIO  
ANTENNA

\* COPYRIGHT 1946

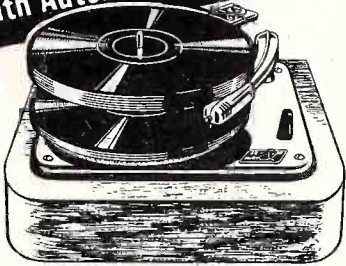
# SNYDER

MANUFACTURING CO.

PHILADELPHIA 40, U. S. A.



*Special . . .*  
**R-L's NEW POST WAR  
 WIRELESS PHONOGRAPH**  
 with Automatic Record Changer.



**IN STOCK FOR IMMEDIATE DELIVERY**

No wires to connect. Just plug in and play through radio. 45 minutes of uninterrupted plays of 10 or 12 inch records without reloading. For 110V. 60 cycle operation. Complete with open type walnut veneer cabinet. Shipping weight 14½ lbs.

B6200 Net, Each . . . . . **\$26.97**

Write for Free 1946 Parts Catalog



731 West Washington Boulevard  
 DEPT. S CHICAGO 6, ILLINOIS

**NOT MERELY AS GOOD  
 AS THE OTHERS  
 BUT BETTER  
 THAN ALL OTHERS!**

**SIMPLIFIED . . . CON-  
 TROLLED OPERATION**  
 . . . The Newcomb  
 clear-view, plastic keylock  
 control panel cover prevents  
 unauthorized misadjustments.



**DE LUXE  
 K-SERIES**

**T**HE KEYLOCK cover is another of the many features that make the name Newcomb outstanding in the sound equipment field. Designed for the post-war quality market, Newcomb amplifiers are unexcelled in the true reproduction of music and voice. Without reservation . . . Newcomb sound equipment will give finer, longer, more trouble-free service than any other system on market today. Write for information.

THE SOUND OF QUALITY  
**Newcomb**  
**AUDIO PRODUCTS CO.**  
 MANUFACTURERS  
 DEPT. D. 2815 S. HILL STREET  
 LOS ANGELES 7, CALIFORNIA

**MEN IN THE NEWS**

[from page 9]

DuBuque will continue the company's policy of giving Lear distributors all the sales and promotion help possible through an expanded advertising program. Advertising headquarters of the company will be in Lear's main office at Grand Rapids, Michigan.

**Heads Replacement Parts Section**

Appointment of Marshall R. Stoecker as manager of the Replacement Parts Section of the RCA Victor Division, Radio Corporation of America, is announced by J. A. Milling, general manager of the newly-created Parts Department. Mr. Stoecker will be responsible for the development and merchandise planning of all replacement parts required to keep in operation equipment produced and sold by the company. His section will also handle all customer orders and control of finished goods inventories for the expanding Parts Department, as well as finished goods warehousing for all parts catalogued and stocked by the Department.

**Admiral's R. M.**

Wallace C. Johnson, manager of field activities, Admiral Corporation announces appointment of Paul R. Dye as Regional Manager for all Admiral products. Mr. Dye was formerly sales manager for the Taylor Electric Company, radio and appliance distributors, in Milwaukee.

**Motorola Appoints**

Galvin Mfg. Corporation of Chicago, makers of Motorola radios for home and car, announces appointment of Lt. Colonel Vernon A. Kamin as regional sales manager for the New York territory.

Recently released from active duty, Col. Kamin's liaison duties included administrative work on such ground signal equipment as the Motorola "Handie Talkie" and the "Walkie Talkie."

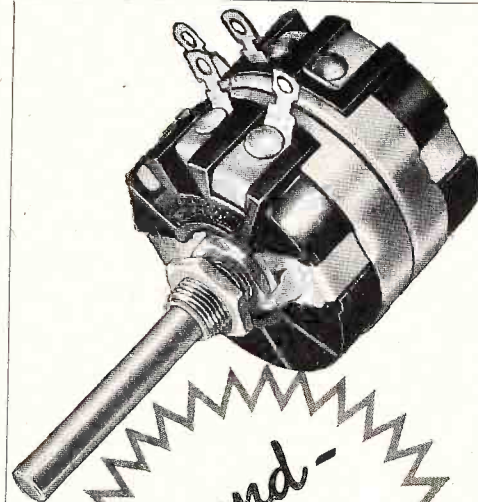
Col. Kamin comes to Motorola with a wealth of experience in the radio business and he is now contacting his many friends among Motorola distributors and dealers in his territory.

Along with Herb Frost, he inaugurated the radio department of Sears Roebuck & Co., later resigning to become president of the Corona Radio & Television Corp., manufacturers of "private brand" radios. As general manager of the Goodyear Tire & Rubber Company's radio division, he successfully merchandised several well-

known lines of car and home radios until after Pearl Harbor when he entered the Signal Corps as Chief of the Radio Branch of the Engineering and technical service.

**RCA Victor Home Instruments**

Appointment of John C. Marden as assistant advertising manager and sales promotion manager of the RCA Victor Home Instruments Department is announced by J. David Cathcart, advertising manager of the Department. William H. Tindall and Frank Schmitt are staff assistants. Mr. Marden, who was product manager for the



**Sound-System  
 CONTROLS**

★ Clarostat constant-impedance controls are the No. 1 choice with sound-system experts because such controls eliminate the distortion that would arise from the mismatching of impedances.

Available in standard T-pads and L-pads. 8 to 500 ohms. Maximum power dissipation of 2.5 watts. Continuous range from 0.5 to 30 DB attenuation at 90% rotation. Last 10% affords infinite attenuation. Employable at either the source or the load in a circuit.

★ Ask Our Jobber . . .

He can supply these sound-system controls. Ask for latest Catalog No. 46A covering the extensive Clarostat postwar line of resistors, controls and resistance devices. Or write us.



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



Radiola line before the war and who served as a procurement official in Washington for RCA during the past four years, will be in charge of merchandising advertising, dealer-point-of-sale advertising and sales promotion, according to the announcement.

### Lewyt Award

A Certificate of Appreciation from the War Department has been awarded to Alex M. Lewyt, President of Lewyt Corporation, Brooklyn, New York, for patriotic service during World War II. The award took place May 6th at the offices of Col. B. R. Olmsted, District

Chief of the New York Ordnance Department, who made the presentation on behalf of Chief of Ordnance, Lt. Col. L. H. Campbell, Jr.

Mr. Lewyt was cited for his managerial and engineering assistance to the Chief of Ordnance and to the New York Ordnance District, in the production of radar, radio, bombsights, gyro-compass equipment, anti-aircraft devices, airplane components, and also for his participation in the atom bomb project.

### Zenith News

With the Zenith Radio Corporation ready to ship new radio sets as the parts situation permits, H. C. Bonfig, vice president in charge of household radio, recently announced the following appointments of district sales managers:

Hugh H. Boyer, Albany-Buffalo, Rochester - Syracuse - Harrisburg - Johnstown - Scranton.

William W. Boyne, Detroit - Grand Rapids - Fort Wayne - Indianapolis.

James W. Henry, Kansas City - Springfield - Wichita - Des Moines - Omaha.

Harold O. Hilding, Minneapolis - Fargo - Aberdeen - Green Bay - Milwaukee.

Martin J. Toohill, Terre Haute - Louisville - St. Louis - Cincinnati - Charleston - Williamson.

Fred H. Strayer, Oklahoma City - Amarillo - Dallas - El Paso - San Antonio.

### Proctor Appoints

T. P. (Tom) James and H. S. (Cy) Perkins have been appointed assistant general sales managers of the Proctor Electric Company, Philadelphia, by Robert M. Oliver, vice president and general sales manager. Mr. James' responsibilities will cover the direction of sales activities for major accounts including syndicate buying groups, chain stores, furniture stores, jewelry stores and other large volume outlets. Mr. Perkins will be responsible for the general dealer distribution of Proctor products.

As announced in a recent widely publicized merchandising policy booklet, Proctor products are sold only through franchised wholesalers.

### Thermador S. M.

The appointment of Frank A. Ballman as general sales manager of Thermador Electrical Manufacturing Company, Los Angeles, largest manufacturers of electrical appliances in the West, was announced recently by William E. Cranston, Jr., general manager. Mr. Ballman was, until a short time ago, a Major in the Army Air Forces.



The  
**UNIVERSAL**  
Electrolytic

• Now available in aluminum-can construction — the postwar Aerovox Type PRVC cleat-mounting universal replacement electrolytic! Readily doubles for twist-prong, spade-lug and screw-base types. Insulated positive and negative wire leads. Multiple sections have concentrically-wound sections with common negative. In all popular voltages and capacitances.

• Ask Our Jobber . . .

Ask for Aerovox Type PRVC metal-can cleat-mounting electrolytics. Keep a stock on hand for your rush jobs. Ask for postwar catalog. Or Write us.



FOR RADIO-ELECTRONIC AND  
INDUSTRIAL APPLICATIONS

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

**IMMEDIATE DELIVERY!**

## Automatic Players



Record changer with Crescent Model #100, completely assembled with amplifier, ready to play. Cabinet of brown leatherette with 3/8" seasoned pine, rubber bumpers on base. Cabinet dimensions: 16" long, 12 3/4" wide, 6 1/2" high; height with changer 12". AC amplifier with heavy duty power transformer complete with tubes 6V6, 6C5, and 6X5, tone and volume controls, cord and plug, separate AC line switch, 6" speaker. Well constructed, excellent tone quality.

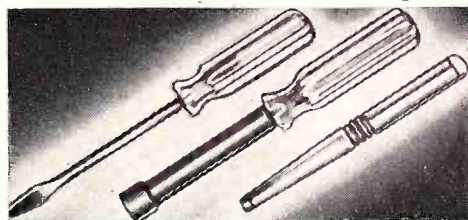
**\$31.50**

20% deposit required on all orders.

Dept. B

**UNION Radio Corporation**

328 S. Paulina • Chicago 12, Ill.



For

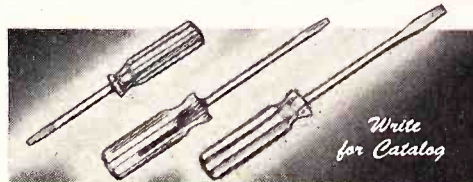
Every  
**RADIO NEED**  
there's a fine  
**VACO**

Shock-Proof • Break-Proof  
**Amberyl Plastic Handle**  
**SCREW DRIVER**  
to do the job better!  
**173 TYPES**

**VACO**  
PRODUCTS CO.

317 E. ONTARIO ST. • CHICAGO 11, ILL.

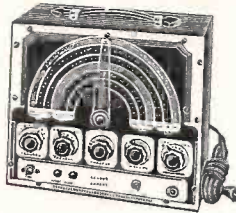
Canadian Warehouse 560 KING STREET, WEST • TORONTO 2, ONTARIO



Write  
for Catalog



**IMMEDIATE DELIVERY!**  
NEW! APPROVED MODEL A-200  
**SIGNAL GENERATOR**



Complete with all tubes, connecting cables, instructions, etc. Battle-ship gray crackle finish. Size; 12 x 10 x 6 5/8".

- 8 R.F. BANDS  
100 Kc.-250 Kc., 190 Kc.-500 Kc., 420 Kc.-1000 Kc., 1000 Kc.-3000 Kc., 3 Mc.-9 Mc., 9 Mc.-25 Mc., 18 Mc.-50 Mc., 27 Mc.-75 Mc.
  - CONTINUOUSLY VARIABLE RF-AM attenuator control.
  - EXTERNAL MODULATION FROM 40 to 30,000 cycles.
  - INTERNAL MODULATION at 440 cycles.
  - NEGLIGIBLE HARMONIC OUTPUT.
- NET Price..... **\$49.50**

- OTHER INSTRUMENTS IN STOCK**
- McMURDO-SILVER "Vomax" ..... \$59.85
  - SIMPSON 260 Volt-Ohm-Milliammeter .. 38.95
  - SIMPSON 240 "Hammer" ..... 26.50
  - TRIPLETT 2413 Tube Tester ..... 49.50
  - TRIPLETT 625-N Volt-Ohm-Milliammeter 45.00
  - RADIO CITY 802-N Tube & Set Tester .. 59.50
  - RADIO CITY 665-A Vacuum Tube V.M. .. 89.50
  - WATERMAN 2" Oscilloscope ..... 55.00

—Send for New Catalog—  
C.O.D. orders should be accompanied by 25% deposit.  
**SCENIC RADIO & ELECTRONICS CO.**  
53 Park Pl. Dept. R, New York City 7

**Jobbers**

**Amateurs and Servicemen**  
OUTSTANDING VALUES

	PRICE
Krystrons 723 A-B .....	\$ 6.72
B.C. 729 receiver used and B. C. 730 transmitter, used .....	15.95
When purchased separately .....	10.00 Each
Spaghetti Tubing, size 0 to 10 .....	.65 per 100'
Radio fuses assorted sizes, 100 .....	3.65
0-200 micro amp meter 2 3/4 inches ..	3.98 Each
Meter rectifiers (Halfwave) .....	.95 Each
(Fullwave) .....	1.69 Each
Western Electric condensers and re-tard coils, 10 assorted .....	1.95
Five conductor cable 20 ft. lengths ..	.79
1/2" & 5/8" Ceramic Standoff Insulator, Threaded .....	2.75 per 100

Freight paid on orders over \$200.00  
Write for circular

**AMERICAN SALES COMPANY**  
1811 West 47th Street Chicago 9, Illinois

**18 YEARS IN RADIO**



**GET THIS**  
*New* **CATALOG**  
By This Old Firm

Latest developments in radio and electronic parts and devices, newest ham gear, gadgets for experimenters, bargains in war surplus items.

**FREE TO YOU**

Mail the coupon below and get this new catalog FREE.

**BURSTEIN-APPLEBEE CO.,**  
1012 McGee, Kansas City 6, Mo.

Send me FREE catalog advertised in  
**Radio Service Dealer**

I AM \_\_\_\_\_  
STATE CONNECTION IN INDUSTRY \_\_\_\_\_  
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TOWN \_\_\_\_\_ STATE \_\_\_\_\_

*Ad Index*

Aerovox Corporation .....	47
American Sales Co. ....	48
B & D Distributing Co. ....	48
Burgess Battery Company .....	44
Burstein-Applebee Co. ....	48
Centralab .....	40
Clarostat Mfg. Company .....	46
Concord Radio Corp. ....	43
Federal Telephone & Radio Corp. ....	19
General Cement Mfg. Co. ....	40
General Electric Co. ....	38, 43
General Industries Co., The .....	36
Hollander Radio Supply Co. ....	37
Hytron Radio & Electronics Corp. ....	2
International Resistance Co. ....	37
JFD Manufacturing Co. ....	42
Ken-Rad Div. of G. E. Co. ....	29
Lake Radio Sales Co. ....	44
Murray Hill Books, Inc. ....	9
National Carbon Co. ....	7
Newcomb Audio Products Co. ....	46
Olson Radio Warehouse .....	42
Racon Electric Co. ....	31
Radio Corporation of America .....	15, Cover 4
Radio Parts Company .....	41
Raytheon Mfg. Company .....	3, 41
Rider, John F. Publisher, Inc. ....	35, 45
R-L Electronic Corp. ....	46
Sams, Howard W. & Co., Inc. ....	10
Saturday Evening Post .....	Cover 3
Scenic Radio & Electronics Co. ....	48
Sheffield Radio & Appliance Co. ....	48
Simpson, Mark Mfg. Co. ....	33
SNC Manufacturing Co. ....	38
Snyder Manufacturing Co. ....	45
Solar Manufacturing Corp. ....	39
Sprague Electric Co. ....	1
Stewart-Warner Corp. ....	23
Sylvania Electric Products Inc. ....	Cover 2
Triplett Electrical Instrument Co. ....	32
Union Radio Corp. ....	47
Vaco Products Company .....	47
Walker-Jimieson, Inc. ....	5
Waterman Products Co. ....	39

**HOME AND ESTABLISHED BUSINESS — \$15,000**

Because of poor health, I am offering for sale my radio maintenance business, located in a city in northern New England with a servicing area of 50,000 people. Complete with large inventory of parts, first grade test equipment, and modern home with all conveniences.

For details, write to  
Box 77, Radio Service Dealer,  
342 Madison Avenue, New York 17, N. Y.

**PAPER and MICA CONDENSERS**

50 paper and mica condensers \$1.00. Brand new. Fine assortment. Popular sizes. Some high voltage. Cash, check or M. O.

H. DOBRIN, 855 E. 175 ST., BRONX, N. Y.

**LAST MINUTE SPECIALS!**

Iron Cord Sets, 6 ft. fine quality	Each
G.E. wire with plugs .....	\$0.42
Extension Cord Sets, 7 ft., with 3-way cube tap .....	.41
Pittsburgh Automatic Electric Iron .....	6.45
1 Burner Hot Plate .....	2.40
Streamlined Electric Iron .....	3.90
Sessions Mantel Electric Clock #1019 .....	Per Doz. 8.80
Key Holder Flashlights with Batteries .....	\$4.25

**ELECTRIC Coffee Maker Set**

Consists of a beautiful Electric Coffee Maker Stove, 8-Cup Glass Coffee Maker, Attachment for Grilling, also Attachment for making Toast ..... \$6.85 (O.P.A. Retail Price \$9.98 each)  
Compact, exceptionally high gain, hum-free 3-tube AC-DC Phono Amplifier ..... 4.50  
5" Jensen Speaker and Output Transformer ..... 3.75  
Write for illustrated literature featuring other merchandise. 2% discount for payment with order, otherwise shipped C.O.D. net.

**Sheffield Radio & Appliance Co., Inc.**  
916 W. Belmont Ave., Dept. C, Chicago 14, Ill.

**SORRY!**

Limited Quantities Only  
**HYTRON TUBES**  
**BRIGHT STAR BATTERIES**  
**CORNELL-DUBILIER**  
**CONDENSERS**  
**MAZDA PANEL LAMP\$**  
**SIX TUBE LICENSED SUPERHET.**  
LIST \$28.80 YOUR COST \$20.34

**B & D DISTR CO.**  
639 TOMPKINS AVENUE  
STATEN ISLAND 5, N. Y.  
PHONE: GIBRALTAR 7-2660

**ADDRESS CHANGES—**

Subscribers to RSD should notify our Circulation Dept. at least 3 weeks in advance regarding any change in address. The Post Office Dept. does not forward magazines sent to a wrong address unless you pay additional postage. We cannot duplicate copies of RSD sent to your old address.

RSD Circulation Dept.

**Cowan Publishing Co.**

342 Madison Ave., New York 17, N.Y.



WATCH FOR OUR  
ADS IN THE  
SATURDAY EVENING  
**POST**

When a manufacturer asks you to "watch  
for our ads in the Post," he's calling your  
attention to the best kind of local support.

For advertisements in the Post reach your  
best customers—the leaders, who are first  
to buy the new and better things.

And advertisements in the Post get attention  
for people like to read ads in the Post—  
far more than in any other magazine.

THE SATURDAY EVENING  
**POST**



**ENGINEERING LEADERSHIP is behind every**

**Cunningham  
Electron Tube**



Princeton Laboratories

RADIO CORPORATION OF AMERICA

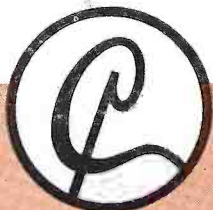
... that's why you're in the lead with **Cunningham**

**T**HE HIGH-QUALITY Cunningham Electron Tubes you sell are the result of the vast engineering resources of the Radio Corporation of America.

From its research laboratories have emerged the new and revolutionary tube types that have made possible the great advancements in FM and Television and the expansion of your business into fields allied with radio. And from these same laboratories will come still more

revolutionary tube types that will constitute the foundation of your business in the future.

It is this *Engineering Leadership* behind Cunningham Electron Tubes that brings you new products to sell and more people to sell to. It is also the reason why customers look for the Cunningham sign in your store window when replacement tubes are needed—because they know "Big C" is a symbol of *consistently* high quality.



Listen to "THE RCA SHOW," Sundays, 2:00 P.M., EDT, NBC Network

**A QUALITY PRODUCT FOR RADIO SERVICE-DEALERS  
BY THE RADIO CORPORATION OF AMERICA**