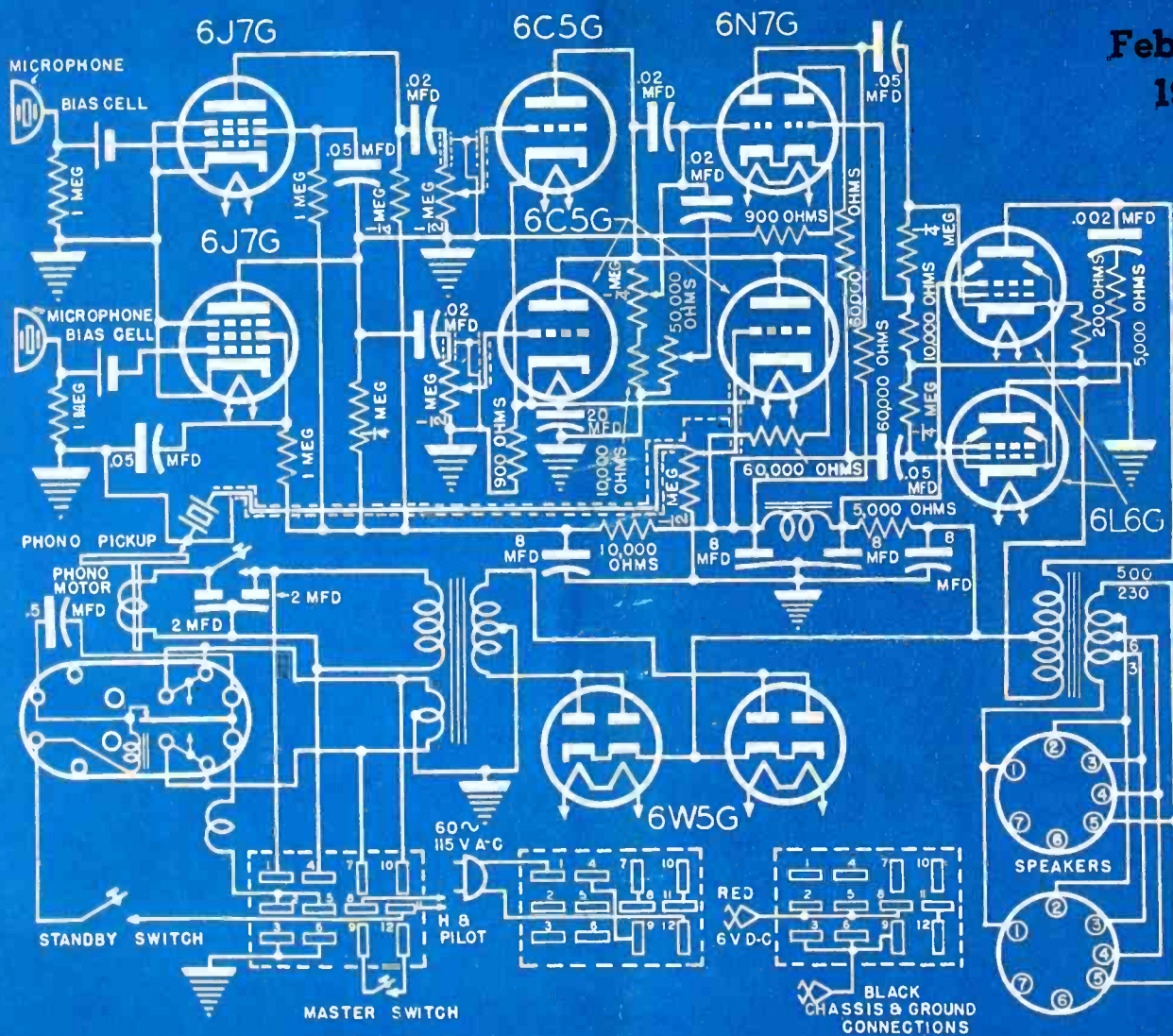


SERVICE

February
1945



Thirty-watt 4-stage battery amplifier with two high-gain inputs. (See page 35)

Feather-light Needle Pressure



IS JUST ONE OF THE FEATURES OF

WEBSTER RECORD CHANGERS

**THE WAR IS NOT
OVER UNTIL FINAL
VICTORY IS WON**

**BUY MORE
WAR BONDS
NOW**

... and

KEEP THEM

Needle pressure of one-ounce or less multiplies record life many times and positively eliminates needle scratch. This is just one of the extra values Webster Record Changers bring to better combinations. Of course, Webster changes records dependably . . . without jamming . . . faster than ever before. Every model has velocity trip. A child can learn the simple operation of Webster Changers in a minute or two. Oversize motors provide adequate power for a full load of records . . . with plenty of torque and without motor rumble. All these advantages are combined in changers of strikingly handsome appearance. Turn tables have beautiful, velvet-soft coverings. You will be wise to look for Webster Record Changers in the combinations you sell. Webster means satisfied customers.

WEBSTER

3825 W. ARMITAGE AVE.

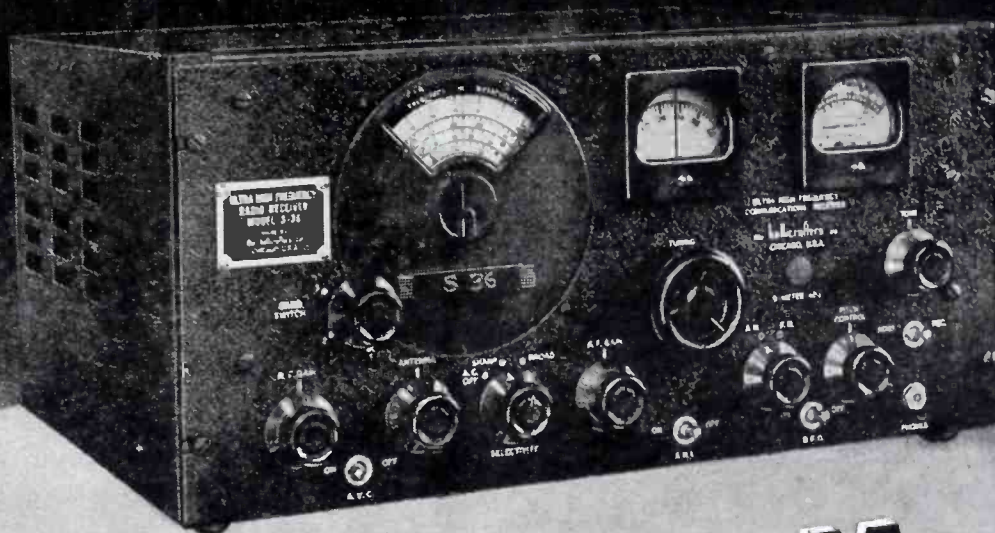


PRODUCTS

CHICAGO 47, ILLINOIS

5 YEARS AHEAD OF ITS TIME

FM
AM
CW



27.8 to 143 Mc
Covers old and new FM bands

hallicrafters Model S-36

EXACTLY five years ago — in 1940 — Hallicrafters introduced a very high frequency communications receiver with a range of 27.8 to 143 Mc. This model was clearly five years ahead of its time in its anticipation of new and exciting possibilities for superior performance on the higher frequencies. Today Model S-36 stands by itself as the only commercially built receiver covering this range. It is outstanding for sensitivity, stability, high fidelity. With its extraordinary VHF versatility it is ready for immediate application in the ever widening fields of FM and higher frequency development work. Engineering imagination at Hallicrafters is reaching out beyond the next five years, beyond the present known limits of radio technique so that Hallicrafters equipment will continue to be always ahead of its time, above and beyond your best expectations.



BUY A WAR BOND TODAY!

hallicrafters RADIO

THE HALLICRAFTERS COMPANY, MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 16, U. S. A.

EDITORIAL

POSTING service charge bulletins where they cannot only be *seen* but *read*, is, fortunately, rapidly becoming a must in service shops. Service shop-owners have found that these bulletins solve a multitude of problems, eliminating disputes and accelerating servicing.

Some Service Men have grouped and affected a standard price policy for specific operations. They have reported that these standards have helped to eliminate labor headaches. Such standards cover repairs of dial cords, speakers, tone controls, etc. The program is similar to one practiced in Canada where standards even cover such items as resetting of buttons, repair of hum controls and realignments. Charges range from \$1.25 for simple shop labor to \$16 for the installation of a 12-tube power transformer. The hum-control charge usually is about \$4.50 and covers any size of resistance required to eliminate the trouble. Incidentally all charges include a complete checkup and inspection of the set in the shop, as well as pickup and delivery.

THE servicing of hearing aids, discussed in this column some weeks ago, continues to be a lively topic among Service Men and manufacturers, too. Commenting on the manufacturer's problem, a chief engineer says that there is a big difference in the objectives of hearing aid service and of radio service. He declares that the radio Service Man must fix a receiver so that it sounds satisfactory. However, the hearing aid man must restore the original acoustical performance, an exacting operation.

Explaining the engineering design problems involved in hearing aids, this specialist points out that a good aid will have but a 2% harmonic distortion in the acoustical output while under the same conditions some aids might have a distortion as high as 35%. Since many of the hard-of-hearing are actually more sensitive to harmonic distortion than the normal hearing person, this factor must be considered very carefully.

Other engineering details of Service Man importance disclosed by this expert covered voltage gain and stability. He revealed that the voltage gain in the older types of equipment was around 100 db, whereas today it is not much over 85. This extra voltage gain introduced a critical state of stability. Thus their repair was difficult too because of a possibility of oscillation and feedback. Newer types eliminated this problem, but exacting service is still essential. And, says this specialist, unless your training and experience qualifies you for such precision servicing, recommend someone who has the servicing requirements, or suggest factory servicing.

SERVICE

A Monthly Digest of Radio and Allied Maintenance

Reg. U. S. Patent Office

Vol. 14, No. 2

February, 1945

LEWIS WINNER

Editorial Director

ALFRED A. GHIRARDI

Advisory Editor

F. WALEN

Managing Editor

	Page
Auto Set Dial Cord Installation Notes (For Chrysler C-1708; Ford F-1740; Lincoln L-1760, 1761; Studebaker S-1722, S-1726)	24
Crystal Pickups (Data for 17 RCA types)	26
High-Fidelity Recorded-Music Reproduction. By Willard Moody	16
Hiring Service Men. By Charles and H. A. Middleton	14
Old Timer's Corner	33
Postwar Receiver Components and Accessories. By Donald Philips	11
Service Helps. By Edward Arthur	18
Ser-Cuits. By Henry Howard	20
Cover	
30-watt Amplifier (Silver-tone 8950)	35
Circuits	
Philco 42-245	21
Philco 41-609	25
Philco 730A	25
Silver-tone R81	21
Silver-tone 8950 (Cover)	35
Service Helps	
DeWald 555	18
Fada 207 APT	18
Grunow 1151	18
Magnavox CR-171	18
Motorola 51F11	18
Motorola 161L12	18
Zenith 6R683	18
Index to Advertisers	40
Manufacturers	
News	28
New Products	34
Jots and Flashes	40

Copyright, 1945, Bryan Davis Publishing Co., Inc.

Published monthly by Bryan Davis Publishing Co., Inc.

19 East 47th Street, New York 17, N. Y. Telephone PLaza 3-0483

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

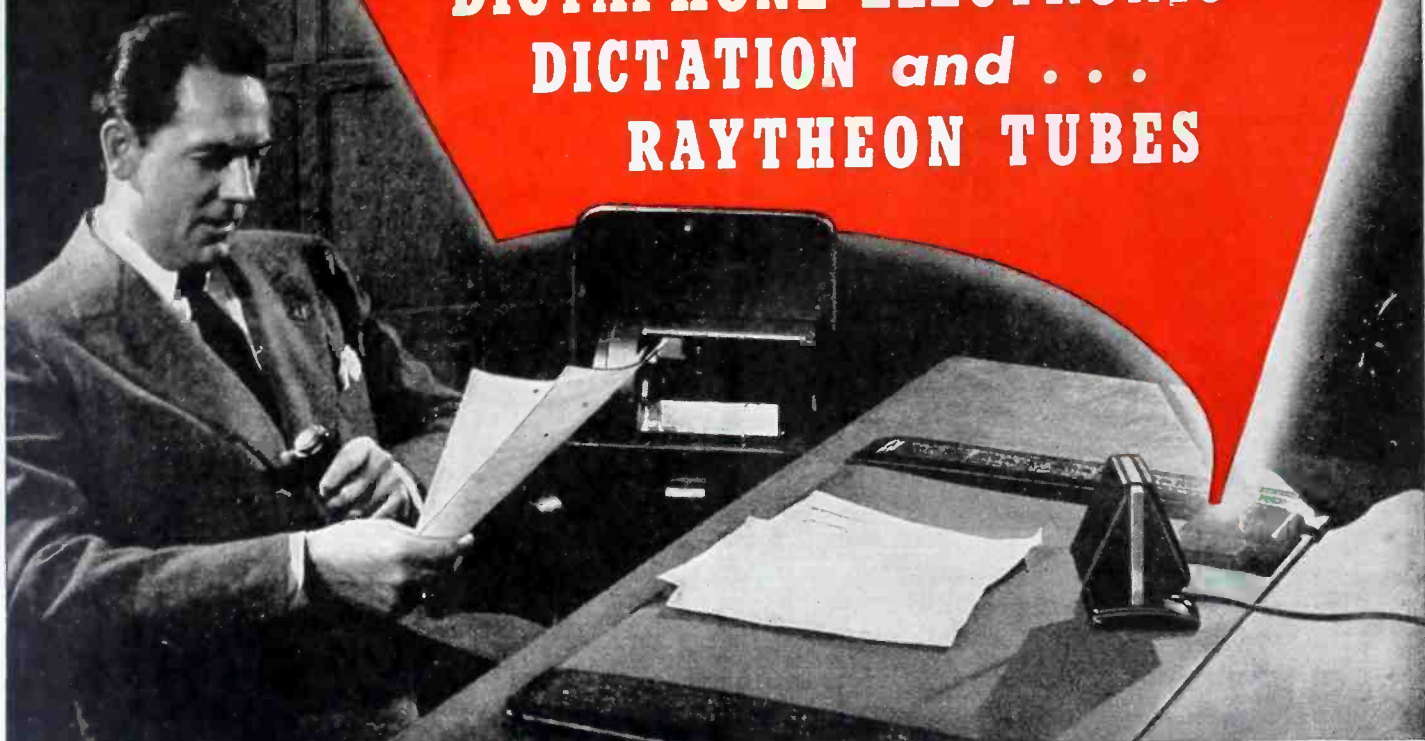
Paul S. Weil, General Manager
A. Goebel, Circulation Manager

James C. Munn, 10615 Wilbur Avenue, Cleveland 6, Ohio
Pacific Coast Representative: Brand & Brand, 816 W. Fifth St., Los Angeles 13, Calif.; Telephone Michigan 1732



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

DICTAPHONE ELECTRONIC DICTATION *and . . .* RAYTHEON TUBES



● If you're a radio serviceman or engineer, you'll appreciate the ingenuity and development work which produced this new Dictaphone Electronic Dictating Machine which is available for essential uses. And if you're a busy executive, as well, you'll praise it as an aid to getting things done more easily, more quickly and more conveniently. Not only does it record dictation, but over-the-desk conversations and both ends of phone-calls too!

Raytheon high-fidelity tubes used in this remarkable new machine consistently deliver clear, realistic reproduction and give long, dependable performance...just as they will in the future for this and an infinite variety of other electronic devices.

When peace comes, Raytheon tubes will be more readily available. And they'll be even finer than Raytheon's pre-war tubes,

for their design and construction will have been proved by the toughest test of all—the acid test of battlefront performance. We can promise, too, if you're a serviceman or dealer, that the Raytheon tube line will be the most *beneficial* line for you to handle. After Victory it will pay you to switch to Raytheon high-fidelity tubes!

Increased turnover and profits . . . easier stock control . . . better tubes at lower inventory cost . . . These are benefits you will enjoy after the war as a result of the Raytheon standardized tube type program, which is part of our continued planning for the future.



Raytheon Manufacturing Company

RADIO RECEIVING TUBE DIVISION

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

Listen to
"MEET YOUR NAVY"
Every Saturday Night
ENTIRE BLUE NETWORK
Coast-to-Coast
181 Stations



RAYTHEON

High Fidelity

ELECTRONIC AND RADIO TUBES



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

DEVOTED TO RESEARCH AND MANUFACTURE OF TUBES FOR THE NEW ERA OF ELECTRONICS



EVERYDAY IS WASHDAY AT Triplet

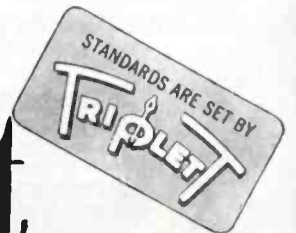
• The special equipment and solutions with which jewels are washed are minor parts of the Triplet method of manufacturing fine electrical measuring instruments but they are significant. They typify the dozens of out-of-sight Extra Precautions that assure your permanent satisfaction with Triplet Instruments. These Extra Care provisions are routine in Triplet plants but through them Triplet maintains in mass production the hand-made quality of fine instruments.

Extra Care in our work puts Extra Value in your Triplet Instrument.

*Precision first
...to last*



Triplet



ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO



Your Jobber

is again in a position to supply servicemen and experimentors with either standard, completely assembled and individually cartoned selector switches or in kit form.

Available in two forms of insulation, i. e.; steatite or bakelite.

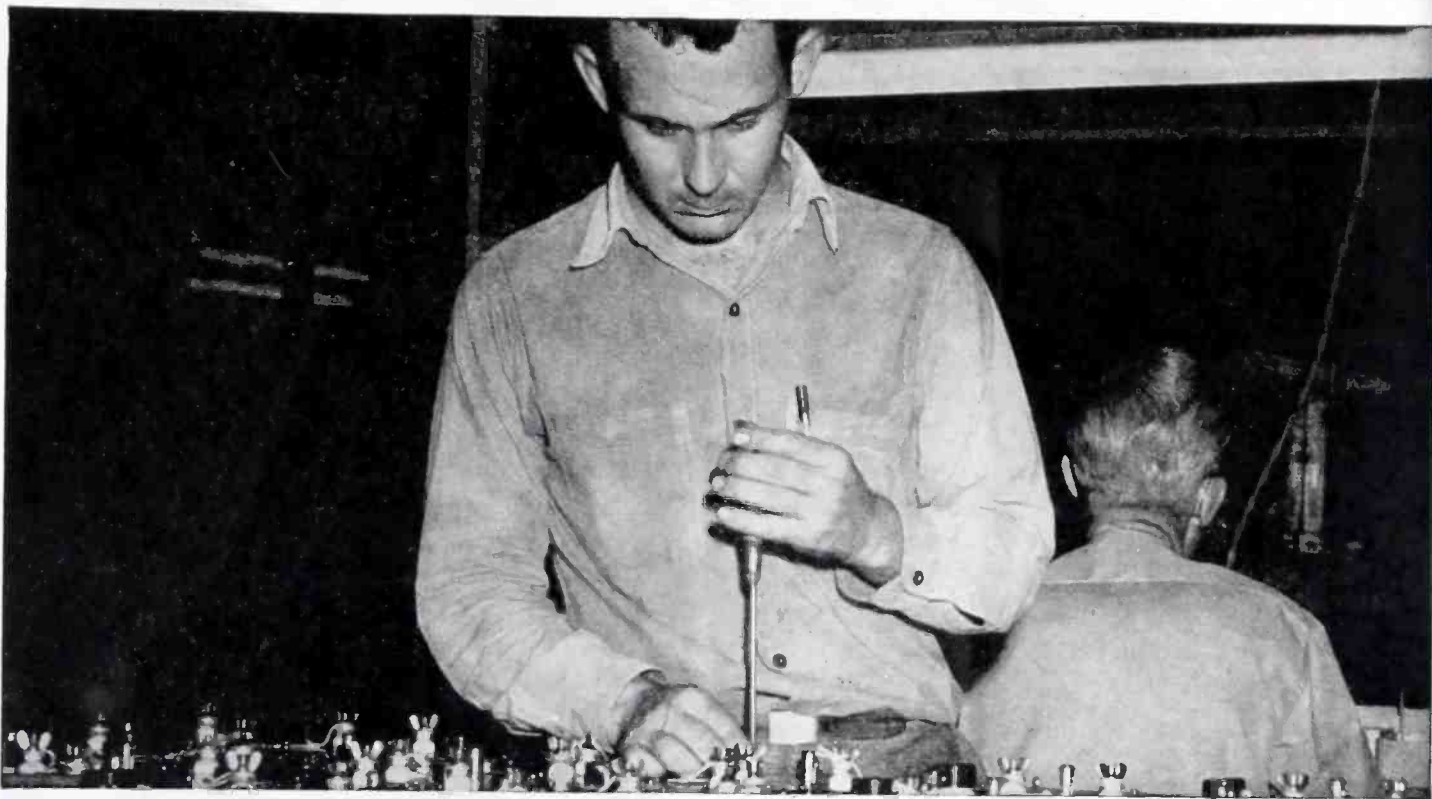
All switches have double-wipe contact terminals for long life and have a consistently low contact resistance of less than $2\frac{1}{2}$ milliohms and are completely self-cleaning. Index is positive with 30° between each rotating position.

Switches are also available for transmitter use.

Send for illustrated Catalog No. 24

Centralab

Division of GLOBE-UNION INC., Milwaukee
Producers of Variable Resistors—Selector Switches —
Ceramic Capacitors, Fixed and Variable—
Steatite Insulators.



Skilled fingers check every connection before this Meissner electronic equipment leaves Mt. Carmel, Ill., its destination—"Somewhere with the Armed Forces." This "precisioneering" may make the difference between a successful military operation or a defeat, and Meissner's "precision-el" are working for victory.

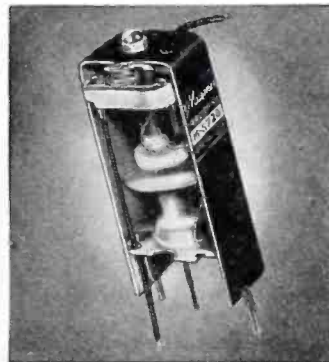
THIS IS PRECISIONEERING by Mt. Carmel's famed "Precision-el"

Precisioneering isn't just another word for precision quality. It means that pride and skilled craftsmanship are represented in every product. To the men and women of Meissner, precisioneering means that they are maintaining the same high standards of workmanship that earned them the name "precision-el"—highest standard of an exacting industry.

To you, the users of Meissner precision-built electronic equipment, it means that these precisioneered products give you added quality, greater dependability.



Precision testing in Meissner Laboratories proves the precision quality of the work of Meissner "precision-el." It means new highs in performance when you specify Meissner precision-built electronic equipment for your product.



"Step Up" Old Receivers!

These Meissner Ferrocart I. F. input and output transformers are getting top results in stepping up performance of old worn receivers. Special powdered iron core permits higher "Q" with a resultant increase in selectivity and gain, now available for frequency range 127-206. Ask for numbers 16-5728 input, 16-5730 output. List \$2.20 each.



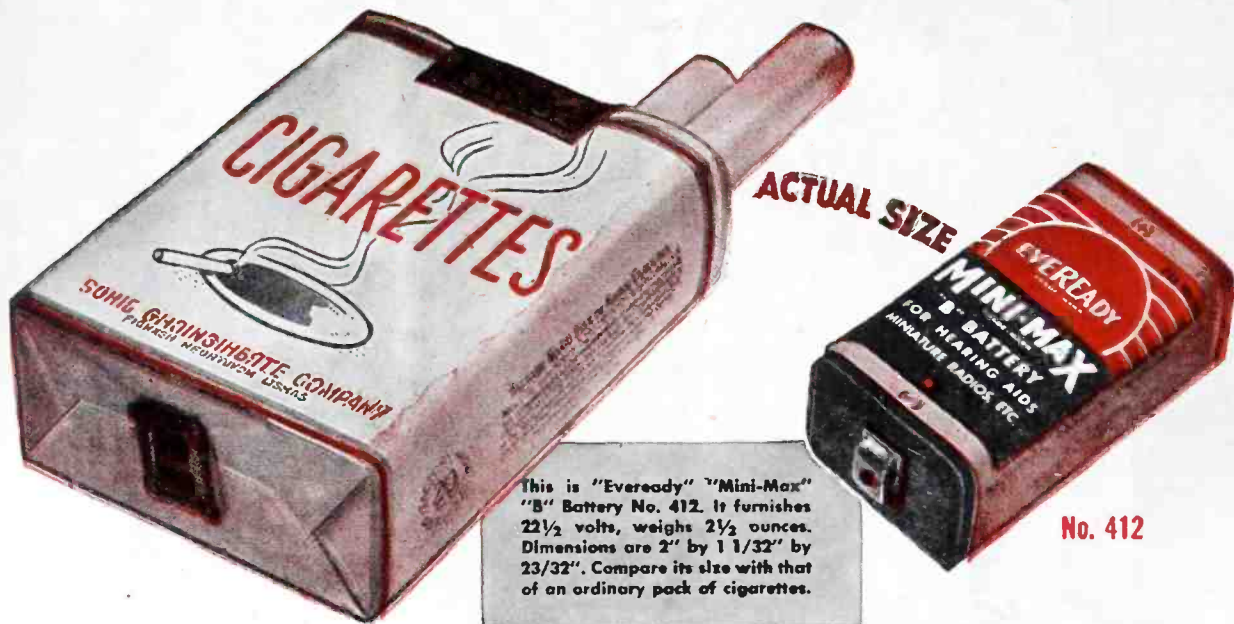
Concentration on the production of finer electronic equipment is characteristic of the men and women of Meissner. This devotion to quality production makes "precisioneering" out of even the most routine jobs—gives even greater skill to technicians like these.

MEISSNER

MANUFACTURING COMPANY • MT. CARMEL, ILL.

ADVANCED ELECTRONIC RESEARCH AND MANUFACTURE
Export Division: 25 Warren St., New York; Cable: Simontrice

Take a look at the size of the "BATTERY OF TOMORROW"



"EVEREADY" "MINI-MAX" "B" BATTERY (22½ VOLT)

HERE IT IS—the midget battery that opens up new fields of opportunity in postwar radio and electronics. 22½ volts crammed into a space so small that it staggers the imagination!

"Eveready's" exclusive "Mini-Max" construction makes all this possible. Actually it has proved a vital factor in improved communication equipment for this mobile war. By the same token this revolutionary "Mini-Max" construction will make possible radically new portable radio sets and other electronic devices after the war—sets for the personal use of an individual. Sets so small they will fit in a man's vest pocket or a woman's handbag. The portable radio business, just coming into its own before the war, promises to return with an even brighter future—aided by this midget battery. You can look forward to a new line of merchandise on your shelves—new customers—new business.

Actually, the baby "Mini-Max" "B" Battery

in itself is an invitation to creative men to develop new devices to keep pace with it. We urge engineers and designers to consult us—discuss their ideas and problems with our engineers, who are ready and willing to cooperate in every way. The laboratories and technical staff of National Carbon Company are at your disposal.

"EVEREADY"
MINI-MAX
TRADE-MARK
RADIO "B" BATTERIES

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation

UCC
General Offices: NEW YORK, N. Y.

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



We can all see with the naked eye that the Payroll Savings Plan provides the most stable method of war financing. Analyze it under the X-ray of sound economics and other important advantages are evident.

A continuous check on inflation, the Payroll Savings Plan helps American Industry to build the economic stability upon which future profits depend. Billions of dollars, invested in War Bonds through this greatest of all savings plans, represent a "high level" market for postwar products. Meanwhile, putting over Payroll Savings Plans *together* establishes a friendlier re-

lationship between management and labor.

To working America the Payroll Savings Plan offers many new and desirable opportunities. Through this systematic "investment in victory," homes, education for their children and nest eggs for their old age are today within the reach of millions.

The benefits of the Payroll Savings Plan to both management and labor are national benefits. Instilling the thrift principle in the mind of the working men and women, the Payroll Savings Plan assures their future security—and is a definite contribution to the prosperity of postwar America!

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

SERVICE

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

THE *Postwar* MIRACLE
THAT WILL *Really*
HAPPEN . . .

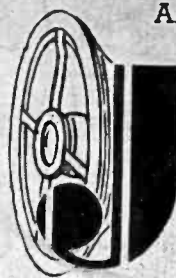
JENSEN SPEAKERS
WITH

ALNICO 5



Among all the miracles that have been talked about for a great and glorious postwar era, here is one thing on which you can really count: JENSEN Speakers will be built around the wartime developed **ALNICO 5** ¶ JENSEN naturally pioneered in the use of this remarkable new magnet material which weighs only a fraction of other magnetic alloys of equal strength. Thus JENSEN postwar speakers with **ALNICO 5** will be lighter and more compact, but still as highly efficient and rugged as ever. ¶ JENSEN military loud speakers are now using **ALNICO 5** in great quantities.

And as soon as conditions permit, **ALNICO 5** will become a feature of JENSEN PM Speakers.



Jensen
SPEAKERS WITH

ALNICO 5

Specialists in Design and Manufacture of Acoustic Equipment

JENSEN RADIO MANUFACTURING COMPANY • 6601 SOUTH LARAMIE AVENUE, CHICAGO 38, ILLINOIS

SERVICE. FEBRUARY, 1945 • 9

SYLVANIA NEWS

RADIO SERVICE EDITION

FEBRUARY

Published in the Interests of Better Sight and Sound

1945

**SYLVANIA
SERVICEMAN
SERVICE**

by
FRANK FAX



A large, attractive, three-color display banner featuring the phrase "Complete Radio Service" is now ready for distribution to servicemen by Sylvania Electric.

The banner, pictured below, measures 46 by 28 inches; is printed in black, green and white on special weather-proofed "ducking" material making it suitable for use either inside or outside

**COMPLETE
RADIO SERVICE**

WE RECOMMEND
**SYLVANIA
RADIO TUBES**



of the store. It has six metal grommets to provide extra reinforcement.

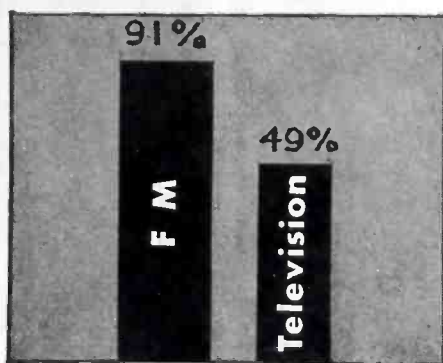
This useful, durable and attractive display banner may be obtained for only \$.40 (three for \$1) from your local Sylvania distributor, or from Frank Fax, Sylvania Electric Products Inc., Emporium, Pa.

This newest display is another in the extensive list of Sylvania promotion material designed to help servicemen merchandise both their own service and the Sylvania products they sell.

Present Set-Owners Rate FM First In Current Sylvania Radio Survey

*91% of Consumers Interviewed Say They
Want This Feature In Postwar Receivers*

Preliminary reports of the nationwide survey being conducted by Sylvania Electric indicate a high degree of public interest in frequency modulation. Of the thousands of set-owners who have been interviewed, 91% have indicated their desire to have FM incorporated in their postwar receivers.



Graph shows percentages of set-owners stating that they want FM and television in their postwar sets.

70% say they are willing to pay an additional sum in order to get this feature.

Television, while also a subject of considerable interest, ranked behind FM in the tabulation of survey results. 49% of those interviewed stated that they wanted television reception after the war. The same percentage indicated their willingness to pay extra for it.

Service Aspects

This expression of popular interest in frequency modulation suggests the probability that servicemen, after the war, will find the FM feature increasingly common in the sets they will be called on to repair.

Results of other phases of the set-owner survey are now being tabulated, and findings will be published in future issues of SYLVANIA NEWS.

Survey Continues

While the analysis of the results of personal interviews is going on, Sylvania is continuing its survey, and broadening its scope, through the medium of a series of questionnaire-type advertisements appearing in leading national magazines.

The purpose of these advertisements is to gather additional information on consumer preferences and interest in various types of radio and television receivers. This Sylvania research should be helpful to servicemen in their postwar planning.

SYLVESTER SURVEY

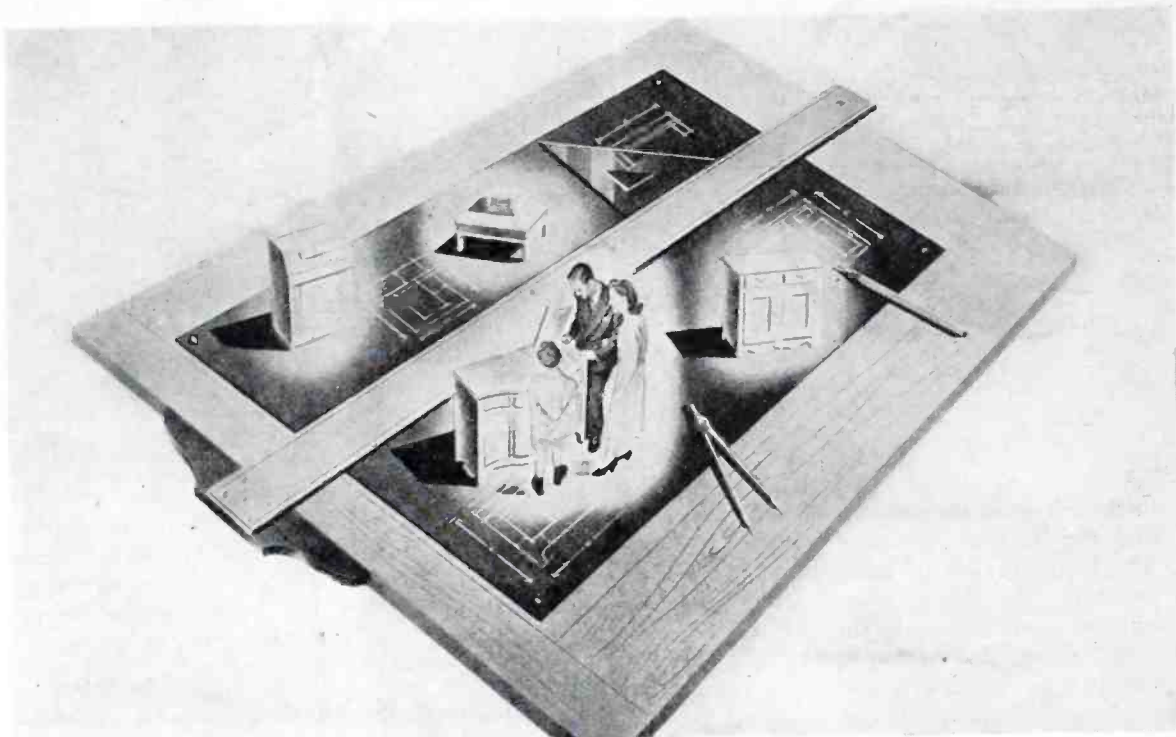


"Would you be willing to go as high as \$300 to have FM and television included in your radio set?"

SYLVANIA ELECTRIC

SYLVANIA ELECTRIC PRODUCTS INC., *Radio Division*, Emporium, Pa.

MAKERS OF RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, ACCESSORIES; INCANDESCENT LAMPS



(Courtesy General Electric)

POSTWAR RECEIVER COMPONENTS AND ACCESSORIES

A VARIETY of new and remarkably effective developments will contribute to the postwar receiver.

We will find, for instance that most components will have been improved in some manner; performance, durability, size or weight. In factories improved methods of production and tests, adopted during the war, will play their role toward providing these improved components.

Loops

One improved component that will find itself used in many receivers is the loop. As a matter of fact many new types of windings have been developed. These improve the Q of the loop. Developments have shown that copper foil placed between loop and chassis reduces the loss in Q due to loops will be larger and wound with heavier wire, allowing greater pickup

by **DONALD PHILLIPS**

with a consequent improvement in signal-to-noise ratio. In higher priced receivers, loops with iron cores may be used. Iron-core loops have been popular in German aircraft direction finders. We'll also find an increased use solinoid types of loops.

I-F Coils

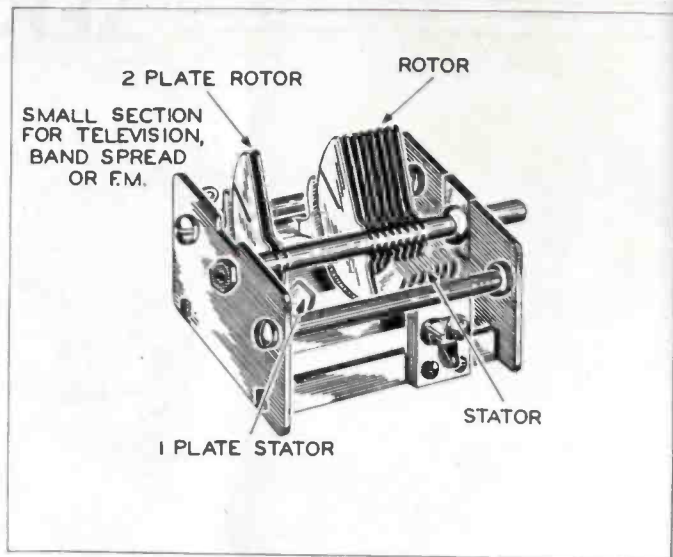
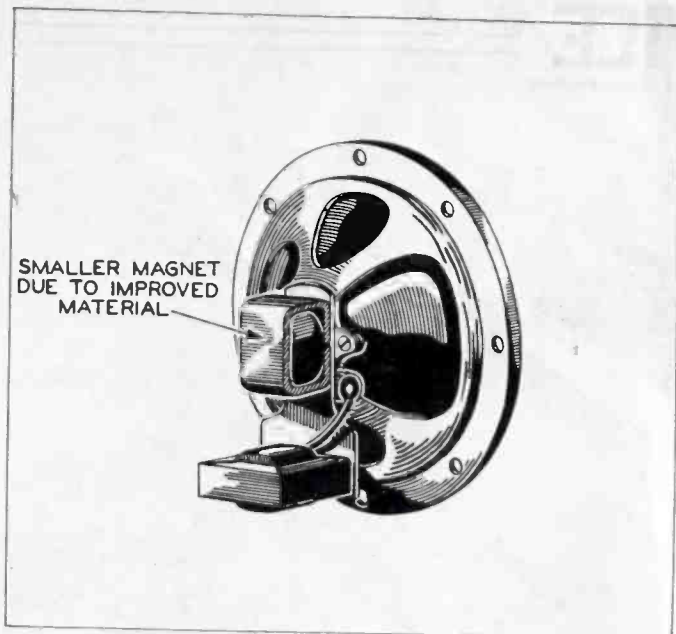
In spite of reduced size, i-f transformers will provide increased efficiency. We may even be using pre-tuned i-f transformers, so matched that no adjustments are required. The more expensive units may have fixed temperature compensated capacitors for increased stability. This will be particularly useful in f-m television or other v-h-f receivers. I-f frequencies are expected to remain at 175, 262 and 455 kc for standard a-m receivers. F-m, television and v-h-f receivers will

probably employ 8 to 20 mc for the i-f-t frequency.

Capacitors

We may have an extension of the broadcast-band frequency range. This would appear at the lower end, and may extend to 520 kc. Ordinarily, such a move would necessitate larger variable condensers with greater maximum capacitance and not more minimum. But tuning condensers are a lot more precise than in the old days and their size can be kept down by using thinner plates with smaller spacing. New methods of manufacture will provide for improved calibration methods and increased tuning efficiency. The Service Man will also be aided by novel methods of condenser mounting which will lessen microphonics. It appears as if the 100% tuned r-f stage is going to return. This will require 3-gang variables instead of the too-familiar 2-gangs to provide improved selectivity.

New type trimmers are now being



Left, typical postwar speaker that will be smaller and have stronger alnico magnets. Above, a multi-function capacitor for f-m, broadcast, television or band-spread.

designed which will probably be constructed along the lines of miniature variables. The better grades of tubular paper capacitors, as well as electrolytics, will be mounted in drawn aluminum cans which have proved to be far superior to cardboard and other types. New sizes providing an extremely high density per square centimeter will also be made.

Resistors

New types of carbon resistors with smaller temperature and voltage coefficients, greater stability and higher power ratings, recently developed will find many postwar receiver applications.

Wirewound elements are far superior to prewar varieties, failures due to opens being greatly reduced. Insulation has also been improved to increase resistor life and usefulness.

Volume and Tone Controls

High standards set by Army-Navy procurement agencies have introduced many improvements in tone and volume controls. Metals recently devel-

oped not only prevent wear of element, but avoid humidity effect, thus eliminating noise problems. Improved pig-tails have also minimized contact noise.

Tuners

Accelerated compact receiver design has provided improved permeability (iron core) tuners. And we will find them in many of the smaller type receivers instead of variable condensers. Such receivers will also see new methods of coupling loop antennas to these tuners. Frequency ranges will be greater due to improvements in powdering techniques. A change in the shunt capacity as well as a change in the position of the iron slug increases frequency range quite effectively.

Power and Output Transformers

Instead of the old type wax paper separators between layers, new type plastic sheets will be used. There'll also be new types of insulation for wire allowing higher operating temperatures, and permitting greater out-

put for a given size transformer. Laminations will be of a better grade of steel providing a further reduction in size, an improvement in power factor and frequency response.

Sockets

Many receivers, particularly the f-m and television types, will feature many low-loss sockets. This will be important because of the high-impedance circuits. Sockets will be of polystyrene low loss ceramic, and other similar materials. Various forms of beryllium copper and other spring alloys will provide for better and more permanent gripping.

Tubes

Improvements in miniature type tube technique will probably result in their being standard in all types of receivers for r-f, i-f, converter and low power audio uses. Only the rectifiers and audio power tubes may be standard size and many of these may be GT or metal.

Dials

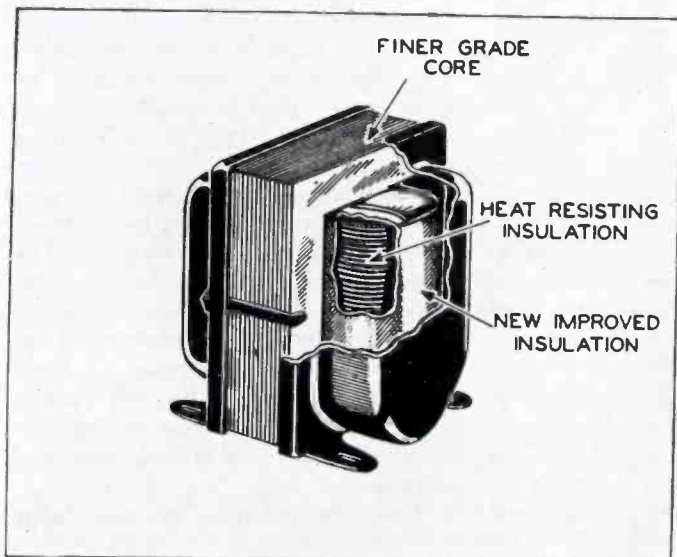
The trend in postwar design indicates that we'll have larger dials, better viewing and clearer figures. There are new forms of illumination with three dimensional effects, and a variety of new materials to enhance appearance.

Cabinets

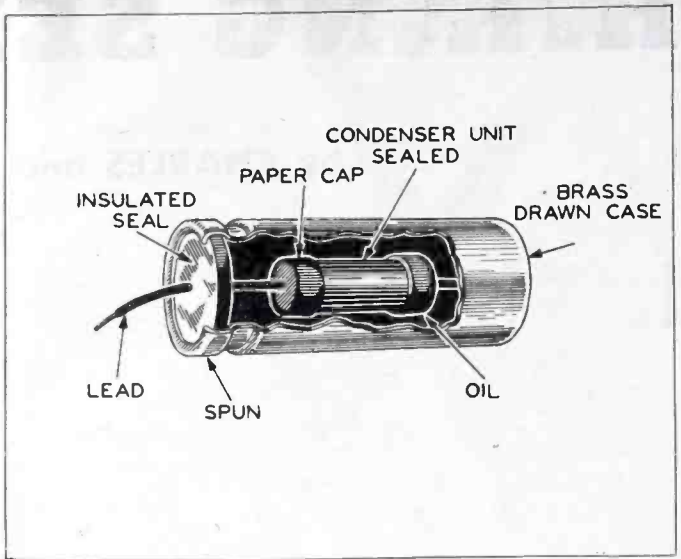
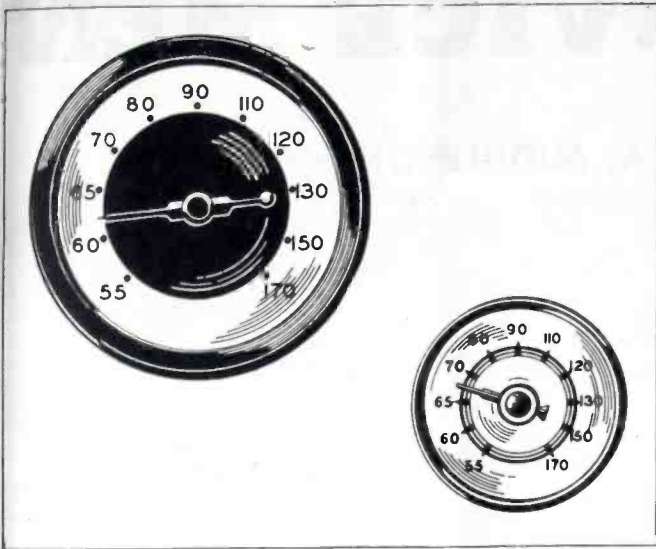
Cabinet designs will be most unusual. With new materials on hand for both compression and injection molding, striking new designs are in the offing. Combinations of bakelite with wood and other materials have great possibilities. There are plastics available which are practically unbreakable.

Speakers

The strongest of the present alnico alloys, No. 5, will prompt an increased



Postwar power transformers that will probably use plastic sheet separators, and other improved forms of insulation. This, with better grades of steel and generally improved design, will provide transformers of unusually high efficiency.



Left, comparison of prewar and postwar dials. New dials will be larger, with large size frequency designations. Right, cross-sectional view of postwar tubular paper condenser design with hermetically sealed case.

application of p-m speakers. With this alloy unusually high flux densities can be obtained with very small magnets. In fact, the speakers may be so tiny that receiver purchasers may doubt their usefulness. However, as tiny as some may be, their performance will be substantial. The low-frequency response and power output of these speakers will far surpass any similar type speaker made before the war. The new types will feature increased frequency response, lighter voice coils, closer gaps, and better dust-proofing.

Most speakers will be supplied less output transformers which will be a big help to the Service Man. Standardization on 3½-ohm voice coils by industry established a short time ago will help the Service Man too. Instead of a wide variety, only a few size speakers and transformers need be carried in stock.

Chassis

The postwar receiver chassis will be constructed from aluminum, magnesium and steel, depending upon the application. Plated rust-resisting steel chassis having new types of coloring effects will be used in large console sets. Portables and light weight models will probably use aluminum as standard material and magnesium where the utmost saving in weight is required.

Wire

New types of plastic insulation which stand up in all climates will be featured in the better sets. We'll also see new types of insulated wire for use in r-f and i-f coils. Adverse climates will not affect such wire. And Q-loss will be minimized by the use of this new type of insulation.

Portables

There'll be several types of port-

ables, using new A and B storage batteries. Most of these will be of the self-charging type and unusually compact.

Postwar Television

Since television will probably be a major postwar factor, it is prudent to survey some of its features and problems. An effective analysis of the new video receivers was prepared recently by Frank Freiman, executive vice president of Magnavox. He said:

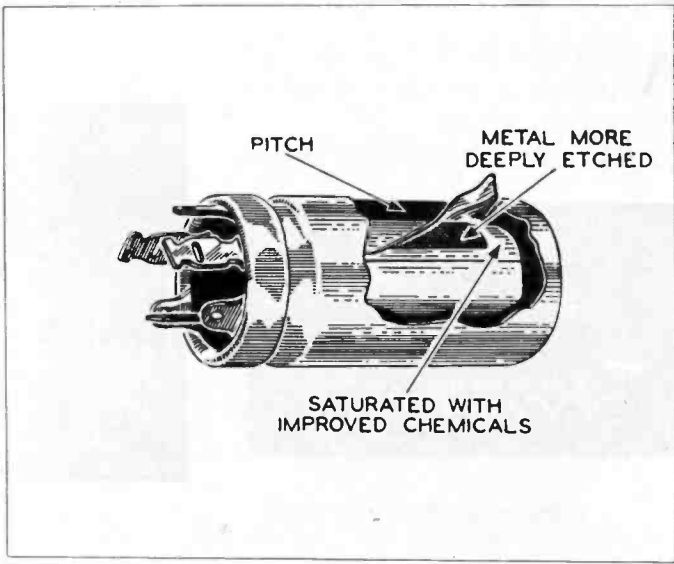
"The location for best television viewing is seldom the location for best auditory reception. The radio-phonograph may be in the living room and the television receiver in the den or library. The television antenna installation, which is of major importance for successful operation, will frequently determine the location of the television receiver. It may be one least desirable for the radio-phonograph.

"Furniture size adversely influences the combination of television and the radio-phonograph. The spontaneous revival of interest in phonograph records developed a prewar trend toward console instruments, embodying both the radio and the

phonograph. This trend was no doubt aided by the public's realization that they had missed most of the musical entertainment through the inadequacy of small table model sets. There has been ample proof of resistance toward the purchase of large cabinets because the modern home will not accommodate bulky furniture. Combining a good musical instrument with television completely ignores these basic factors.

"Industry must take a more realistic view of television in relation to the immediate postwar period and the effect it will have on the radio market as a whole, as well as for the long pull growth of television itself. Factual information should be substituted for ballyhoo in television promotion now. The public should be told what it may expect of television, what the television receiver will be like, what effect, if any, it will have on the radio and the phonograph and the specific areas that will be served by television transmitters. All this in relation to the immediate postwar era, not what might be expected two, three or five years after television is launched. Let's present television as the wonderful separate service that it is and not as either an adjunct to or successor of the radio and phonograph."

Postwar type of electrolytic. Drawn aluminum cans will probably be featured in most types.



HIRING SERVICE MEN

by CHARLES and H. A. MIDDLETON

LIKE most radio service stores in the country today we too have had Service Men employment problems.

Before the war this was a three-man shop. Then a great increase in service business made it necessary to hire more. It was only necessary to advertise and there were many applicants. In a two-year period we hired ten men. Their selection was based on their record of experience and their general presentation. Unfortunately none of these men are with us now since none were capable of complying with the professional service and repair standards we had set up.

Some time ago we tried another method of selecting men, the examination method. It has proved to be the solution, providing just the men we needed in a rapid, simple way. Ten simple but important questions constituted the test. Each applicant, regardless of experience claimed was asked to answer these questions. Substantially correct answers to all the questions were required.

Among the questions submitted were:

(1)—Compute the resistance of R , in a series-filament circuit, using a 25Z6, 25L6, 6K7, 6Q7 and 6A8.

(2)—Draw a diagram of a second detector and the output stages of a

receiver connected to a speaker.

(3)—If the i-f frequency of a receiver is 460 kc, to what frequency must the oscillator be tuned to receive a station at 640 kc?

(4)—Draw a diagram of a diode detector in a receiver.

(5)—Describe the alignment procedure of a superheterodyne receiver.

(6)—Draw a diagram of a power supply for an a-c receiver.

(7)—Show in a diagram where and how the filament voltages are obtained for the battery tubes in an a-c/d-c battery portable where the tubes are connected in series.

(8)—In a receiver employing a tube ahead of the oscillator, list the common names of the five stages used.

Other questions submitted covered diagrams with missing components as well as simple case history problems.

Although the questions are quite simple, seventeen failed to answer question one which required the computation of a line cord resistor.

One applicant who claimed long experience thought 6K7's, 25L6's, etc., had .6 ampere filaments. Many refused to submit to the examination, stating that they just knew the answers to all the problems and didn't have to know about math or circuits. Many who actually believed they knew radio considered it unreasonable that

a Service Man should be expected to know so much. Only four out of forty-seven passed.

We do not believe this condition was brought on by the war, for the same thing was true before. Many have had years of experience without learning the most elementary principles.

The solution, or rather, protection for the Servicing industry is the examination. It need not be a complex test. Questions should contain fundamental problems with which a Service Man should be familiar, if he is to Service successfully. This does not mean that if a man can answer ten simple questions he has met all qualifications, for there are naturally other ability requirements that usually reveal themselves during interview or a few weeks trial. But *elementary radio is a must.*

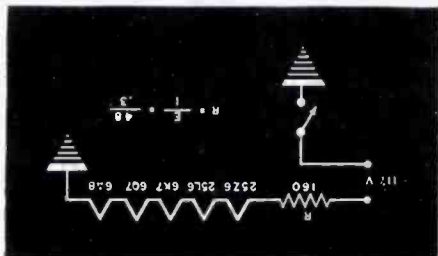
The Service man should take warning now. After the war competition will be strong. There'll be many new trick circuits and accessories. The man who does not study and keep up with developments will find himself on the short end. Every Service Man should study, read books and periodicals. It will be well worthwhile.

[Below and on page 39 appear the answers. Check your percentage against them. The questions are quite elementary and you should be able to answer at least seven of the eight questions.]

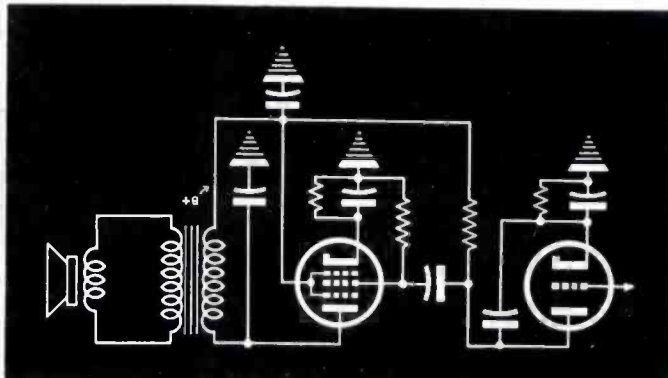
T H E A N S W E R S

ANSWERS to the questions appearing in the above discussion are presented below:

(1)—See diagram below.



(2)—See diagram at right.



A portion of this diagram was also used for a question involving missing components. Omissions in this diagram included plate bypass condensers, cathode resistors and bypass condensers, and C-bias resistors.

(Continued on page 39)



A NEW STAR IN THE ELECTRONIC FIELD



The stage is set for something new in Universal's line of products. Next month will bring the appearance of a new microphone to meet markets made by present and postwar demands. This will be the first microphone of its kind offered by Universal since the War. Universal has, since before Pearl Harbor, been manufacturing microphones and electronic voice communication components for the U. S. Army Signal Corps.

We are still pleased to manufacture all the microphones our fighting men require and we are pleased to make a new microphone to fill their and essential home front needs.

← Emblems of quality in war production

UNIVERSAL MICROPHONE COMPANY
INGLEWOOD, CALIFORNIA

SPRAGUE TRADING POST

A FREE Buy-Exchange-Sell Service for Radio Men



You Can Get KOOLOHMS Now!

At last, greatly expanded production is beginning to match even the tremendous war equipment demand for Sprague KOOLOHM Resistors. As a result, we have been delivering good quantities of 5- and 10-watt sizes in all ranges to Sprague distributors—and hope soon to make a similar announcement, both with regard to KOOLOHMS in other sizes and to many of the previously unavailable Sprague Capacitor types.

As always, we'll appreciate it if you ask for them by name!

WANTED—Late model tube tester in good condition. W. B. Jackson, 5011 Burke St., Columbia, S. C.

FOR SALE OR TRADE—Have many hard-get tubes in 6, 12, 25, 35, 70, and 117 series; 1941 auto radio in good condition, \$10; vibra-pack 300 v. 125 ma. Will sell or trade for radio or photo eqpt. R. Nastoff, 3885 Washington St., Gary, Ind.

WANTED—Rider's manuals, vols. 8 to 14. Offer cash price for any vols. you have. W. Schendel, 518 W. Main St., Sparta, Wis.

WANTED—Operating instructions and a copy of chemically treated 1/4" paper for American Code Reader unit. H. Leigh, Sr., 801 Clintonia Ave., San Diego 10, Calif.

FOR SALE—QST magazines in many paths for 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, etc. Write for list. Will trade all for good 0-200 millimeter. Albert A. Brehm, 3439 Jay St., Cincinnati 29, Ohio.

WANTED—Output meter in A-1 condition. Also one #767 Weston Filatrol for a Weston tube checker, 771 type 2. R. W. Martin, 90 Pine St., Orono, Me.

FOR SALE—Large assortment C-D and Behthelm metal cased non-inductive paper capacitors .1 to 2 mfd. @ 400 to 600 v. Working, 60% off list. National HRO kits, 50% off. Weston #666 Type 1B spot selector analyzer, \$12.50. P. Schaefer, 21 Wadsworth Ave., New York 33, N. Y.

URGENTLY NEEDED—Echophone EC-1 driver. Cash. Gilbert F. Marsh, 327 Washington St., Lansing, Mich.

WANTED—Am interested in obtaining Halcrafter SX-28-A or SX-28. Have De

Forest complete correspondence course in Radio, Television, Sound, except the projector to trade. August C. Swensen, 103 E. Park Ave., San Antonio 2, Texas.

FOR SALE—Superior utility meter 4 1/2" sensitive Hi-Lo ohms, 1000 watts, AC-DC volts, \$15; auto elec. time alarm clock, \$6. Want 0-1 millimeter and d-c 0.5 ampmeter. W. F. Onder, Rt. 1, Box 389, Kimmwick, Mo.

WANTED—Any test eqpt., tubes, Rider's books, parts, etc. at once. Describe fully. Teats Radio Service, 1151 Daisy Ave., Long Beach 2, Calif.

URGENTLY NEEDED—12SA7, 12SK7, 12SQ7, 50L6, 35L6, 6A8, 35Z5, 25Z6, etc. either new or used—also a condenser checker. All replies answered. Byron Radio Service, 151 40th St., N.E., Cedar Rapids, Iowa.

WANTED—One 3 or 4-tube short wave set for earphone use, small speaker, preferably AC-DC. Mickey Berman, 10401 Ostend, Cleveland 8, Ohio.

WANTED FOR CASH—Superior 1230 signal generator and 1240 tube tester, also Raytheon BH tubes. Ezra Bond, Bone-steel, So. Dak.

FOR SALE—Sampson amplifier P.A.M. 16, Serial #11818; 1-281; 2-210; and 1-227 tubes, used but test perfect. Geo. Hassinger, Frankfort, So. Dak.

WANTED—Complete set Rider's manuals. Will pay cash or trade Jackson #650 condenser tester and Precision multimeter, series 900 dynamic electrometer. Both almost new, guaranteed OK. Dukas Radio Service, 314 Ohio Ave., Glassport, Pa.

URGENTLY NEEDED—One 1A7GT, 6A8, and 25Z5 tube. Duane Slater, Box 392, Kilgore, Texas.

SHOP EQUIPMENT FOR SALE—Incl. Jackson #860 dynamic signal analyzer, #650 condenser analyzer, #642 V-O-M; Hickok #530P tube tester, #177X sig. generator with crystal; Rider's manuals 1 to 13; Stancor power pack, and numerous radio books. Want to sell all. Write for list. Clarence B. Stadtmiller, New Paris, Ohio.

SWAP OR SELL—Will sell Supreme tube checker or exchange for signal generator. Will buy or trade hard-to-get tubes. Charles A. McDowell, 1235 1/2 Buffalo St., Franklin, Pa.

FOR SALE—#739 Readrite V-O-M; phono player, Shure pick-up arm and rim-drive motor in fabric covered case; V-T-V-M. Write for details. What have you in tubes, radios, record players, or books? Pfc. Gene Zair, 7477 Girard Ave., La Jolla, Calif.

FOR SALE—Rider's manuals 1 to 5, \$15 f.o.b. Want test equipment. H. H. Nathanson, 426 Rockway Parkway, Brooklyn 12, N. Y.

WANTED—Itadio magazines, Service Feb. 1937, Electronics for 1933 and earlier, etc. Do not want Radio Craft, Radio News, etc. All replies answered. A. Ohan, 420 E. 161st St., New York 50, N. Y.

WANTED—One or two RCA 12SA7 tubes. David Davis, 6837 79th St., Middle Village, L. I., N. Y.

TUBES WANTED—12 volts and up, must be sealed, any quantity. Also record changers. Have opening for good service man at attractive salary. Leading Radio, 114 E. 3rd St., Mt. Vernon, N. Y.

WANTED—Set of 6 prong 3 winding plug-in coils; all wave bands; to tune with .00014 mfd. tuning condenser. George Turin, 59 W. 71st St., New York 23, N. Y.

FOR SALE—12SL7; 6AC7/1852; 6H6 tubes, new, 50% off OPA ceiling. All sizes of micas 10c ea. new. Riebel's Appliance Shop, 1038 N. High St., Columbus, Ohio.

WANTED—All kinds of radio tubes at a fair price. Send list. Regal Radio Stores, 171 Washington St., New York, N. Y.

WANTED—UTC-LS-10X transformer and an Astatic HP-36 pickup. Howard King, 31 W. End Blvd., Winston-Salem, N. C.

WANTED—Phono motor 78 r.p.m. 110 v. 60 cy. a-c. David N. Smith, 265 Newburn Drive, Pittsburgh 16, Pa.

URGENTLY NEEDED—Cash for a used Supreme 504-A tube and set tester, must be in good condition. All letters answered. W. Wolin, 2065 St. Raymond Ave., New York 62, N. Y.

WANTED FOR CASH—One or two 32LGT tubes. Must be new. Byard P. Bridge, 7432 Devon St., Philadelphia 19, Pa.

WILL SWAP 40 tubes including many popular types for tube tester or multi-tester. Richard Price, 1737 Summerdale, Chicago 40, Ill.

WANTED FOR CASH—Supreme 599 tube and set tester or equal; E-200 Precision oscillator or equal; pocket voltohmmeter, any good make; RCA chalyt; also Rider's manuals, tubes, or what have you? F. S. M. Bailey, Raymondsville, Texas.

WANTED—Complete set of Rider's manuals or late numbers, in good condition. Capitol Radio Service Co., 2612 River Drive, Columbia 37, S. C.

WANTED—Short wave receiver to be used for Boy Scout emergency station. Carl Wilkson, 151 Regent St., Campbell, Ohio.

NEEDED AT ONCE—One 70L7 or 70A7, also one 25A7 tube. Cash. Please rush. Brown's Radio Service, 208 Indianola St., Cuero, Texas.

WANTED—Hickok or Precision test eqpt. Describe fully and state price. Also want photo eqpt. E. Sujak, 5321 W. 30th Place, Cicero 50, Ill.

WANTED—Communications receiver, preferably Hallicrafters, for cash. Also want 0-1 ma. d-c meter. Bob LaBrenz, 1027 Borton Ave., Essexville, Mich.

WANTED—Dumont, RCA, or G-E television receivers, any model, any number. State price. All replies acknowledged. L. A. Salazar, 110 Post Ave., New York 34, N. Y.

WANTED—Hickok OS-12 oscillator instruction book. Will pay \$2. Pinkney's Radio Service, 9 Duncan St., San Francisco 10, Calif.

WANTED—Modern tube tester, sig. tracer, analyzer, crystal pickup, head phones, P. M. speakers 12", crystal microphone, small radio phono, elec. G. R. Davidson, 266 Maplewood Ave., Winnipeg, Canada.

FOR SALE—Tubes in original cartons: 12-99, 22-59, BH, 40 1B1, 6D7, OZ4G, 12SA7, 35Z5, 12A5, 12BJ7, 2-8/4S, 2B7, 6E8, 6A4, 20-15, 25A6, 25L8, 25B6 and 43. Express, C.O.D. Linn Amos, 422 North Main St., Rocky Ford, Colo.

URGENTLY NEEDED—Headsets of any type. E. L. Breeden, P. O. Box 348, Manassas, Va.

WANTED—Supreme #589 tube and battery tester or Supreme #599 tube, battery and set tester with operating instructions. Also R.C.P. sig. generator #703 and 40Z5 tube. Anthony Gulotta, 3311 St. Ann St., New Orleans, La.

SEND US YOUR OWN AD TODAY!

IF YOUR FIRST TRADING POST advertisement does not bring results, we will gladly run it again if you advise us and send new copy of not more than 40 words. However, please do not expect the TRADING POST to do the impossible. The fact that it is not unusual for an ad offering equipment for sale to bring several hundred inquiries serves as convincing evidence of how difficult certain tubes and pieces of equipment are to obtain. Nevertheless, we'll do our best to help you!

HARRY KALKER, Sales Manager.

Dept. S-25, SPRAGUE PRODUCTS CO., North Adams, Mass.
Jobbing Sales Organization for Sprague Electric Company



SPRAGUE CONDENSERS KOOLOHM RESISTORS

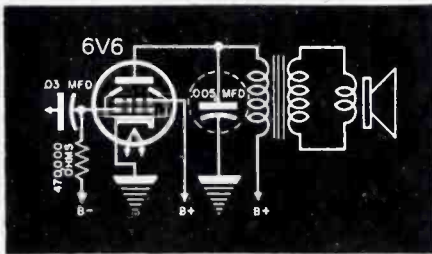
TM. REGISTERED U. S. PATENT OFFICE

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

SERVICE HELPS

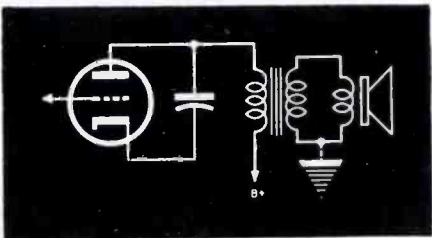
MOTOROLA 51F11

Set Dead: Upon voltage checking, we discovered that there was no plate voltage on the 6V6 output tube. A resistance check showed that the .005-mfd condenser, connected from plate of the 6V6 to ground, was shorted. After replacing the condenser, we then found set that tuning was very broad. This was traced to a high resistance connection on the antenna section of the gang. This was cured by resoldering the contact.



DEWALD 555

Distortion, rasping speaker tone: The voice coil was checked by pushing the cone in and out. There were no indications of the voice coil rubbing on the pole piece. However we noticed that the rapid movement of the voice coil had built up static charges, which we assumed would cause rasping. We grounded one side of the voice coil which grounded this static charge and the trouble disappeared.

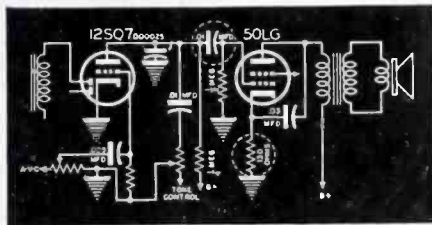


FADA 207APT

Intermittent reception and distortion: Checking the voltage on the grid of the 50L6 output tube indicated a positive potential at that point. The .01-mfd coupling condenser was disconnected from the grid and checked with an ohmmeter. The condenser was found to be leaking. Replacing the condenser helped, but some distortion still remained. A further check showed that the plate potential on all the tubes was slightly high and the output tube

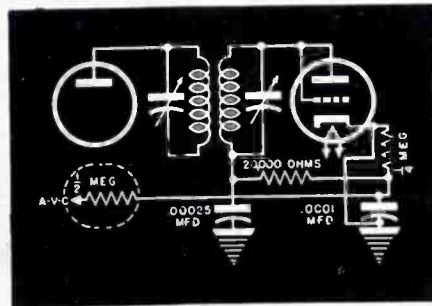
by EDWARD ARTHUR

plate current was low. The grid bias voltage on the output tube was also found to be slightly high. Checking the bias resistor we found that the resistor had increased in value from 130 ohms to about 600 ohms. This, no doubt, was caused by the shorted coupling condenser which in turn caused a high I-R drop in the resistor. We replaced the resistor, but still intermittent reception prevailed. This was traced to a defective 12SA7 tube.



MAGNAVOX CR-171

Inoperative; motorboating: A voltage check disclosed an excessive B+ voltage on the grid of the 6J5 detector and avc tube. We then disconnected the grid lead to the 6J5 and used a resistance check between the grid lead and the plate of the 6SK7 i-f tube. This revealed a short between the primary and the secondary of the second i-f transformer. After replacing the transformer and reapeaking, set operated, but with some distortion. We also noted that the eye tube, 6U5, was not working. Suspecting the avc circuit, we conducted a resistance check of the individual components in the avc circuit. The 500,000-ohm blocking resistor was found open.

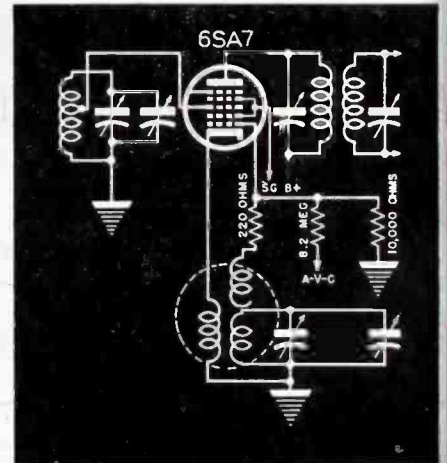


ZENITH 6R683

No signals: Although no signals could be heard, a rushing sound persisted. Check of all voltages disclosed

no defects. We then decided to check the oscillator section. Since there were no voltages that could be checked in this section, we decided to use an old trick. We placed a screw driver on the oscillator section of the gang. If the oscillator were satisfactory, a click would have been heard. But no click resulted.

A resistance check showed that the secondary of the coil was opened. The open was found at the lug.



MOTOROLA 161L12 (PORTABLE)

Noisy, oscillating on the lower end of the dial: Remove the tuning condenser and clean rotor spring contacts with carbon tet. You will find the tuning unit readily accessible. A thin hack saw blade with teeth ground away and beveled to a chisel point may be used to get back of the springs to increase tension slightly. Exercise caution here.

R. A. Dressler

GRUNOW 1151

High intensity oscillation on the two highest frequency bands, no oscillation on the broadcast band and oscillation experienced only at a point about halfway on the volume control: Trouble due to long lead between 50,000-ohm plate load for 85 and bypass condenser. No amount of shunt capacity would stop oscillation until lead was shortened and dressed close to chassis. Low frequency motorboating effect was finally run down by carefully checking wiring. Plate return bypass was run direct from plate return to grounded end of 2000-ohm cathode circuit resistor of 85 stage.

Willard Moody

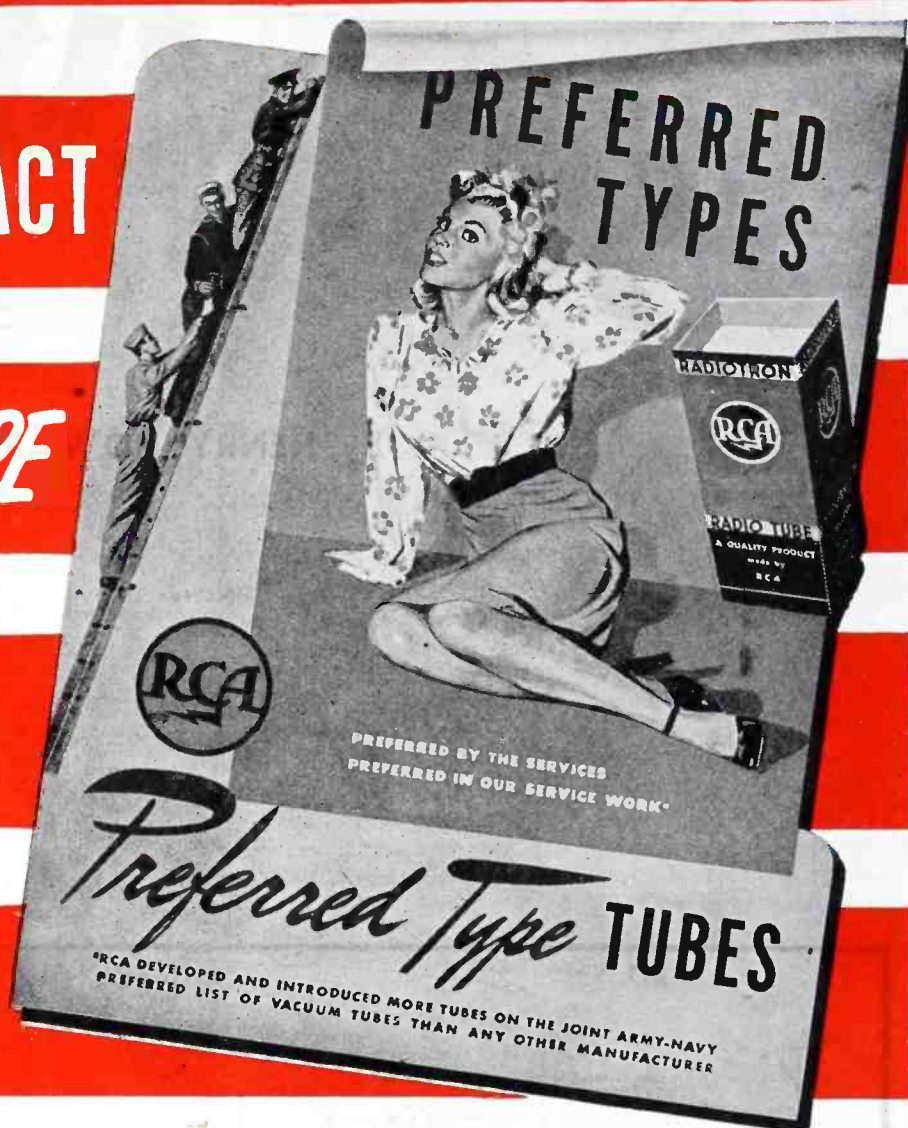
★ ★ **RCA LEADS THE WAY** ★ ★

HOW TO ATTRACT

PREFERRED TYPE

TUBE SALES

YOUR WAY



THAT'S easy...just put up this sign *now*. Naturally, there won't be any Preferred Type Tubes to sell till after the war, but it's not too soon to let people know where they can come to get them when they *are* available.

This is the latest step in RCA's continuous program of merchandising to support RCA distributors, dealers and servicemen during the war. Prewar, many up-to-the-minute RCA sales aids helped you sell and expand your markets... displays, indoor and outdoor signs, RCA clocks, and many others. After V-day, look for an even greater RCA merchandising service to direct sales your way.

Meanwhile, hard-hitting RCA advertisements in top magazines are doing the same job... building toward an even greater radio and electronics business for you after the war.

Get your "Preferred Type Display" from your RCA distributor.

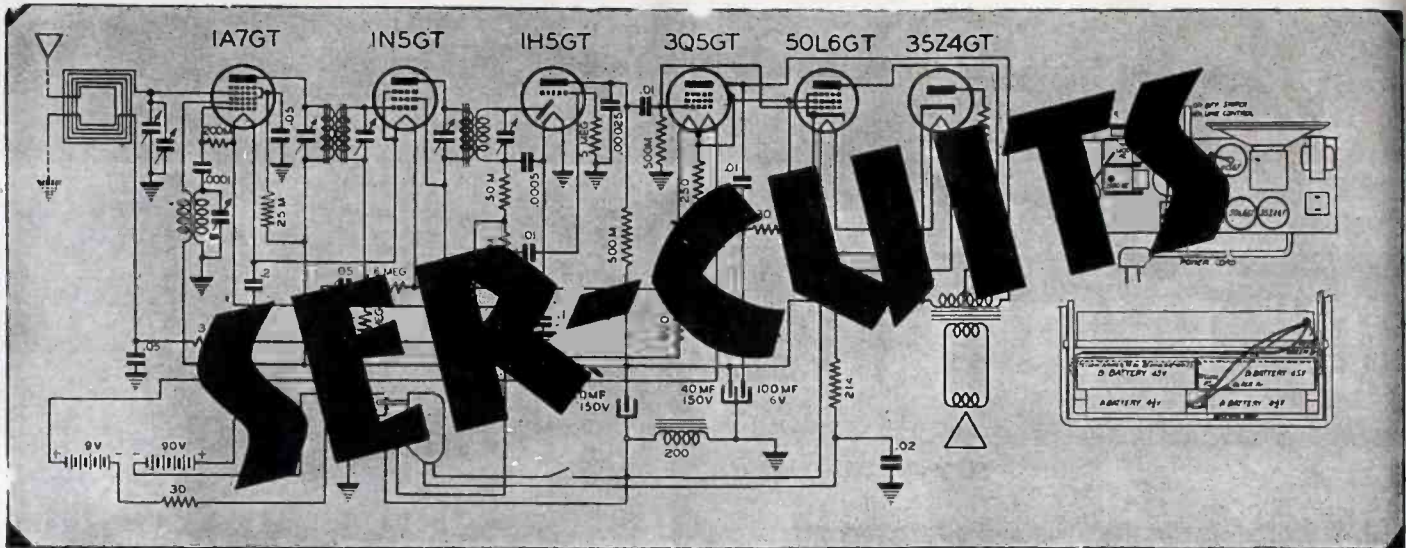
The fountain-head of modern Tube development is RCA!

New, full-color 40-inch by 28-inch display easel (shown here in black and white) to help you maintain your identification with RCA, and to sell the Preferred Type Idea... which means greater profits for you in the future.



62-6636-89

RADIO CORPORATION OF AMERICA
 RCA VICTOR DIVISION · CAMDEN, N. J.
 LEADS THE WAY... In Radio... Television... Tubes...
 Phonographs... Records... Electronics



RENEWED interest in television prompted by an increased allotment of air time, program improvements, relaying and industry promotion has proved quite valuable to the Service Man. Although there are a comparatively few receivers in operation, these are being used more than ever before and servicing therefore has become a factor. As a result of this spirited interest many Service Men have also become quite keen about television receivers, studying circuits and allied data. For the general benefit of these men we have secured a block diagram of a typical television receiver. This is shown in

by HENRY HOWARD

Fig. 1, and is presented through the courtesy of DuMont.

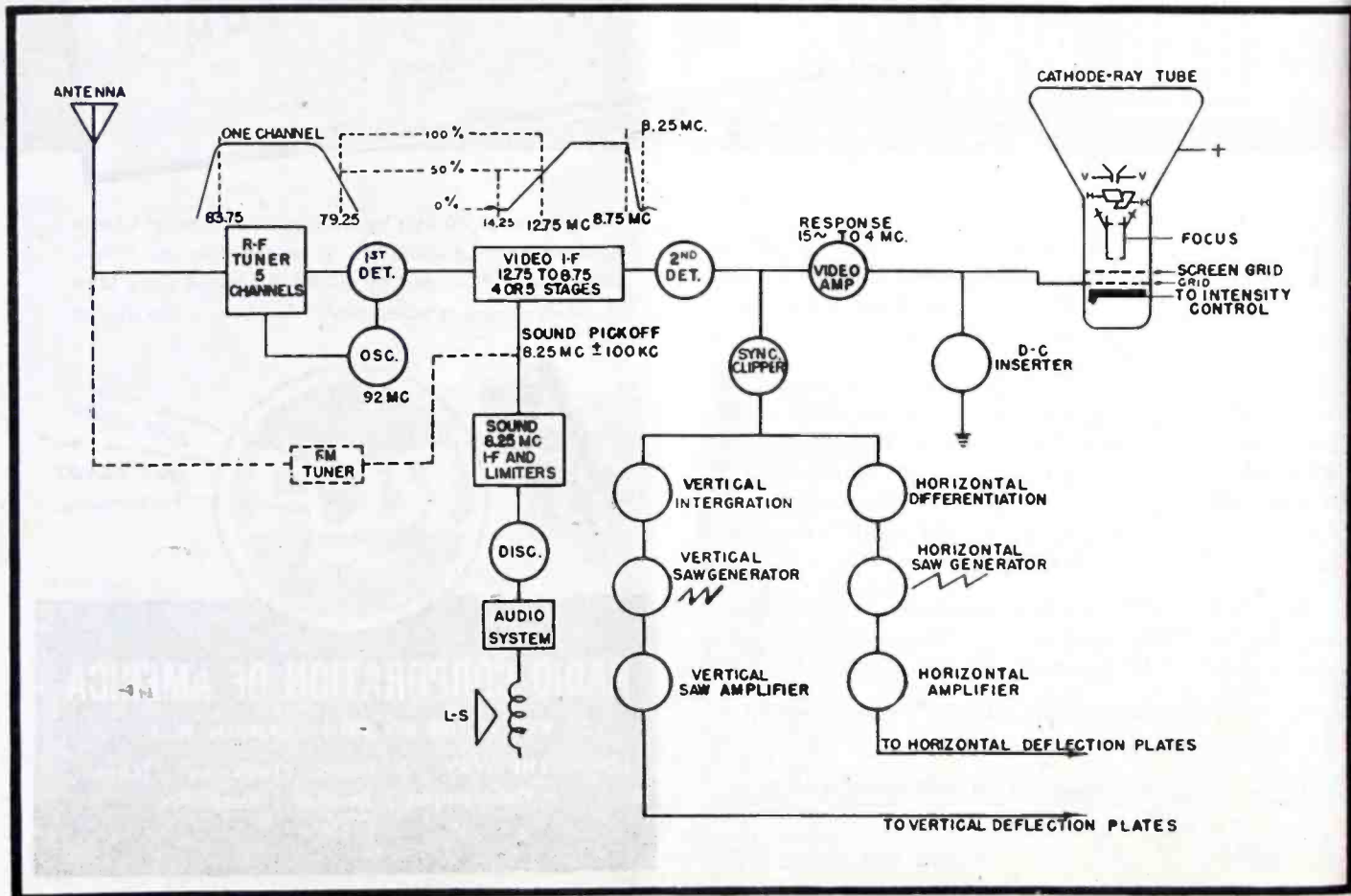
Silvertone R81

In Fig. 2 appears quite an interesting receiver, a 4-band phono combination super, Silvertone R81. A loop, plate or external antenna feeds a 6K8 oscillator-translator. The external antenna contains an i-f wave trap to reduce the possibility of i-f signals en-

Fig. 1. Block diagram of a typical television receiver.

tering the i-f amplifier from the antenna circuit. The bands covered are b-c, police, 5.95 to 18.2 mc and a spread band of 9.3 to 9.85 mc. Bandspread is obtained by connecting the tuning condenser across a small portion of the short-wave transformers. Oscillator coupling is secured through the use of a few turns of wire serving as a small coupling capacitor between the high side of the oscillator tuning condenser and the first detector signal grid.

The i-f stages use two 6U7G's; one of the stages uses resistance coupling. A dpdt phono switch shorts the detector output in phono position. The 1/2-



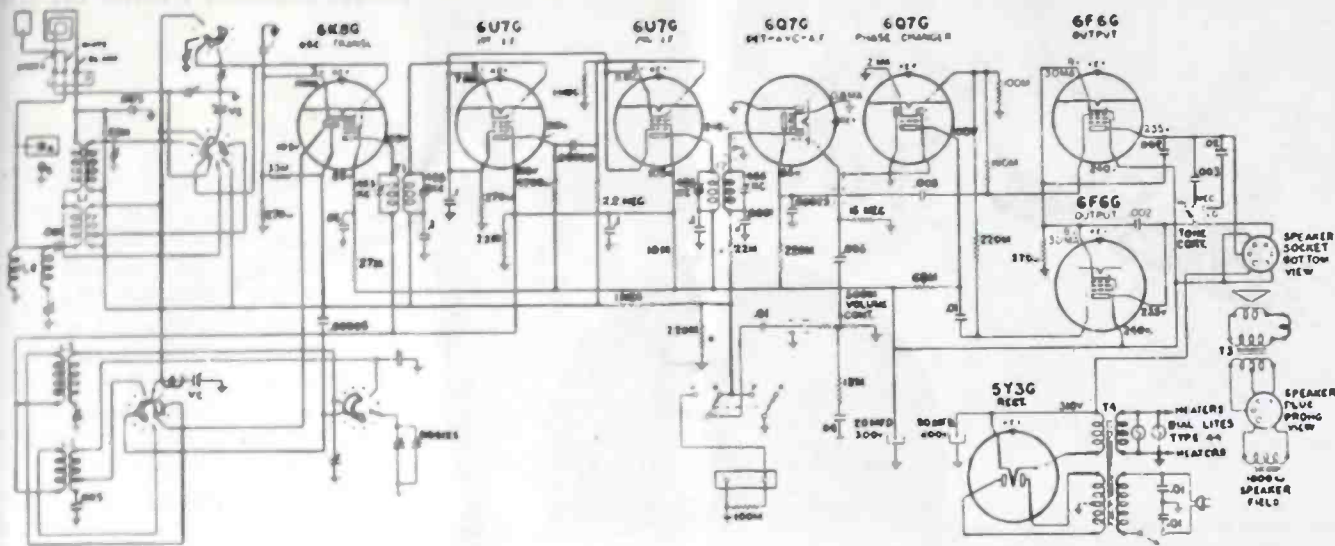


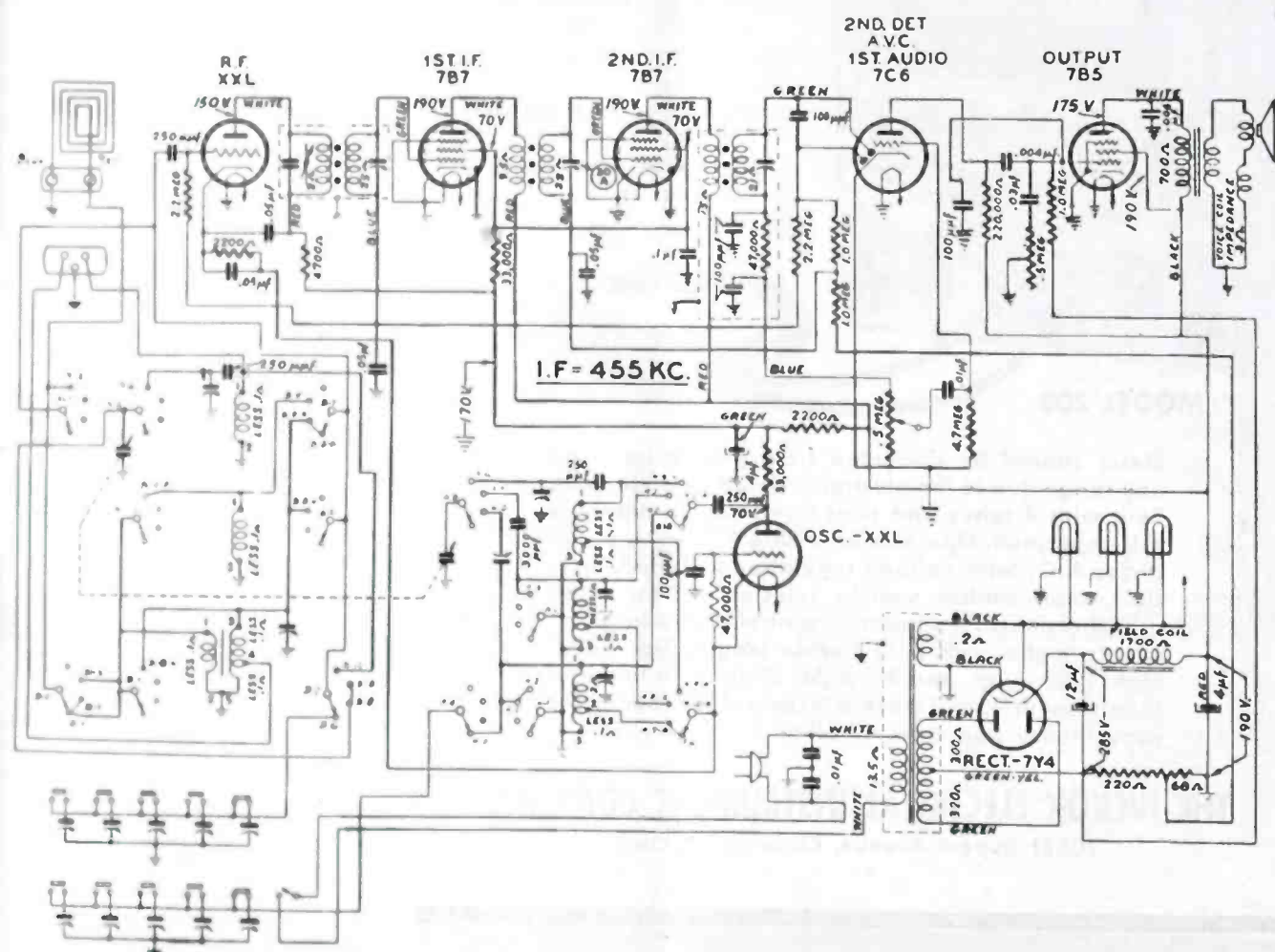
Fig. 2. Silver-tone R81 4-band phono combination.

trap. The output meter should indicate a minimum instead of the usual maximum and, if an interfering station near 455 kc is bothersome, the generator should be set to the frequency of the interfering station, rather than

Fig. 3. Philco 3-band 7-tube model 41-245.

at exactly 455 kc. A 6Q7 is used as a phase inverter for the 6F6 output stage. A power type tone control is also used, switching different capacitors across the high impedance (plate-to-plate) output. Each pentode has a fixed .002 mfd condenser from plate to cathode which is equivalent to *hi* tone. A .003 mfd

(Continued on page 25)



(Continued from page 16)



MODEL 202

Meter cannot be damaged from over-voltage on any range due to the electronic circuit arrangement. Built with 4 tubes and pilot light. Power supply is self-contained. Operates on 110 to 120 volts, 50-60 cycles A.C., with voltage regulation included. Special range control switch, selector switch, ohms adjust control, zero balance control and a large 5" square meter with a 17" scale length. Size 10½" high, 7½" deep, and 8" wide. Weighs 14 lbs. and is finished in baked crackle lacquer. It's a honey for convenience and dependability.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10521 Dupont Avenue, Cleveland 8, Ohio

● A small, compact, practical test instrument for laboratories and Radio Service Stores — engineered up to high HICKOK standards.

Provides for electronic A.C. and D.C. Voltage measurement with extremely high input impedance. Provides an electronic ohmmeter for resistance measurement from .1 of one ohm to 1,000 megohms. Also provides a milliampere meter giving 5 ranges of measurement to one ampere.

ments of an efficient amplifier is a husky loudspeaker. One having a 10" or 12" diameter cone that will not rattle on bass notes is recommended. The speaker may be mounted in a special cabinet, and the heavier the wood and the larger the cabinet, the better in general will be the reproduction. The quality of the wood seems to have a bearing on the tone, just as in the case of a fine violin or a piano. A good cabinet, therefore, is highly desirable. However, by equipping the amplifier with a tone control and experimenting with the parts used in the circuit the over-all frequency response and fidelity can be adjusted to the best possible values. An item that has a direct bearing on the fidelity, particularly in a quiet room, is hum level. This level should be kept down to a low value by using output tubes which are properly matched. In checking the output tubes in a tube tester, it is important to select a pair of tubes which have approximately the same emission. Then, hum currents flowing in each half of the output transformer primary will tend to balance out. Using high-quality filter condensers will also help to keep down the hum. Careful wiring of the amplifier itself with grid circuits isolated from the heater wires is also essential. The chassis used should preferably be one of low resistance material and rugged. Well-plated steel seems to work out well. Under present conditions such a chassis may be impossible or difficult to purchase, but many Service Men have old chassis available which can be stripped of parts and used.

Typical Amplifier

In Fig. 1 appears a typical amplifier circuit. Not a great many parts are used and many of them can be taken from old radios which have been given up as hopeless to repair. Thus we can effect salvaging parts so necessary today.

In this circuit, the audio input is fed to a 6SQ7 grid, the first audio-frequency amplifier. The 6SQ7 drives a 6K6G. Part of the excitation voltage for this tube is used to drive a phase inverter, 6J5G. This is about 1/5th the voltage on the grid of the 6K6G. The output of the 6J5G is then used to drive another 6K6G. The 6K6G tubes are in push-pull class A.

The frequency response is controlled by a 1-megohm tone control, R. Decreasing the value of R results in an increase in the signal current flow

THE STANDARD OF QUALITY FOR A THIRD OF A CENTURY

through a .05-mfd condenser and a decrease in the high frequency output. This occurs because this condenser has a lower reactance for the higher audio frequencies than it has for the low audio frequencies. The bass response may be *picked up*, too, by experimenting with different values of the .02-mfd condensers in the plate outputs of the 6SQ7GT and 6J5G tubes. Using larger values will increase the bass. At high audio frequencies the value of the .003-mfd condenser in the 6K6G plate circuit seems to be the controlling factor and decreasing the value will bring up the treble, while increasing it will reduce the highs. With the speaker in the cabinet, but the amplifier on the floor of the room in which the record player is used, you can experiment with different values of these condensers until the best results are obtained. A listening test, by ear, instead of arbitrary measurements by instruments, is of course used. Ordinarily, servicing in the home is out of the question, but this is custom work, specialized and painstaking. The customer also feels flattered that you are hand tailoring the amplifier to his exact requirements, and the difference is quite apparent. Every room has its own peculiar acoustic properties, and what might sound fine in your shop need not, necessarily, be anything better than *ordinary* in the place where the equipment is used permanently.

The preliminary work should be done in the shop, and the final touches added in the home. The equipment, in every case, need not be excessively elaborate.

Matching Output Tubes

An important point to remember is that output tubes must be properly matched to the load. Small differences can be compensated by adjustment of the value of the .003-mfd condenser in the 6K6G plate, as an example, but an effort should be made to check the turns ratio which for practical purposes is the same as the voltage ratio. Supplying an input signal to the a-f amplifier, the signal voltage across each half of the primary winding connected to the output tube plates should be checked. Then the secondary or voice coil voltage should be measured. The ratio of the voltage across one half of the primary to the secondary voltage is a measurement of the turns ratio. As each output tube requires (see a tube manual) a load of 7600 ohms, if we assume a voice coil having a d-c resistance of 3 ohms, its im-

(Continued on page 29)

**DO 2 JOBS
IN THE TIME
NORMALLY
REQUIRED FOR
ONE!**



A. A. GHIRARDI

**GUARANTEED
TO SAVE YOU
TIME
ON 4 JOBS
OUT OF 5!**

**WHEN A SET COMES IN FOR
REPAIRS...turn to this big**

GHIRARDI book First—Not to your tester

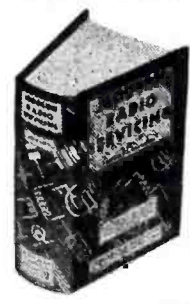
Don't waste time on elaborate testing of every set that comes to you for repair! *FIRST* look up its model number in the big Trouble Case History section of Ghirardi's completely revised, greatly enlarged 3rd edition **RADIO TROUBLE-SHOOTER'S HANDBOOK**.

Four times out of five you'll find listed there not only the cause of the trouble—but **ALSO** the exact step-by-step directions for fixing it. You'll save a whale of a lot of time—and make a lot more money! For example, Serviceman Ralph E. Locke of Calais, Me., says "Ghirardi's Handbook quickly gave me information I'd been looking for for two days and solved a tough job!"

"PAYS FOR ITSELF"

Herbert Perry of Denver says "Helped me the first evening I took it home—and the set it helped me fix paid for the book!"

Over 400 pages of this big, 744-page manual-size book are filled to the brim with the Trouble Case Histories (common trouble symptoms, their causes and remedies) for over 4800 radio models of over 200 popular makes—practically every model in use today.



◀ SPECIAL MONEY-SAVING COMBINATION

Have
**COMPLETE
Service Data
at Your Fingertips**

5-DAY FREE TRIAL

You can buy Ghirardi's famous 1300-page **MODERN RADIO SERVICING** singly for only \$5 (\$5.50 foreign)—but here's your chance to get it along with the new 3rd Edition **RADIO TROUBLE-SHOOTER'S HANDBOOK** for a special money-saving price of only \$9.50 (\$10.50 foreign). Actually, **MODERN RADIO SERVICING** is the only complete, inexpensive volume that gives you a thorough course in modern radio service work—explanation of the inner workings of all Test Instruments; Troubleshooting Procedure; Circuit Analysis; Testing & Repair of Parts; Installation, Adjustments, and Maintenance. Tells What to do, How to do it, and Why. Order today. 5-Day Money-Back Guarantee.

Technical Division, MURRAY HILL BOOKS, Inc., Dept. S-25, 232 Madison Ave., New York 16, N. Y.

Enclosed find \$..... for books indicated, or send C.O.D. for this amount (U.S.A. Only) plus postage. If not satisfied, I may return the book(s) at the end of 5 days and receive my money back.

RADIO TROUBLESHOOTER'S HANDBOOK \$5 (\$5.50 foreign)

MODERN RADIO SERVICING \$5 (\$5.50 foreign)

MONEY-SAVING COMBINATION both books for only \$9.50 (\$10.50 foreign)

Name

Address

City & Dist. No. State

AUTO SET DIAL CORD INSTALLATION NOTES

For Chrysler C-1708, Ford F-1740, Lincoln L-1760 and 1761, Studebaker S-1722 and 1726

WHEN installing new dial cords on Chrysler C-1708, Ford F-1740, Lincoln L-1760 and 1761, and Studebaker S-1722 and 1726 auto sets, Philco recommends the following procedures.

Chrysler C-1708

(1)—Remove the top and bottom cover and front housing.

(2)—Turn the receiver upside down with the control shafts in front.

(3)—Turn the tuning control shaft *clockwise* to the stop position.

(4)—Hook the spring on one end of the cord.

(5)—Hook a paper clip through the eyelet of the cord to which the spring is attached and fasten the clip to the dial mounting bracket.

(6)—Place the long end of the cord over the rear wooden pulley. Wrap seven turns of cord *clockwise* around the back portion of the tuning shaft. Pass the cord through the slot in the collar of the shaft and wrap $\frac{3}{4}$ of a turn *clockwise* around the shaft in front of the collar. Run the cord over the front wooden pulley and fasten the other end of the cord to the spring. Then force the cord over the metal pulley at the top of the scale bracket.

(7)—Place the pointer on the dial cord and slide it to the first line above the 1500 mark.

(8)—Remove the paper clip and recheck the pointer setting, using a broadcast signal or a signal generator. Slide the pointer along the dial cord to the correct frequency.

(9)—Replace the front housing and the top and bottom covers.

Ford F-1740 . . . Lincoln L-1760, 1761

(1)—Remove the tuning condenser assembly from the front casing of the receiver.

(2)—Remove the dial and shaft assembly from the tuning condenser bracket.

(3)—Remove the dial drum from the knob and shaft assembly.

(4)—Place the tuning condenser

unit on the bench with the bracket to the back and the metal pulley facing up. The tuning condenser plates must be in mesh.

(5)—Connect one end of the cord to the link and hook the link on the right tab on the inside of the pulley. Feed the cord through the slot in the pulley and wrap one turn of the cord *clockwise* around the pulley, keeping the cord to the right of the guide pin on the tuning condenser.

(6)—Hold the dial drum with the left hand and wrap two turns of cord *counter-clockwise* around the spool, keeping the cord to the left of the pin in the spool. Loop one turn of cord around the pin. Then wrap one turn *counter-clockwise* around the spool, keeping the cord to the right of the pin in the spool.

(7)—Place the knob and shaft on the spool, with the pin on the spool nearest to the knob, and with the thin washer on the left side of the knob and the thick washer on the right side. Place the shaft in the grooves on the tuning-condenser bracket.

(8)—Bring the cord *counter-clockwise* around the idler pulley on the bracket and wrap five turns of cord *clockwise* around the knob shaft. Be sure that the washer is against the end of the bracket.

(9)—Bring the cord *clockwise* around the pulley on the tuning condenser and connect the end of the cord to the link on the drum.

(10)—Hook the closed end of the tension spring to the tab on the left side of the pulley and hook the other end to both ends of the cord where it enters the pulley.

(11)—Replace the tuning condenser assembly.

Studebaker S-1722

(1)—Remove the chassis from the housing.

(2)—Place the receiver on the bench, right side up and with the shafts to the front.

(3)—Turn the tuning condenser plates in mesh.

(4)—Feed the loop on the short end of the cord through the hole in the back of the tuning shaft and pass the free end of the loop through the loop of the cord. Pull the cord tight.

(5)—Wrap $1\frac{1}{2}$ turns of cord *clockwise* around the end of the tuning shaft and then $\frac{3}{4}$ of a turn *clockwise* around the tuning condenser drum.

(6)—Fasten the center loop of the cord to one end of the spring and fasten the other end of the spring in the hole in the drum.

(7)—Pass the long end of the cord around the idler pulley and through the hole in the sub-base.

(8)—Hold the cord and turn the receiver over with the wiring side showing.

(9)—Wrap one turn of cord *clockwise* around the tuning dial drum.

(10)—Holding the cord with one hand, turn the tuning shaft *clockwise* until the stop position is reached.

(11)—Wrap $1\frac{1}{2}$ turns of cord *counter-clockwise*, around the tuning shaft in back of the front flange.

(12)—Feed the loop of the cord through the hole in the shaft and pass the free end of cord through the eyelet. The cord must have tension after it is assembled.

(13)—Assemble the receiver in the housing.

Studebaker S-1726

(1)—Remove the top and bottom cover, and front housing.

(2)—Place the receiver on the bench right side up with the control knobs in front.

(3)—Turn the tuning shaft *clockwise* as far as it will go.

(4)—Loosen the two set screws on the tuning shaft coupling, so that the shaft turns freely.

(5)—Place the small U spring in
(Continued on page 30)

SER-CUITS

(Continued from page 21)

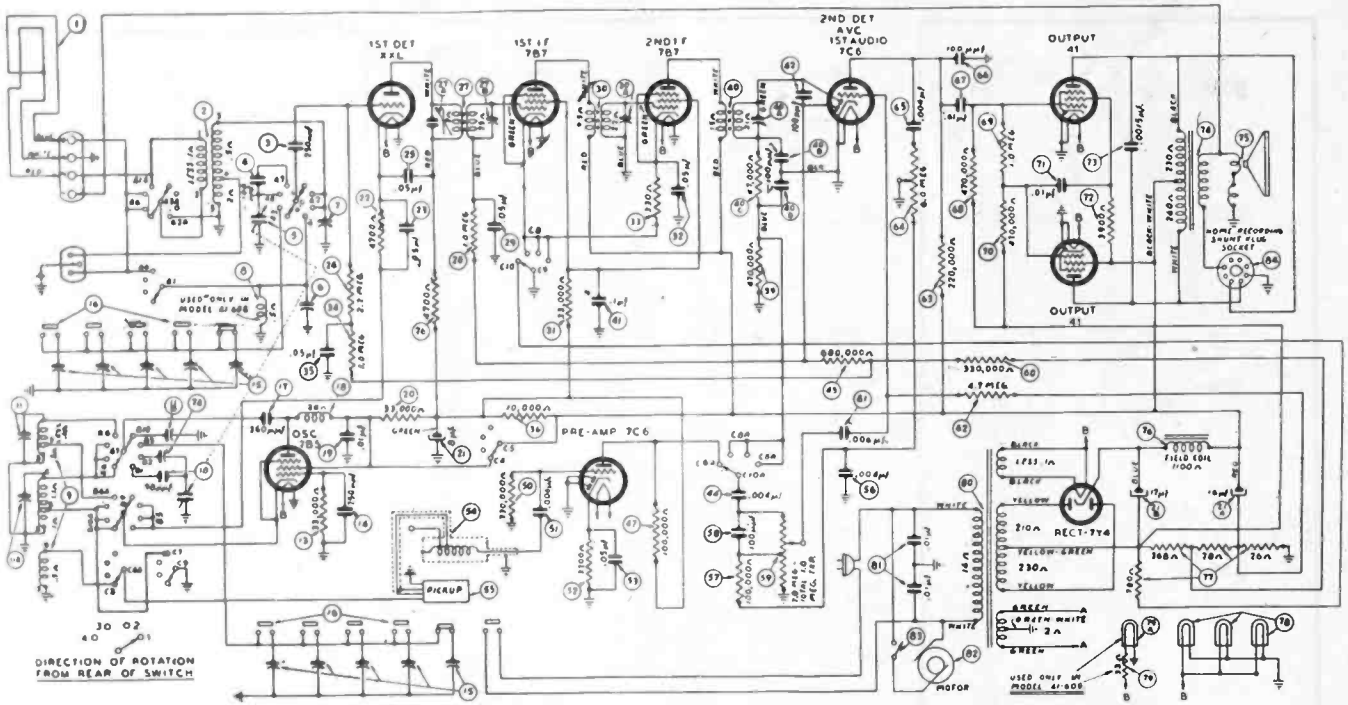


Fig. 4. Philco 41-609.

condenser added from plate to plate (equivalent to .012 mfd across the output of a single tube) produces *med* tone, while a .02-mfd condenser accounts for *lo* tone.

Philco 41-245

A 3-band, 7-tube receiver, Philco 41-245, with two transformer coupled i-f stages is shown in Fig. 3. The loop antenna is used directly on b-c and through a transformer on police. A shunt inductor placed across the antenna transformer changes the fre-

quency range for the intermediate band. Separate detector and oscillator triodes are used with cathode-to-cathode coupling. The r-f filter used to keep r-f out of the power amplifier usually consists of a single condenser across the first audio output from plate to ground. In this set, a 100-mfd condenser is run from the 7B5 power tube grid to ground.

Since a 7Y4 indirectly-heated ca-

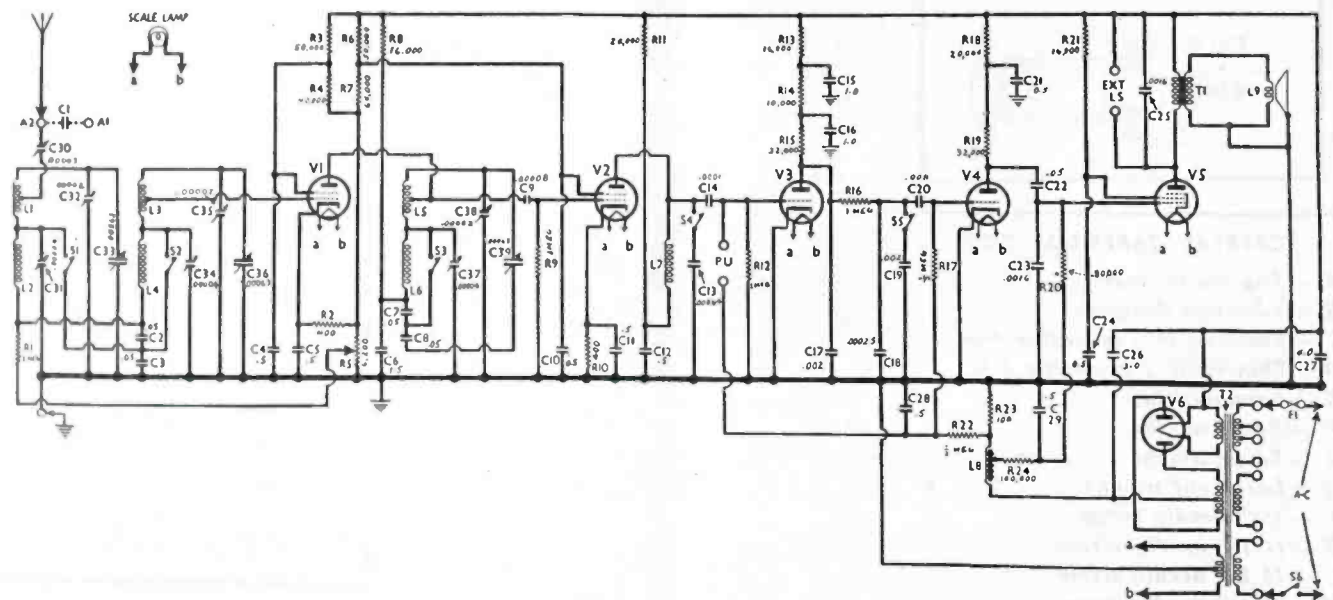
thode type rectifier is used, only a single filament winding is used on the power transformer, and this has one side grounded. A C-bias voltage divider consisting of 220 and 68 ohms in the negative high-voltage lead supplies bias for the output stage and avc bus.

Philco 41-609

A Philco 3-band light-beam phono receiver, model 41-609, is shown in Fig. 4. A phototube and 7C6 high-

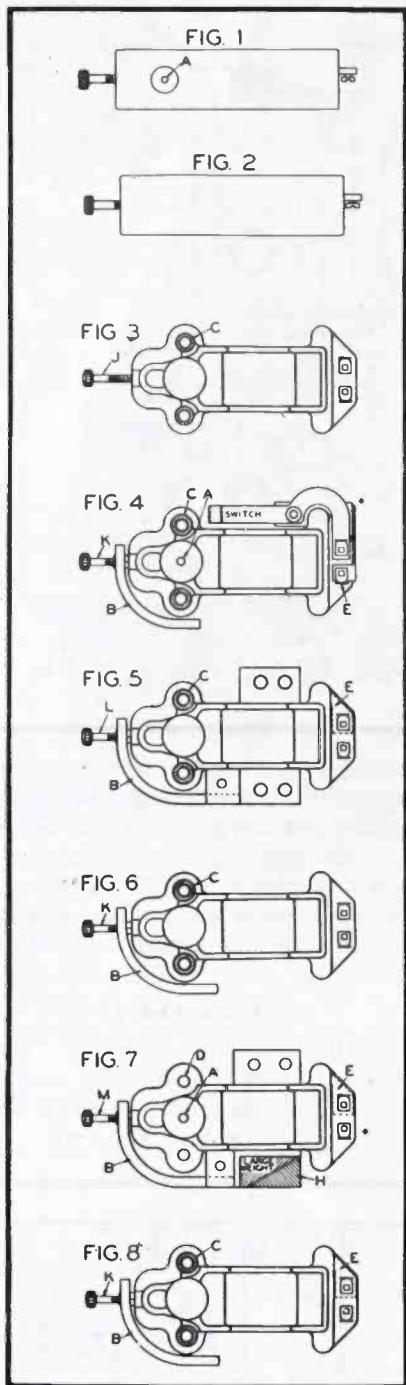
(Continued on page 29)

Fig. 5. Philips 730A.



CRYSTAL PICKUPS

DATA FOR 17 RCA TYPES



CRYSTAL CARTRIDGE CODE

- A — Top needle hole
- B — Viscoloid damper
- C — Thick (5/16") mounting hole
- D — Thin (7/32") mounting hole
- E — Grounded lug
- F — Small weight
- G — Large weight
- H — Large cut weight
- J — 5/8" needle screw
- K — 11/16" needle screw
- L — 13/16" needle screw
- M — 15/16" needle screw

Model Number	Crystal Cartridge Stock No.	Crystal Cartridge Fig. No.	
QU2-C	33905	7	
QU3-C	33905	7	
*QU5 (RP-145E)	33905	7	
6QU	33122	5	
8QU5-C	34307	9	
U-8	33122	5	
U-9	33122	5	
U-10	33122	5	
*11-QU (RP-132A)	31156	4	
*12-QU (RP-132A)	31156	4	
U-12	33905	7	
*VA-15 (RP-152)	35171	7	
U-20	33905	7	
VA-20	31050	3	
VA-21	33122	5	
*VA-22	{ RP-139D	{ 31156	4
*VA-24	{ RP-145C	{ 33905**	7
	{ RP-145E		
*U-25 (RP-132M)	31156	4	
*U-26 (RP-132M)	31156	4	
*U-30 (RP-132M)	31156	4	
*U-40 (RP-139A)	35171	7	
*U-42 (RP-145)	35171	7	
*U-43 (RP-145)	35171	7	
*U-44 (RP-145)	35171	7	
*U-45 (RP-139A)	35171	7	
*U-46 (RP-140)	33905	7	
O-50	33217	6	
U-50	33217	6	
QU-51C (RP-145E)	35171	7	
*QU-52C (RP-152S)	35171	7	
QU-56C	33122	5	
R-56	39686	12	
R-60	33122	5	
R-89	31050	3	
R-91	31050	3	
R-93-B	31050	3	
R-93-C	31050	3	
R-93-F	33122	5	
R-94-B	31050	3	
R-98	31156	4	
R-100	33122	5	
V-100	33122	5	
V-101	33122	5	
V-102	33905	7	
R-103-S	33122	5	
U-104	31050	3	
V-105	33122	5	
*U-106 (RP-129B)	14820	1	
*U-107 (RP-129A)	14820	1	
*U-109 (RP-129)	14820	1	
U-111	31050	3	
U-112	31050	3	
U-115	31050	3	
U-119	31156	4	
U-121	31050	3	
U-122E	31156	4	
UY-122E	31156	4	
*U-123 (RP-139B)	31156	4	
U-124	31156	4	

Crystal Cartridge (Discontinued—See note)..... 38453..... 15

*Automatic Record Changers

**Used on 25 cycle model only.

†38453 Discontinued:

Use 39550 for V215, V219, V221.

Use 39919 for V-225 Top.

††Styli stock numbers:

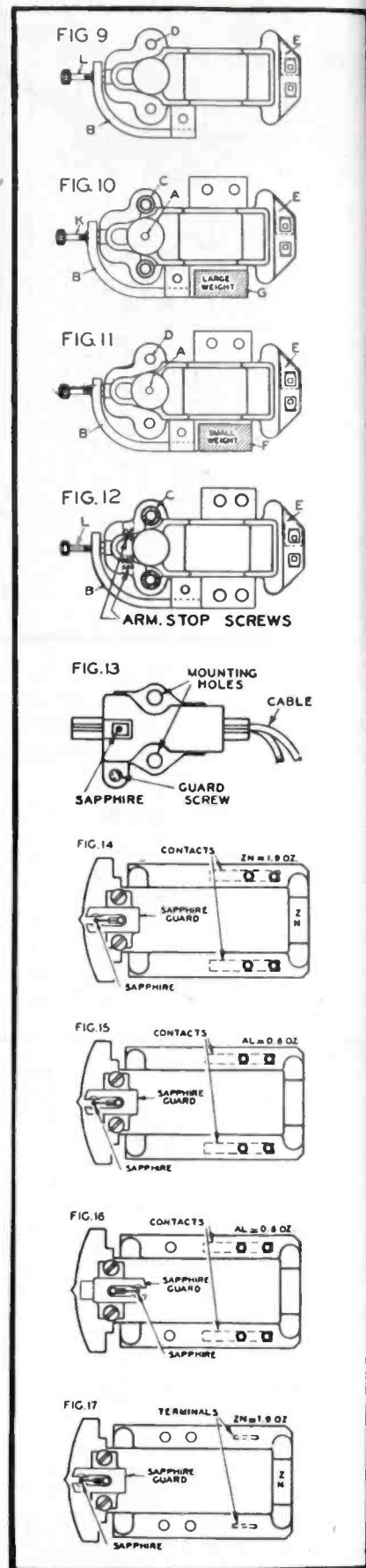
39564 Pfanstiehl stylus (not available at present).

70050 Sapphire stylus.

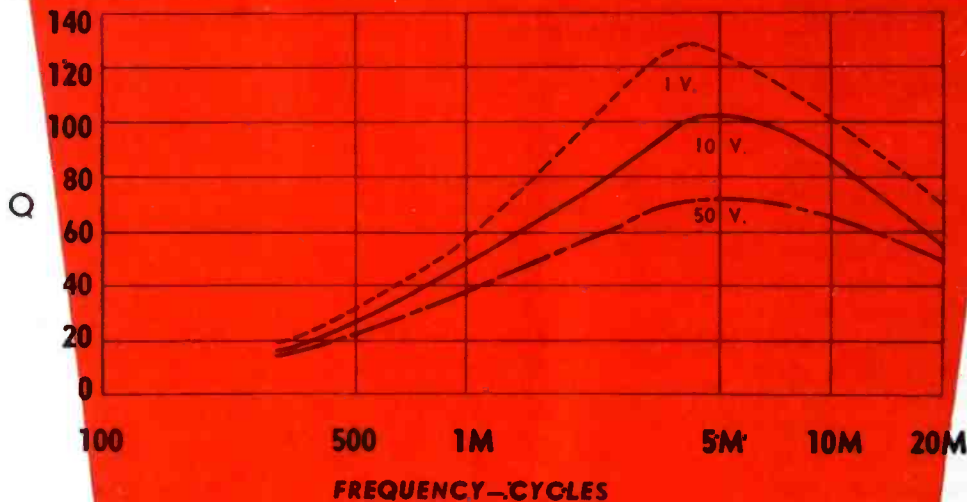
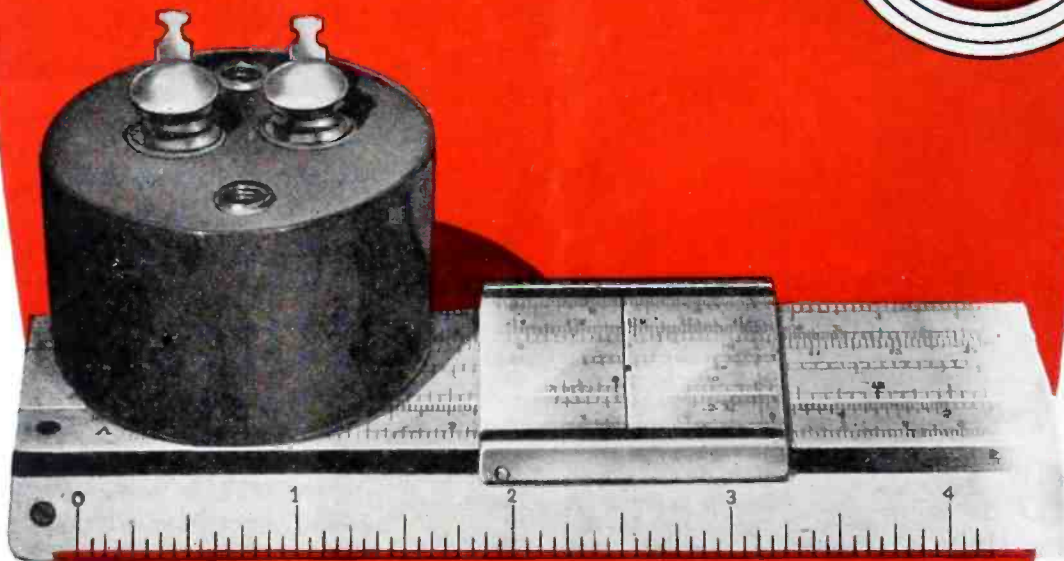
‡Styli stock numbers:

38449 Standard output—
(Normally used in 38453, 38598, 39550, 39919)

39863 High output—
(Identified by red dot on shaft at junction with sapphire support wire. Normally used in 9890.)



HIGH Q COILS *by*



There are many applications in the audio field requiring coils of high Q and good stability. UTC coils of the type HQA series are ideal in this respect. Q CHARACTERISTICS of a typical .14 Hq. coil at three voltages are illustrated. VOLTAGE STABILITY is high. At 1,000 cycles, for applied voltages from .1 to 25 volts, the change in inductance is less than 1%. DC current change in inductance is approximately 1% per 40 Ma. linearly.

HUM PICKUP is low due to a self shielding structure: . . . 70 microvolts per gauss at 60 cycles.

TEMPERATURE effects are negligible. From -60° degrees C. to plus 35° degrees C., inductance variation is less than 1/3%.

MECHANICALLY, these units are hermetically sealed in a drawn steel case 1-13/16" diameter by 1-3/16" high. Weight . . . 5 ounces.

VIBRATION effects are not evident over entire range of normal aircraft tests.

HQA UNITS are available in any inductance value, from 5 Mhy. to 2 Hq., and are ordered as: HQA followed by value in Mhy. Typical semi-standard values are:

HQA-12.5 \$5.00 net	HQA-200 \$8.00 net
HQA-30 \$6.00 net	HQA-500 \$9.00 net
HQA-80 \$7.00 net	HQA-1250 \$10.00 net

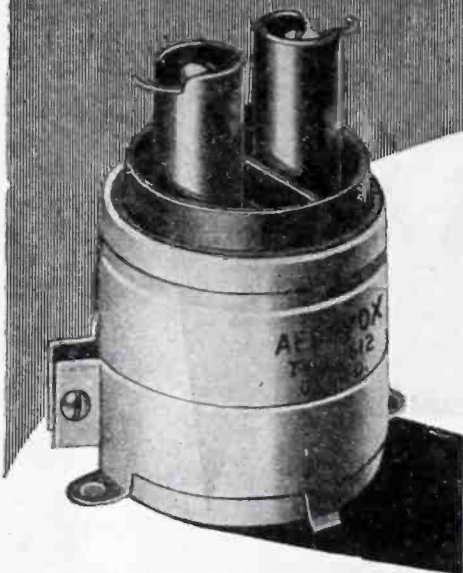
United Transformer Co.

150 VARICK STREET

NEW YORK 13, N. Y.

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





HIGH-VOLTAGE requirements

● Aerovox Type 12 is an immersion-proof oil-filled paper capacitor designed to meet high-voltage, high-altitude operating requirements. Particularly suitable for high-voltage circuit applications such as in television, cathode-ray tube power supplies, high-voltage rectifier circuits, aircraft transmitters, or as a high-voltage by-pass capacitor. Note barrier in bakelite top. This further increases insulation and creepage path between terminals.

AEROVOX TYPE 12 HYVOL
 Supplied with adjustable mounting rim for vertical mounting.
 For certain less critical applications, ceramic insulators may be removed and unit used without them.
 Voltage ratings from 2000 to 7500 volts d.c.w. Capacitances from .01 to 2.0 mfd., depending on voltage.
 For high-voltage high-altitude operation, particularly aircraft, units cover be had with special porcelain pillar and single, taller insulator pillar terminal with corona shield.

● Write for Literature . . .



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



JACK GEARTNER JOINS ECA

Jack Geartner has been named sales manager of the Electronic Corporation of America, 45 West 18th Street, New York. Mr. Geartner was formerly assistant sales manager and advertising director of Emerson Radio and Phonograph Corporation.



* * *

BITTAN SALES NAME CHANGE

The D. R. Bittan Sales Company, 53 Park Place, New York, will hereafter be known as the Bittan-Nevins Co. Irvin Nevins and D. R. Bittan are partners in the company.

* * *

JONES PROMOTED BY SYLVANIA

Walter R. Jones has been appointed general engineering manager for radio receiving tubes at Sylvania Electric Products Inc.

* * *

H. P. SEGEL MOVES

Henry P. Segel Company have moved to 143 Newbury Street, Boston, Mass. Branch offices are at 474 Woodland Street, Hartford, Connecticut.

* * *

ADOLF GROSS HEADS NEWARK ELECTRIC NEW YORK BRANCH

Adolf Gross has been named president of the Newark Electric Co., Inc., the New York City branch of the Chicago store. The new branch will be at 115 W. 45th St. For the duration, Mr. Gross continues as consultant to and purchasing agent for the ERSA.

Stanley Cojala will be manager of the new unit and Edward Cornfield will assist.

Sam Poncher is president of the Chicago store at 323 W. Madison St.

* * *

KLINGENSCHMITT NEW R. C. OF A. PRES.

F. A. Klingenschmitt has been elected president of The Radio Club of America, Inc. for the 1945 term.

Other new officers are: vice-president, O. James Morelock; treasurer, Joseph Stanley; corresponding secretary, M. B. Sleeper; recording secretary, John H. Bose; and publicity chairman, Austin C. Lescarboura.

* * *

G. E. NAMES O'BRIEN, METZNER, LANG AND HENDON TO NEW SALES POSTS

L. R. O'Brien and R. W. Metzner, former executives in the Ken-Rad Tube and Lamp Corporation, have been appointed sales managers in the tube division of G. E.

Mr. O'Brien will act as sales manager of equipment tubes, and Mr. Metzner will

(Continued on page 31)

For Soldering in Tight Places . . .

DRAKE

No. 400 Soldering Iron

Smallest Industrial Iron Ever Designed

60 Watts — 1/4 in. Tip
 Only 9 in. long. Wt. only 8 oz.

This mighty mite is backed by DRAKE's 25 years of soldering iron manufacturing experience. The high quality and long-service of DRAKE Soldering Irons have made them outstanding favorites with all types of radio men everywhere. The DRAKE No. 400 is an outstanding value at



Only \$4.50
LIST

Drake Has an Iron for Every Purpose.
 Ask Your Radio Parts Jobber

DRAKE ELECTRIC WORKS, INC.

3656 LINCOLN AVE., CHICAGO 13, ILL.



WIRES

MADE BY

Engineers FOR
 Engineers

VICTORY

concentrating upon

for the duration

cornish

WIRE COMPANY, INC.

15 Park Row, New York City, New York



HIGH FIDELITY AMPLIFIERS

(Continued from page 23)

edance will be approximately 3×1.5 or 4.5 ohms at 400 cycles. In any event, the turns ratio required should be determined using either factor and then adjustments should be made for the best tonal quality, as required. It is essential that the output transformer be of good quality, with plenty of iron in its core.

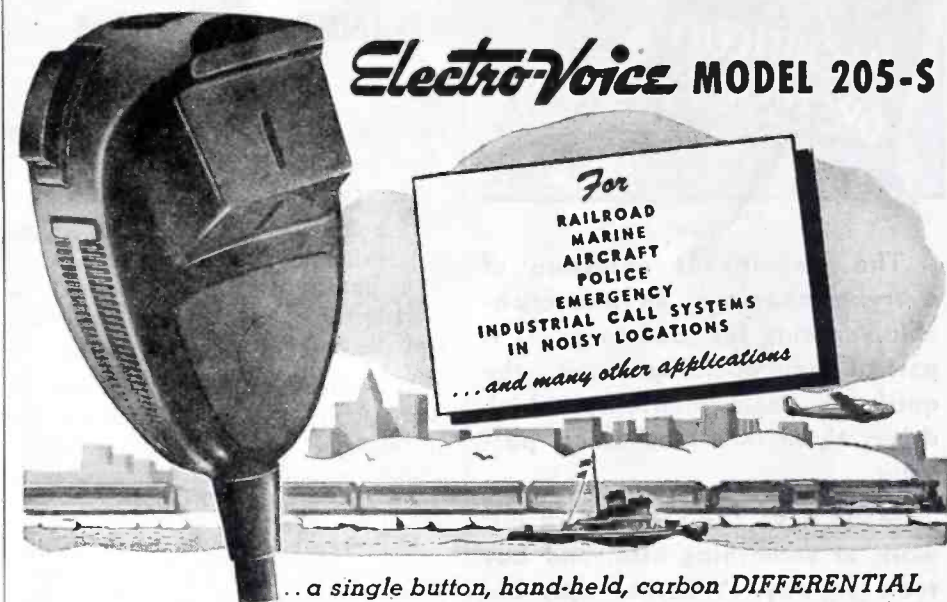
The individual Service Man may have his own ideas on types of amplifiers to build, choice of tubes and other characteristics, and need not necessarily adhere to the circuit design shown here. The important thing is to recognize that there is a definite field for this type of work, and that it can be made extremely profitable. Incidentally the record player turntable should be rugged and the motor should be capable of revolving without excessive wobbling. A good quality motor which will maintain its speed is essential. Motors which vary in speed cause serious distortion, and such distortion can be quickly detected by trained ears. A shimmying, wavering sound indicates an unsteady motor speed. A governor type motor is considered best.

SER-CUITS

(Continued from page 25)

triode preamplifier is used. A loop and external antenna feeds a triode first detector and two 7B7 i-f stages. The oscillator is a separate 7B5 pentode. A 6-megohm tone control is tied in with a 2 megohm tapped volume control. With the arm at the top, a .004-mfd condensers is across the first audio tube, cutting the highs. This is aided by a bass compensator on the volume control, consisting of a 100,000-ohm resistor and the .004-mfd condenser in parallel. The 6-megohm shunt of the tone control is negligible. With the tone control at the bottom, the .004-mfd condenser shunt is effectively removed, restoring the highs. Simultaneously, the 100,000-ohms is directly grounded. This reduces the bass accentuation. Intermediate positions represent proportional tone values.

The push-pull stage makes use of screen-grid inversion, the grid of the second power tube receiving its signal from the screen of the first tube by resistance coupling; in this case, across 900 ohms. The 1-megohm resistor between the power tube grids introduces some degeneration in the first audio, since some of the output signal is returned to the input in phase opposi-



ONE OF A SERIES OF ELECTRO-VOICE ADVERTISEMENTS EXPLAINING IN DETAIL THE APPLICATIONS AND SPECIFICATIONS OF ELECTRO-VOICE MICROPHONES

Electro-Voice MODEL 205-S

For
RAILROAD
MARINE
AIRCRAFT
POLICE
EMERGENCY
INDUSTRIAL CALL SYSTEMS
IN NOISY LOCATIONS
... and many other applications

... a single button, hand-held, carbon DIFFERENTIAL microphone, designed for maximum intelligibility under extreme noise

Ambient noise is fed into dual apertures, shown in photograph, in correct phase relationship to provide almost complete cancellation of the entire noise spectrum. Speech that originates close to one of these apertures is faithfully reproduced. Articulation percentage is at least 97% under quiet conditions, and 88% under a 115 db noise field. The Model 205-S is unusually versatile . . . can be used, indoors or outdoors, for all speech transmission in any noisy, windy, wet or extremely hot or cold location.

Because the 205-S is a noise-cancelling microphone, it must be used in a manner different from any other type. The microphone should be held so that the lip rest will touch lightly against the upper lip. This brings the mouth and instrument into the correct position for proper transmission. As with all Electro-Voice microphones, the Model 205-S is guaranteed to be free from defect in material and workmanship — for life.

SPECIFICATIONS OF THE MODEL 205-S

OUTPUT LEVEL: Power rating: 27 db below 6 milliwatts for 10 bar pressure. Voltage rating: 10 db above .001 volt/bar, open circuit. Voltage developed by normal speech (100 bars): .32 volt.

FREQUENCY RESPONSE: substantially flat from 100-4000 c.p.s.

ARTICULATION: at least 97% articulation under quiet conditions; 88% under 115 db of ambient noise.

AVERAGE BACKGROUND NOISE REDUCTION: 20 db and higher, depending on distance from noise source.

WEIGHT: less than eight ounces.

INPUT: standard single button input is required.

CURRENT: 10-50 milliamperes button current.

HOUSING: molded, high impact phenolic housing; minimum wall thickness, 5/32"; vinylite carbon retainer.

TEMPERATURE RANGE: from -40° to $+185^{\circ}$ F.

PRESS-TO-TALK SWITCH: available with or without hold-down lock. Double pole double throw contacts provide an optional wide assortment of switch circuits.

STANDARD SWITCH CIRCUIT: provides closing of button circuit and relay simultaneously.

THERMAL NOISE: less than 1 millivolt with 50 milliamperes through button.

STURDY CONSTRUCTION: capable of withstanding impact of more than 10,000 6" drops to hard surface.

POSITIONAL RESPONSE: plus or minus of 5 db of horizontal.

CONDUCTOR CABLE: 5 feet of two conductor and shielded cable, overall synthetic rubber jacketed.

Model 205-S, List Price. \$25.00

Model 205-S, with switch lock, List Price. \$26.50

Electro-Voice MICROPHONES

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



tion. In phono position, the i-f cathodes are removed from ground, lessening the B load. This allows the B voltage to rise a little, and providing more power output on phono operation. The power is further increased by shunting the C voltage divider with 780 ohms, which decreases the power grid bias.

Philips 730

The Philips 730A t-r-f receiver with two r-f stages, three tuned circuits, operating at various voltages from 100 to 260 and at frequencies of 40-100 cycles is shown in Fig. 5. Both l-w and m-w are covered and a capacity

coupled bandpass filter is used between antenna and the first r-f tube. A different capacity value, C_2 and C_3 , is used for each band. For the sake of perfect tracking, similar condensers are used in the second r-f stage, C_7 and C_8 . The tuning condenser and the inductors are in the plate circuit at $B +$ potential, the condenser being insulated from the chassis. The 6200-ohm potentiometer, R_6 , is the gain control.

In the power supply, a tapped filter choke is connected in the negative h-v, in series with bias resistor R_{25} .



The magnificent obsession of every mechanic is an unquenchable yearning for good tools. It is part of their make-up . . . it's the quirk in their mentality which drives them into mechanical pursuits.

Many have the same quirk but work at something else, and buy tools anyway. Whether they become engineers, artists, or surgeons, a special appreciation of balance and artistry finds expression in the pride of owning a fine tool . . . many fine tools.

VACO SCREW DRIVERS with gleaming Amberyl handles have that fine quality and perfect balance which make them favorites of both "professional" and "amateur" users. There are 173 types of **VACO DRIVERS**, shock-proof and break-proof . . . each built to perform some certain task easier—better—faster.

In Radio Service Work, especially, the versatility of Vaco drivers is an aid to speeding up every job. Write for catalog.

VACO PRODUCTS CO.

311 E. ONTARIO ST. • CHICAGO 11, ILL.
Canadian Warehouse: 560 KING STREET, WEST • TORONTO 2, ONTARIO

DIAL CORD INSTALLATIONS

(Continued from page 24)

the slot at the back of the tuning shaft.

(6)—Hook one of the knotted ends of the cord into one of the hooks on the spring and turn the shaft clockwise until there are eight turns of cord on the shaft between the spring and the front shaft bracket.

(7)—Hook the remaining end of the cord to the other hook on the spring and turn the shaft counter-clockwise until one turn is wound on the back end of the shaft.

(8)—Hold the tuning shaft so that it does not turn and place both cords counter-clockwise over the two pulleys.

(9)—Bring the cord under the pointer with the front end of the cord in front of the guide bracket and the back end of the cord in back of the guide bracket.

(10)—Slide the pointer over to the right end of the guide bracket and place the large *U* spring under the pointer and through the slot, with the hook to the back.

(11)—With a fine piece of wire as a hook, feed the front end of the cord through the hole in the pointer from the bottom and fasten this loop to the hook on the *U* spring on the pointer.

(12)—Pull the cord tight and loop it over the pulley on the left end of the pointer guide bracket. Tighten the set screws on the tuning shaft coupling.

(13)—The pointer can be adjusted to the proper frequency by holding the tuning shaft and sliding the pointer along the guide bracket.

(14)—Replace the front housing and top and bottom covers.

NATION-WIDE
MAIL ORDER
DISTRIBUTORS
SINCE 1928



RADIO AND
ELECTRONIC

DEVICES

For . . .

TRADE
INDUSTRY
VOCATIONAL
COMMUNICATION
PUBLIC UTILITY
and
EXPERIMENTAL
APPLICATIONS

BURSTEIN-APPLEBEE CO.

1012-14 MCGEE ST.
KANSAS CITY 6, MISSOURI

★
KEEP BUYING
WAR BONDS
★

RADIO SET LINE WANTED

Responsible distributor in Southwest desires good line of home radio receivers. Write Box 245, SERVICE, 19 E. 47 St., New York 17, N. Y.

KEEP YOUR RED CROSS
AT HIS SIDE



Get **EVERYTHING!**

Standardize on

STANCOR Transformers

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

STANDARD TRANSFORMER CORPORATION
1500 N. HALSTED STREET • CHICAGO



NEWS

(Continued from page 28)

sales manager of replacement receiver tubes.

J. M. Lang has been appointed assistant manager of the Ken-Rad Division of the G. E. electronics department.

Claude J. Hendon has been named manager of sales in the G. E. tube division.

* * *

ROBINSON WITH ARHCO

J. Homer (Robby) Robinson has been appointed vice president and general sales manager of the American Radio Hardware Company, Inc., 152-4 MacQueston Parkway, South Mount Vernon, New York.

Mr. Robinson was formerly with National Union Radio Corporation as district manager, export and advertising manager and more recently general sales manager.



* * *

W. M. OWEN BECOMES AEROXOV PRESIDENT

W. Myron Owen has become president of the Aerovox Corporation, New Bedford, Mass.

Mr. Owen recently resigned the vice-presidency of the Detroit Harvester Company, of which he remains a director. He is also a director of Duncan Electrical Mfg. Co., the Chicago Rivet & Machine Co., and the Seneca Falls Machine Co.

Stanley Green has been named vice president and chief engineer.

Samuel I. Cole, retiring Aerovox president remains as general manager. Samuel Siegel, who was vice president, remains with the company as director of purchases.

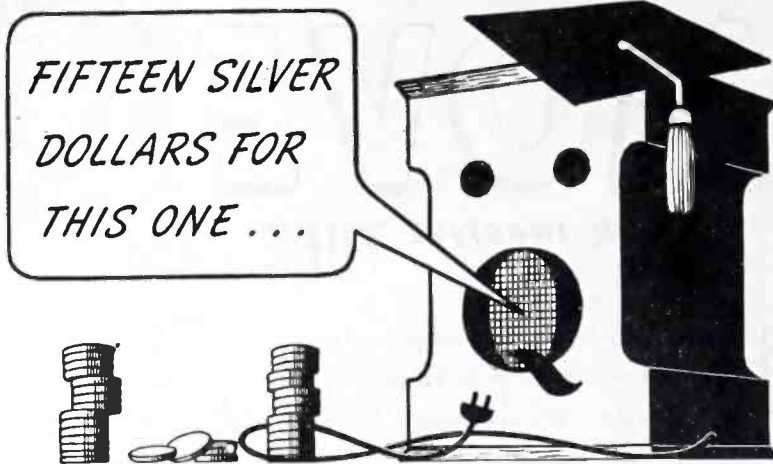


* * *

CLAROSTAT WINS QUALITY RATING

For the third time the Army Air Forces have awarded the approved quality control rating to Clarostat Mfg. Co., Inc., Brooklyn, N. Y.

RIDER VOLUME XIV COVERS 1941-42 RECEIVERS



"Fifteen silver dollars for this one..." were the first words I spoke as a new radio, four years ago. I don't remember the question, but I was thinking of those, my first words the other day when I noticed that that's the price of Rider's Abridged Manual Vols. I to V. It also occurred to me if the "Doctor" had asked "What's the best fifteen dollar investment a radio serviceman can make?" the answer would be easy.

That particular book gives the servicing data on the most widely sold sets issued between 1929 and 1935.

For sets of my age, made in 1941-42, there's Vol. XIV. This gives all the information you need to quickly diagnose and cure defects in we receivers issued during the last year and a half of civilian radio production.

If your jobber's out of a particular volume when you ask for it, please be patient. WPB paper limitations, y'know.

RIDER MANUALS (14 VOLUMES)

Volumes XIV to VII . . . 12.50 each volume

Volume VI 9.50

Abridged Manuals I to V (1 vol.) 15.00

Automatic Record Changers

and Recorders 7.50

OTHER RIDER BOOKS YOU NEED

The Cathode Ray Tube at Work

Accepted authority on subject 4.00

Frequency Modulation

Gives principles of FM radio 2.00

Servicing by Signal Tracing

Basic Method of radio servicing 4.00

Servicing Superheterodynes 2.00

The Meter at Work

An elementary text on meters 2.00

The Oscillator at Work

How to use, test and repair 2.50

Vacuum Tube Voltmeters

Both theory and practice 2.50

Automatic Frequency Control Systems

—also automatic tuning systems 1.75

A-C Calculation Charts

Two to five times as fast as slide rule . . . 7.50

Hour-A-Day-with-Rider Series—

On "Alternating Currents in Radio Receivers"—

On "Resonance & Alignment"—

On "Automatic Volume Control"—

On "D-C Voltage Distribution" 1.25 each

JOHN F. RIDER PUBLISHER, INC. 404 FOURTH AVE., N.Y. 16, N.Y.

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

Cable: ARLAB

RIDER MANUALS *are complete* IN 14 VOLUMES

FOURTH WHITE STAR TO SOLAR

The Bayonne, N. J., plant of the Solar Manufacturing Corp. has received the fourth white star for the "E" flag.

* * *

NEWS OF THE REPRESENTATIVES

At a recent meeting of the Dixie chapter, E. L. Hollingsworth was reelected president and James Millar was reelected secretary for 1945.

Merton Dobbins, a manufacturers representative and member of the Pacific Northwest chapter died recently.

* * *

STACKPOLE RESISTOR COLOR CODE CHART

Vest pocketed resistor color code indicators have been prepared by Stackpole Carbon Company, St. Marys, Penna.

Contains complete information on resistor color coding under the American

War Standard and joint Army-Navy specifications, both being identical with the RMA setup.

The charts are free.

* * *

H. A. STEPHENS NOW HUDSON AMERICAN AD MAN

Henry A. Stephens has been appointed manager of advertising and public relations of Hudson American Corporation, 331 Madison Avenue, New York. Mr. Stephens was formerly assistant to the vice president.

* * *

PEEK JOINS ELECTRONIC LABORATORIES AS S-M

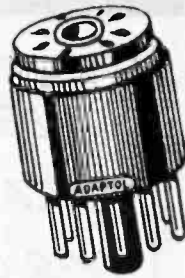
Walter E. Peek has been appointed sales manager of Electronic Laboratories, Inc., Indianapolis. Mr. Peek has been a

(Continued on page 32)

BRASS-TACKS ADVICE ON HOW TO

MOVE

YOUR INACTIVE TUBE STOCKS



169 types of ADAPTOL Adapters, many with built-in resistors, now make it possible to adjust any tubes in your stock to current requirements. We are the originators of IR5 to IA7 Adapters; we enjoy a cherished reputation for quality and precision; we are able and eager to consult with Service houses on the liquidation of tube inventories. . . . put your problem up to specialists!



To convert for use of available tubes—transform to scarce types—eliminate wiring. . . . specify ADAPTOL Adapters!

ADAPTOL COMPANY
260-B UTICA AVENUE
BROOKLYN 13, N. Y.
Phone PResident 4-1520, 1521

NEWS

(Continued from page 31)

member of the engineering staff for the past four years, serving in both a design and sales engineering capacity, with particular attention to the vibrator field.

Mr. Peek was chief radio engineer of Noblitt-Sparks Industries, Columbus, Indiana, for several years.

* * *

MAJESTIC ENTERS RECORD BUSINESS

A phonograph recording company, to be known as Majestic Records, Inc., of New York, has been announced by Majestic Radio & Television Corporation of Chicago. Recording studios and offices will be in New York City and a manufacturing plant in Newark, N. J.

James J. Walker, former mayor of New York City, is president of the new company.

* * *

SYLVANIA BANNER

A new banner for Service Men printed on a weatherproof material in three colors, green, black and white, has been announced by Sylvania. Banners are available from Sylvania distributors, or direct, and are priced at 40¢ each or three for \$1.00.



PASCHKES CELEBRATES 25TH RADIO YEAR

Otto Paschkes, president of Solar Manufacturing Corp., recently celebrated his 25th year in radio.



* * *

R. J. McNEELY RESUMES SALES POST AT HOFFMAN RADIO

R. J. McNeely, wartime plant superintendent for Hoffman Radio Corporation, Los Angeles, has returned to his original duties as sales manager for the company to coordinate postwar plans with the engineering department and the postwar committee.

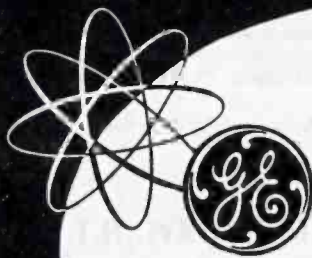
Succeeding Mr. McNeely as plant superintendent is Eugene N. Knox, former foreman. Sam L. Spraggins, former chief inspector, becomes assistant to Mr. Knox; and Allen Frame takes over Mr. Spraggins post as chief inspector.

* * *

LEEDS AND NELSON PROMOTED BY G.E.

L. M. Leeds has been appointed manager of the electronics laboratory of General Electric. W. C. White, formerly in charge of this laboratory, has been appointed the electronics engineer of the G. E. research laboratory.

J. E. Nelson has been made sales manager of industrial tubes at G. E.



UNIMETER

This unit fulfills an extremely important need for general utility portable service equipment. It has wide range coverage for both a-c and d-c measurements of voltage, current measurements on d-c and the popular ranges on resistance.

The UM-3 is designed to clearly indicate all the functions which aid in the prevention of application of high voltages when preparing for current or resistance measurements.

Other G-E units for better servicing include: Tube Checker TC-3, Unimeter UM-4, and Oscilloscope CRO-3A.

For details write: *Electronics Department, General Electric, Schenectady 5, New York.*

Electronic Measuring Instruments



UM-3 GENERAL ELECTRIC

177-D2



OLD TIMER'S CORNER

by **SERVICER**

SEEMS to me there's quite a bit of money to be made in records.

For some reason which I just haven't been able to figure out, Service men have stayed away from this business in droves. Some of them don't want youngsters coming into their store to work and not to buy. Others don't want the responsibility of carrying a large stock, and still others don't want to go through the trouble of making up some record buyers which can be used for the purpose of selling the commodity.

All this is a bit of nonsense. You have to carry stock to make repairs, don't you? Maybe you'll have a receiver line, peacetime, and handle sets. Well, merchandise is merchandise.

And, in addition, there's nothing like music with its universal appeal to bring the customers filing into your shop. Have records for the whole family from little Janie who loves to jitterbug to Grampa who loves those deep down with Negro spirituals. This brings up the question of what to carry.

There are all kinds of records . . . opera records, concert records, children's records, religious records, language records in each of the above groups. What you should stock is the problem.

Distributor Help

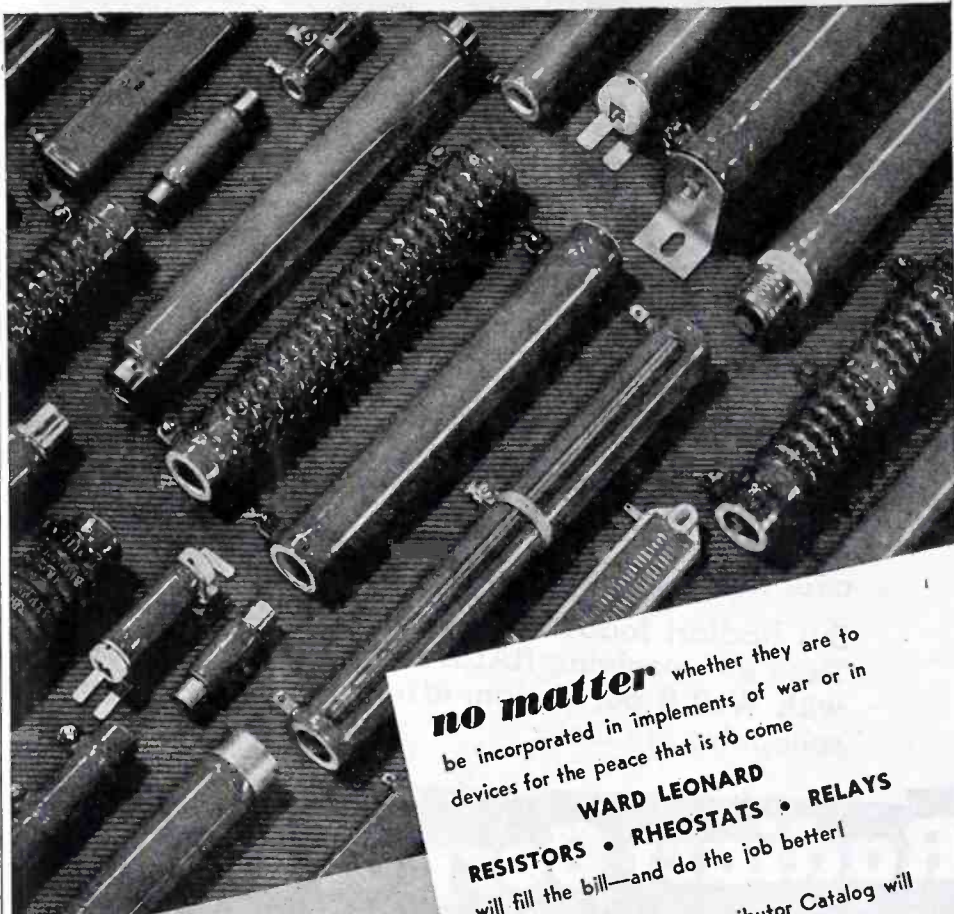
Probably the easiest way to get yourself started, is to put yourself under the wing of a local distributor. He will know what to send you; and he will, if he's a good business man, not sell you what won't move, because he can build a swell market through your store.

If you don't carry a certain brand or the "label" and not another, from the sales angle. Good records are to be found under all labels which include: Hit, Decca, Victor, Columbia, Capitol, Ansche, Blue Note and many others that are not so well known. You will find that your stock will be a cross section of the label (or labels) your distributor sends you.

This brings to mind another thing. If you don't carry a certain brand or one of record, it wouldn't be a bad idea to recommend the fellow down the street, who stocks what the customer wants. You'll create friends that way—friendship that will pay dividends.

Accessories

We mustn't forget the accessories that go with the business. Needles, record albums, record stands, brush-offs, re-ording blanks, sheet music, etc. These make a mighty sweet side line. And the buying of records will also bring you



no matter whether they are to be incorporated in implements of war or in devices for the peace that is to come

**WARD LEONARD
RESISTORS • RHEOSTATS • RELAYS**

will fill the bill—and do the job better!

Our new Electronic Distributor Catalog will be ready about March 15th. Send your name to assure receiving an advance copy.

WARD LEONARD ELECTRIC CO.
Radio and Electronic Distributor Division
53 West Jackson Blvd., Chicago, Ill.



WARD LEONARD
ACCEPTED MEASURE OF QUALITY

some service business when the phonos break down, which they do once in a while. All this spells money!

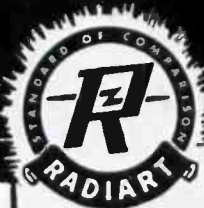
Last but not least, it is a nice feeling to have people look up to you in their choice (and your recommendations) of the music they should listen to. It is pleasant to have your shop busy with music from opening to close. And it will be surprising how the older folk will ask you to get that certain record for them, and will wait until it comes in. The youngsters, too, for that matter. You will cement bonds with your community and those whom you serve far beyond your fondest hopes. For music is the one thing which all of us like in one way or another.

Incidentally, don't be stingy with let-

ting the customers hear what they want without worrying too much that they will wear the shellac off the records. There's a store in a big city I once read about that acknowledges that it has many more *listeners* and *lookers* than buyers—yet it still does the biggest business in records in these United States. That's for you. Do the same.

And while you are selling the records, don't forget to make a sort of sly survey of what your buyers are thinking in terms of *postwar* radio consoles, what they have now, and what they think they would like to spend afterwards. All this is like casting your bread on the waters—it will surely return sevenfold in the form of increased orders when the war is over.

FACTS Regarding Radio Parts Production



Government orders for radio and electronic equipment are the largest on record and are still increasing.

Military leaders believe in using equipment lavishly because equipment saves lives. So war orders must take precedence over all others.

But Radiart Jobbers are not forgotten . . . They are receiving RADIART VIBRATORS, with W P B permission, after government schedules are met.

Radiart Corporation

3571 W. 62nd. St.

CLEVELAND 2, OHIO



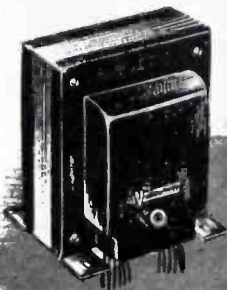
to be opened
"V" Day
from
HALLDORSON

After victory, Halldorson Transformers will be available in quantity. Now we are proud that our transformers are on the fighting front, doing the job where it's "Tough," helping to bring our boys home. However, we are producing a complete line of victory type transformers in limited quantity, but maintaining Halldorson's high standards. **JOBBERs**, write for complete information on our Halldorson Victory Type Transformers.

THE HALLDORSON COMPANY

4500 Ravenswood Avenue

Chicago 40, Illinois



HALLDORSON
Vacuum Sealed
TRANSFORMERS



NEW PRODUCTS

CHERRY RIVETS

Rivets for receiver repair work have been announced by Cherry Rivet Company, 231 Winston Street, Los Angeles 13, California.

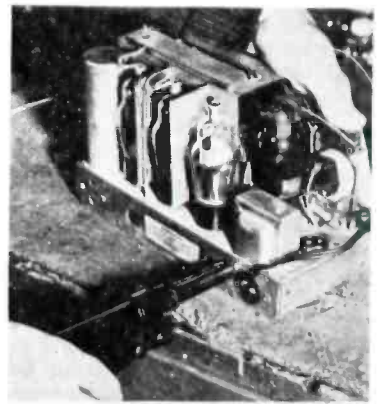
For radio repair work, the hollow rivet is said to be especially applicable. Because of its tolerances, this rivet does not require exact hole drilling in the material to be riveted. In application, the rivet and stem are placed in the material hole, and the stem top is inserted into the gun head. The pulling force of a rivet gun also made by Cherry Rivet Company draws the stem against the rivet shank, forcing the shank to spread and clinch into the material with a clinching force of from 300 to 600 pounds. Then the stem breaks into two parts, both parts falling free of the rivet.

Rivets can be used for fastening tube sockets, transformers, name plates, loud-speaker shields, parts to chassis, lid hinges on portables.

Three rivet guns are available. One, the G-15, is air-powered. All the others are hand operated. Of these, the G-25 and G-35 guns are especially useful for small shop installations.

The G-35 gun, built on the ratchet principle is 11½" overall, and can be operated with one hand. It has snap on pulling heads interchangeable to fit any Cherry rivet.

The G-25 gun, working on the leverage principle, is 9½" overall and also is operated with one hand.



J. F. D. ADJUSTABLE BALLASTS

Adjustable ballasts for a-c/d-c, housed in perforated metal containers have been announced by the J. F. D. Manufacturing

(Continued on page 36)

30-WATT AMPLIFIER

(See Front Cover)

A 30-watt 4-stage high-grain amplifier, designed to operate off a 6-volt storage battery or a-c line, appears on the SERVICE cover this month.

In this model, Silvertone 8950, there are two high-gain input positions to accommodate high-impedance crystal, velocity or no-voltage velectron microphones. A low-gain input position for phonograph pickup is also provided.

The power-supply system includes a heavy-duty vibrator which draws 141 watts from the battery, generating 60 cycle a-c. This is fed to the main power transformer supplying both motor and amplifier.

The output of the amplifier is substantially flat from 50 to 10,000 cycles per second.

In the two high-gain input jack circuit are 1-megohm grid leaks which feed into a pair of 6J7G pentodes. Note the use of bias cells. Separate ½-megohm volume controls regulate the voltage input to separate the 6C5G's whose plates are paralleled to feed a 6N7G third audio and 6L6G beam output. A tap is taken from the 6L6 grid leak to feed the second triode of the 6N7 which acts as a phase inverter to supply the other 6L6 for push-pull output. The -phono input runs through a shielded cable to a ½-megohm volume control and into a separate 6C5G. This amplifier is connected in parallel with the other two 6C5's, and the three tubes are supplied through a common 60,000-ohm plate load resistor.

The three cathodes of the 6C5G's are also tied together, allowing a common bias supply of 900 ohms and 20 mfd. A tone control for treble and bass is shunted across the first 6N7 triode input. This consists of a .02-mfd condenser in series with a 50,000-ohm rheostat for bass (high suppression), and a 10,000-ohm resistor in series with a ¼-megohm rheostat for treble (low suppression).

One simple way to analyze the operation of this control system is to consider the audio coupling (or blocking) condenser, .02-mfd unit, in series with the treble control resistors with the output taken at the junction and the input fed to the entire series circuit. We note then that low audio frequencies will tend to be held back by



General Industries constant-speed electric phonograph motor—Model CX

YOU'LL HAVE *Smooth Power* MOTORS FOR PEACETIME PRODUCTS

No doubt about it. Those quick-starting, velvety-running *Smooth Power* motors will be right back on the job as soon as we've finished our war work.

They'll be driving turntables, record-changers and recorders as smoothly and dependably as always . . . with complete fidelity in every word or musical note. They'll deliver finished performances —for you and your customers.

So, for your peacetime de-

signs—include General Industries *Smooth Power* motors, recorders and combination record-changers and recorders. No deliveries now, of course, but you can count on them for your postwar production.

THE GENERAL INDUSTRIES CO.
DEPT. M • • • ELYRIA, OHIO



the blocking condenser, while high frequencies will get through to the grid. The amount of differentiation is dependent upon the ratio of condenser reactance (at the frequency in question) to the value of resistance. By making either the condenser or resistor variable, this ratio can be changed at will; changing primarily the low-frequency input, providing what sounds like a treble control.

The output transformer has a multi-impedance output for speakers and line, but the amplifier is furnished

with dual 12" 6-ohm p-m speakers. The power transformer has two primaries, one for the a-c line and one for the vibrator. Two 6W5G's, each with paralleled elements, serve as rectifiers which feed the 6L6 plates directly, 6L6 screens after a resistance filter, second and third stage after a choke section, and the 6J7 input tubes after another resistance filter. This method of separation not only provides the correct amount of filtering to the respective stages, but also prevents audio coupling through the B supply.

MARCH SPECIALS of HARD-TO-GET RADIO PARTS

for IMMEDIATE delivery

National Electronic can supply you immediately with hundreds of hard-to-get radio parts at exceptional prices . . . some listed below. Take advantage of these savings by ordering from this list today.

LIMITED OFFER

Dry battery eliminator for farm sets. Will deliver up to 112v of B and up to 2v of A from any 6v storage battery. In handsome black metal container . . . complete with cables, etc. Extra Special while they last. . . . Each, \$15.95

TUBE SPECIALS

Only these types available, while they last. Do not ask for others. All fully guaranteed.
Types UX200A-31-27 Each, 39¢
Types-39 6SN7GT-55 Each, 49¢
Types-6SL7GT-655-6Y6-1T4-384-11A. Each, 59¢
Types-7H7-22 Each, 69¢

6 ft. Electric Cord Sets, high grade, soldered, molded, rubber plug at one end, stripped and tinned at other.
Each, 29¢; 10 for \$2.75; 100 for \$24.60

3,000 m.f.d. at 3v F.P. Condenser in aluminum can 1 1/2" D X 2 1/16 H. Fresh Stock.
Special, while they last. **\$1199**
Each, \$1.39; 10 for

A superior Mike Cable, single conductor, shielded and pre-war natural rubber cover, 13¢ per ft.; 100 ft. for \$9.90
Dual conductor and shield as above, 18¢ per ft.; 100 ft. for \$15.95
CONTINENTAL CARBON RESISTOR KIT No. C6 Assortment, 100 RMA coated 1/2 and 1 Watt resistors (2/3's are one watt). Unusual bargain at. \$3.35
AERIAL KIT containing aerial wire, rubber coated, lead-in, insulators, ground clamp, window strip, etc. Each, 89¢
20 MFD 150 WV Tubular Pigtail Electrolytic. One year guaranteed. Each, 35¢; 10 for \$3.30
10 MFD 450 WV Tubular Pigtail Electrolytic. One year guaranteed. Each, 43¢; 10 for \$3.95
DeLux assortment of 50 Bakelite Set Screw Knobs for 1/4" Shaft. Kit, \$4.19
50 MFD 150 WV Tubular Pigtail Electrolytic. One year guaranteed. Each, 49¢; 10 for \$4.45

Heavy Duty GE Pyranol 10 MFD 600 WV (900Pk) Oil filled paper filter condenser in Hermetically Sealed metal container 3" x 4 1/2" x 1" with connections brought through ceramic bushings. List \$9.80. Our price **\$2950**
\$3.30; 10 for

Assortment of 200 pcs. Special Radio Hardware including Tube Sockets, Terminal Strips, Grip Caps and Plugs. Kit \$1.49.
20x20/150WV Tubular Electrolytic. First Line Condenser. One year guar.
Each 61¢; 10 for \$5.60

HI-TEMP RUBBER PUSH BACK WIRE — Solid and Stranded (#20)
100 ft. roll 71¢; 10 for \$6.50.

OUTSTANDING OFFER

An assortment of 20 high grade Vitreous Wire Wound Resistors in 5, 10 & 25 W sizes ranging from 30 to 30,000 Ohms. Selected as to popular usage, Ohmite, Electrohn, Sprague, Utah, etc. Kit #277. List price \$9.60. **\$299**
Your cost is only

LOCTAL SOCKETS—(Metal Supporting Ring)
10 for \$1.10; 100 for \$9.99.
10 MFD 50 WV Tubular Pigtail Electrolytic Condenser. One year guar. Each 28¢; 10 for \$2.45.
Chicago telephone 1 meg Midge! Vol. Cont. with switch, standard 3/8" bushing, shaft 1/4" D. X 1". Audio taper. Each 45¢; 10 for \$3.95.
10 x 10/450 WV Tubular Electrolytic. First Line Condenser. One year guar.
Each 74¢; 10 for \$6.90

C.O.D. orders require 20% deposit. We pay all shipping charges only on prepaid orders of \$25.00 or more. L-265 or AA-3 certificates are required. Sorry, but no orders under \$2.50 can be accepted.

Our FREE bulletin lists many other hard-to-get radio parts and supplies. Ask for it today.

**NATIONAL
ELECTRONIC SUPPLY**

77 W. Washington Blvd.

Dept. S-3

Chicago 2, Ill.

NEW PRODUCTS

(Continued from page 34)

Co., 4111 Fort Hamilton Parkway, Brooklyn, N. Y. Ballasts are said to be provided with a longer mica form so that long and finer lengths of resistance wire can be used for making precise adjustments. The ballasts are said to take the place of 2500 exact duplicates.

An extended line of exact duplicate ballasts for RCA, Zenith, Stromberg-Carlson, Philco, etc., has also been developed by J. F. D.

G. E. H-F PAPER-DIELECTRIC CAPACITORS

High-frequency .01-mfd paper-dielectric capacitors, have been announced by G. E. Developed primarily for grid- and plate-blocking service in the electronic-oscillator circuits of high-frequency induction-heating equipments, they can also be used to advantage in other high-frequency oscillator circuits of a similar nature.

Internal kraft-paper and aluminum-foil assemblies, thoroughly impregnated with a low-loss liquid dielectric and hermetically sealed in rectangular metallic cases.

The units are supplied with removable footed-type brackets. 20,000-volt rating is available in either a plain case, or with cooling fins to permit a higher current-carrying capacity.

IRC WIRE-WOUND RESISTORS

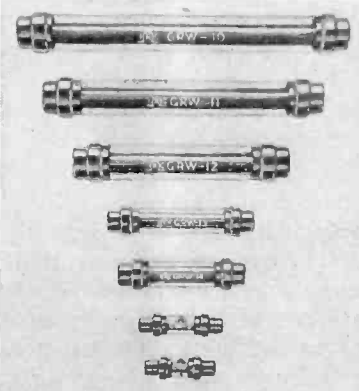
A completely sealed power wire-wound resistor, GRW, has been announced by International Resistance Company, 401 N. Broad Street, Philadelphia 8, Pa.

IRC engineers claim that the new resistor will actually support a transverse load of as much as 100 pounds. The resistor is also said to be capable of withstanding a twisting torque of 80 inch-pounds.

All connections are welded. Pyrex glass enclosure tube is heat-treated.

Sealing between the ferrules and the pyrex glass enclosure is done with pure lead, which has a melting point well above the 275°C operating temperature of the resistor.

Seven standard sizes are now available. They correspond to Army-Navy types RW-10F to RW-16F, inclusive, and are identified as types GRW-10 to GRW-16. Resistance values covered by these seven types are from 0.1 ohm to 46,000 ohms, with power ratings from 15 to 140 watts.



LANGEVIN 102 AMPLIFIERS

A series of wide-band amplifiers, type 102, has been developed by The Langevin Company, Inc., 37 West 65th Street, New York.

One type, 102-A, has input impedances

It's
SMART

to use our



INSTRUMENT REPAIR SERVICE

Testing instruments, worth their weight in gold! Can't take chances . . . gotta get 'em serviced RIGHT! Here's where we shine . . . all makes repaired by experts!

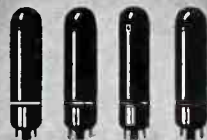
BUT—Please, before shipping, let us know make, model and serial number, age of instrument, and what seems to be the trouble. Then we can steer you straight. . . .

AUTHORIZED SUPREME SERVICE STATION

BURLINGAME ASSOCIATES

Service Division 34

11 Park Place New York 7, N. Y.



4 STANDARD TYPES

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

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

Ask Your Jobber.

AMPERITE

THE *Simplest*
WAY TO REPLACE

BALLASTS

WRITE FOR REPLACEMENT CHART

AMPERITE Co. 561 BROADWAY, NEW YORK, N. Y.

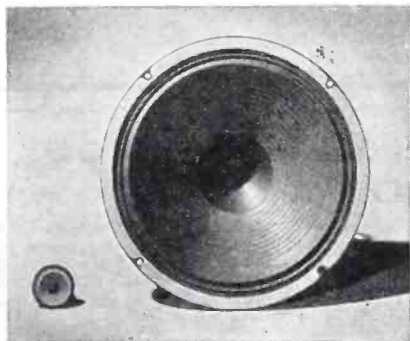
of 30/250; output impedance, 600 ohms; frequency response, 30/16000 cps, - 5 db. Another, 102-B, is a three-stage amplifier with a gain of 95 db. It employs input stage electronic mixing, and is intended for public-address installations. The third, 102-C, consists of a three-stage amplifier, fixed gain or adjustable, 75/85/95 db. The last, 102-D, is a two-stage amplifier with an input impedance of 600 ohms and bridging; fixed gain, 600 ohms input, 61 db; bridging input, 45 db.

* * *

PERMOFLUX SPEAKERS

Loudspeakers of 2" to 15" sizes, have been announced by Permoflux Corporation, 4900 West Grand Avenue, Chicago 39, Illinois. Speakers have diaphragms graduated in 1/2" steps up to and including 7 1/2" with other standard sizes up to 15".

Power handling capacities are from 1 to 20 watts, with acoustical output in 2 db steps. Speakers are said to use a new magnetic alloy.



* * *

STRUTHERS-DUNN LATCH INTERLOCK RELAYS

Two-coil relays, series 50XBX, with latch-in relay construction have been designed by Struthers-Dunn, Inc., 1321 Arch Street, Philadelphia 7, Penna. This latch is said to require no extraneous parts other than integral extensions of the coil armatures themselves. It operates positively from a momentary impulse. Application of power to one coil latches the contacts into one position. Power then applied to the other coils throws the contacts into a latched-in second position. A third unlatched position, valuable for certain applications, can be obtained by energizing both coils simultaneously.

Relays of this general type are produced in ratings from 6 to 200 amperes or more, and with practically any desired contact arrangement. Standard types provide for two auxiliary contacts, one in each coil circuit.

One type, 50XBX103, has double-pole, double-throw main contacts, and is rated at 6 amperes at 24 v d-c and is 3 7/16" long; 1 1/8" high; and 1 5/8" wide.

* * *

ALLIED RADIO P-A SYSTEMS

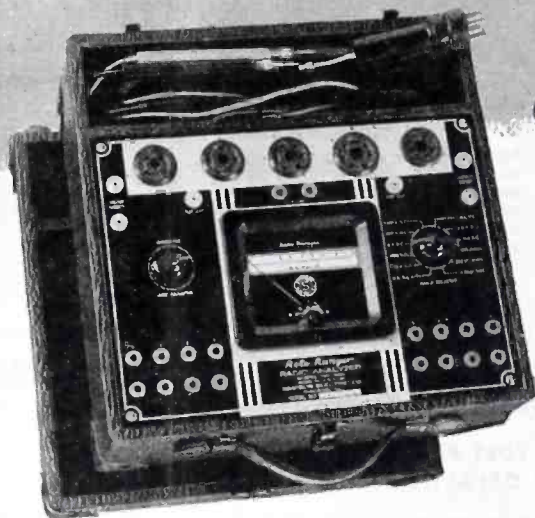
All-purpose 60-watt amplifying systems are now being produced by Allied Radio Corporation, 833 West Jackson Boulevard, Chicago 7, Illinois.

Has four individually-controlled microphone channels, two individually-controlled phono channels, universal output for matching any arrangement of speakers, individual controls for high and low frequencies, optional phono top, etc.

Available separately or with any com-

REMEMBER THIS SIMPSON

"First"?



Roto-Ranger

... the ingenious tester that does away with multiple scales — provides a separate dial for each circuit—offers truly direct reading.

The record shows that Simpson has always been just a step ahead of the field. The "Roto-Ranger" above is just one of a long list of important developments first offered in Simpson instruments.

They are designed and built by men who know *your* needs, *your* problems. Ray Simpson has been searching for, and finding, new refinements to make your work easier, and your jobs better since the very beginning of radio.

If you are now a Simpson owner you know first-hand the extra measure of accuracy and stamina built right in. If you're not, make this thrill a definite part of your future plans.

MODEL NO. 260 HIGH SENSITIVITY TESTER

Ranges to 5000 Volts, both AC and DC, at 20,000 ohms per volt DC and 1000 ohms per volt AC. Current reading from 1 microampere to 500 milliamperes. Resistance reading from 1/2 ohm to 10 megohms. Five decibel ranges, -12 to +52DB.



SIMPSON ELECTRIC CO.
5200-18 W. Kinzie St., Chicago 44, Ill.

Simpson

INSTRUMENTS THAT STAY ACCURATE

combination of speakers and microphones, depending upon individual requirements.



* * *

CRL PRE-WAR RADIOHMS

Centralab's split knurl midget radiohms

are now being made in accordance with prewar construction.

Wartime construction featured a threaded steel shaft with split-knurl tip. To make adjustments, the tip was removed, shaft was cut to required length minus 21/32", tip was replaced and prick-punched to prevent turning. Present construction specifies an extruded brass rod that allows immediate cutting to desired length as well as slotting the fin to the exact depth of the original control without removal of the tip.

Radiohms affected by the revived construction process are NK-136 to NK-144 inclusive and NK-172 to NK-174 inclusive. Both old and new specifications call for a 3" shaft from end of bushing. A

(Continued on page 38)

FIFTH EDITION
WARTIME RADIO SERVICE

75 PAGES—OVER 1500 TESTED TUBE SUBSTITUTIONS

The only book of its kind—Will save its cost over and over in time saved—Though you may know the substitution, you save the time it takes to figure the changes.

Each Substitution Set Down Like the Example Below

TUBE	SUBSTITUTE	CIRCUIT CHANGES NECESSARY
12SA7	12K8	Make adaptor as follows: no. 1 on base to no. 1 on top no. 2 on base to no. 2 on top no. 3 on base to no. 3 on top no. 4 on base to no. 4 & 6 on top no. 5 on base to no. 5 on top no. 6 on base to no. 8 on top no. 7 on base to no. 7 on top no. 8 on base to cap

THE LAST THIRTEEN PAGES CONTAIN A VERY COMPLETE TUBE CHARACTERISTICS CHART WITH CLEAR BASE VIEWS

REPAIRING BURNED OUT TUBES

CHANGING 1.4 & 2.0 VOLT FARM RADIOS FOR ELECTRIC OPERATION

BEST METHODS FOR MAKING ADAPTORS

Price \$3.00 Postpaid

Get this money making time saver from your distributor today or order from

CITY RADIO CO.
 The RADIO CITY of PHOENIX, ARIZONA
 EAST WASHINGTON AT FIFTH STREET

DISTRIBUTORS AIRMAIL TODAY FOR PROPOSITION

TUBES—PARTS

RADIO DEALERS—SERVICEMEN

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

M. V. MANSFIELD CO.

937 LIBERTY AVE.

PITTSBURGH 22, PA.

Ted McElroy

World's Largest Manufacturer of Wireless Telegraphic Apparatus

COMPLETE CENTRAL OFFICE EQUIPMENT

McElroy Manufacturing Corp.

32 Brookline Avenue • Boston, Massachusetts

UNIVERSAL MIDGET TOOLS
DANDY SIXTEEN PIECE SET

Midget Pliers, Diagonal Cutters, Four Midget End Wrenches, Needle-nose Pliers, Screwdriver, 5 Punches and Chisel, Round File, Midget Adjustable Wrench. \$14.85. IMMEDIATE DELIVERY. Remit Today. Price List and Order Blank Free with Order. DEALERS TOOL SUPPLY, 1527 Grand St., KANSAS CITY, MO.

WHEN YOU CHANGE YOUR ADDRESS

the new address, and do this at least four weeks in advance. The Post Office Department does not forward magazines unless you pay additional postage, and we cannot duplicate copies. Be sure to notify the Subscription Department of SERVICE at 19 E. Forty-seventh St., New York 17, N. Y., giving the old as well as mailed to the old address. We ask your cooperation.

slight spread of the shaft portion is essential to provide tension for the knob in both cases.

* * *

RCA 3D22 THYRATRONS

A four-electrode thyatron, 3D22, for use primarily in relay and grid-controlled rectifier applications has been announced by RCA. Conservatively rated to handle an average output current of 0.75 ampere in continuous operation.

Because of its xenon-gas filling, the 3D22 has a control characteristic which is essentially independent of ambient temperature throughout the range from -75 to +90°C.

* * *

STACKPOLE INSULATED RESISTORS

Insulated resistors, specifically designed to meet the recently issued Army-Navy specifications, are now being manufactured by Stackpole Carbon Company, St. Marys, Pa. The new units are available in 1/3- (RC-10); 1/2- (RC-21); and 1-watt (RC-30) sizes in all required ranges.

* * *

WARD LEONARD PLUG-IN ENCASED RELAY

A plug-in type relay, enclosed in a metal can and fitted with a standard octal plug base has been announced by Ward Leonard, Mt. Vernon, N. Y.

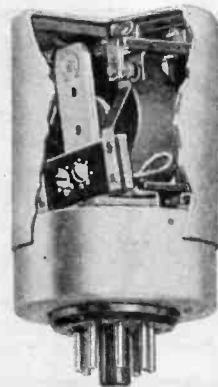
The relay mechanism is encased in a cylindrical metal housing 2 1/16" in diameter and 3 1/8" high. It is said to be supported against shock by means of a key in the center of an insulating disc that fits in the top of the case.

Double pole, double throw contacts are rated 4 amperes at 115 volts, 60 cycles

NEW PRODUCTS

(Continued from page 37)

a-c and at 24 volts d-c, 1/2 ampere from 25 to 115 volts, d-c.



* * *

G.E. H-F PARALLEL-PLATE CAPACITORS

High-frequency, water-cooled parallel-plate capacitors, HFP, for resonant or tank circuits of high-frequency electronic oscillators such as those used in electronic-heater equipments, are now being made by G.E. When connected in parallel with an inductance coil, this capacitor completes the resonant circuit which determines the frequency of the oscillator.

In this application the capacitors are operated at relatively high voltages and may be required to carry heavy currents con-

tinuously at frequencies up to several megacycles. The units are available in standard ratings ranging from 2,000 volts, 0.025 mfd, to 9,000 volts, 0.0056 mfd.

The capacitors employ a synthetic dielectric liquid.

* * *

CARTER HAND GENERATOR

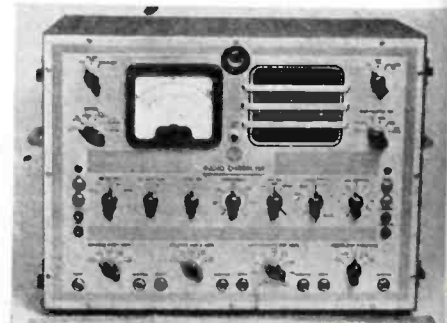
A one-man hand generator delivering about 40 watts has been developed by the Carter Motor Company, 1608 Milwaukee Avenue, Chicago, Ill. Two cranks are turned to operate. Drive is by way of a gear train.

* * *

RCA AUDIO CHANALYST

A new model audio chanalyst has been announced by the RCA Victor Division of RCA.

The unit, Type 170A, contains a calibrated high gain amplifier, beat-frequency oscillator voltohmyst (modified for flat, linear measurement of audio frequencies), an impedance tester and a high-speed electronic indicator.

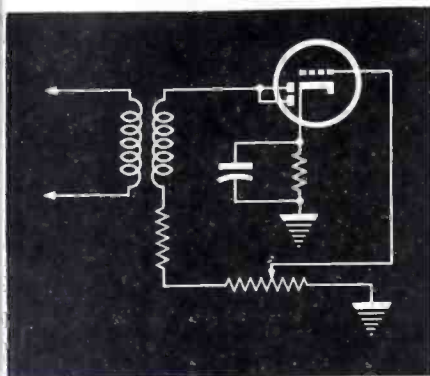


ANSWERS TO SERVICE MAN TEST QUESTIONS

(Continued from page 14)

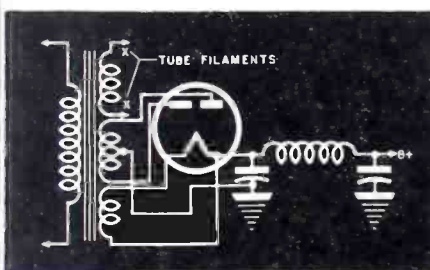
(3)— $640 + 460 = 1100$ kc

(4)—See diagram below. The diode filter resistor is normally bypassed on



each side with .0001-mfd condensers to ground.

(5)—There are many variations, depending on receiver. Basically the procedure is as follows: Connect a signal generator to grid of first detector through a small condenser. Advance volume control to maximum po-



sition. Keep the generator audibility low. Peak i-f alignment trimmers at 1400 kc. Adjust padder at 600 kc.

(6)—See diagram below, at lower left.

(7)—There are several variations. Here is one:



(8)—First r-f, converter-first detector, i-f, second detector, output.



For the TOUGHEST RESISTORS, ask for GREENOHMS

★ Greenohms—those green-colored cement-coated Clarostat power resistors—definitely "Stay Put". They are tough! Resistance is right to start with—and stays right even after years of use and abuse.

Standard fixed units in 10 and 20 watt ratings; 1 to 50,000 and 1 to 100,000 ohms, respectively. Standard adjustable units, 25 to 200 watts; 1 to 100,000 ohms. Brackets. Additional sliders available. Greenohms are also available in special windings, terminals, mountings, taps, etc.

★ Ask Our Jobber ...



Ask him for Clarostat Greenohms for those tough jobs. Ask for the Clarostat Interim Line Catalog, listing essential wartime items. Or write us direct.



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

PEED UP REPAIRS WITH THESE G-C AIDS!



FREE STEEL CABINET

G-C Dial Belt Kits

Exact replacement woven fabric belts. Easy to install — no stretching — no adjustments — a perfect fit every time. Kits come with 25, 50, 100, 200 or 300 belts.



Radio Chemical Laboratory

Twenty 2 oz. bottles. A complete assortment of cements, solvents, coil dopes, lubricants, cleaners, etc. Brushes in bottle caps. Indexed steel rack.



G-C Ne-O-Life

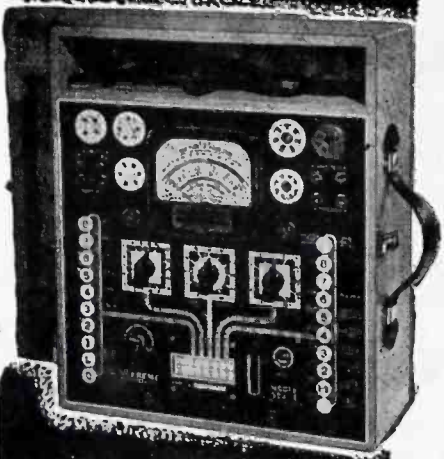
New improved design. Useful hundreds of ways. Tests AC and DC lines, DC polarity, fuses, etc. You can't afford to be without this handy all-purpose trouble shooter.

Order From Your Radio Parts Jobber ALWAYS ASK FOR G-C PRODUCTS

GENERAL CEMENT MFG. CO.
ROCKFORD, ILLINOIS



MODEL 504-A Tube and Set TESTER....



★ **THE PORTABLE LAB
THAT GIVES YOU—
Everything!**

- ★ Design proven by over 5 years production of thousands of this model.
- ★ Operation as simple as ABC. Multifunction push-button switches do all work. Simply "follow the arrows" for tube checking. No roaming test leads for the multi-meter.
- ★ Open face wide scale 4 1/4-inch rugged meter built especially for this tester—500 microampere sensitivity.
- ★ Each AC and DC range individually calibrated.
- ★ Professional appearance. Solid golden oak carrying case.
- ★ Guaranteed Rectifier.

SPECIFICATIONS

- DC MICROAMPERES:
0-500
- DC MILLIAMPERES:
0-2.5-10-50-250
- DC AMPERES
0-1-10
- DC VOLTS—1000 OHMS PER VOLT:
0-5-25-100-250-500-1000-2500
- AC VOLTS
0-5-10-50-250-1000
- OUTPUT VOLTS:
0-5-10-50-250-1000
- OHMMETER:
0-200-2000-20,000 OHMS
0-2-20 MEGOHMS
- BATTERY TEST:
Check Dry Portable "A" and "B" Batteries Under Load
- CONDENSER CHECK:
Electrolytics checked on English Reading Scale at Rated Voltages of 25-50-100-200-250-300-450 volts.
- TUBE TESTER:
Emission type with noise test, floating filaments, easy chart operation. Checks all receiving type tubes.
- POWER SUPPLY:
115 volts 60 cycle. Special voltage and frequency upon request.

SUPREME

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

JOTS AND FLASHES

INFORMATION received by RMA indicates that bills to regulate radio servicing have been introduced in the California and Oregon legislatures . . . the measures call for license fees for Service Men . . . NEDA reports 313 members distributed among 24 chapters throughout the country . . . Barker & Williamson, Upper Darby, Pa., awarded Army-Navy "E" . . . Bendix Radio names Horace W. Royer product manager and Wm. R. Albright western merchandise manager . . . 7th War Loan campaign scheduled for late May and early June . . . John W. Kirschner named sales representative for RCA tubes in East with headquarters in Harrison, N. J. . . . Treasury citation for outstanding record in last War Loan drive awarded Electronic Corp. of America . . . John Meck Industries issues effective brochure on postwar designs and plans . . . write to Plymouth, Ind., for your copy . . . Many leading radio executives attended 20th annual dinner-cruise of Veteran Wireless Operators Ass'n in New York on February 17th . . . Remember, waste paper is war paper . . . save every scrap and be sure to get it to your local authorities . . . H. G. Kronenwetter appointed manager of advertising production of Sylvania radio products . . . Ken Burcaw, Cornell-Dubilier jobber s-m recently completed a swing throughout middle West . . . Congratulations to Ed De-Nike on appointment as distributor s-m by National Union . . . Ray Durst, v-p of Hallicrafters, a recent visitor to Washington and other Eastern cities . . . Although test equipment, tubes, components etc., are still very difficult to secure, it is imperative that you read all advertising carefully . . . write for literature offered by manufacturers . . . maintain close contact with your distributor . . . by so doing, you'll keep up-to-the-minute on all new developments and be ready to do an efficient job the moment our industry gets the *green light* . . . Clarostat, for the third time, is the recipient of the Approved Quality Control Rating from the Army Air Forces . . . George S. Ryan named as assistant to vice-president of Westinghouse . . . How about dropping a line to our editors telling them the type of articles you would like to see in SERVICE . . . they would appreciate your suggestions . . . SERVICE will remain a 100% service publication . . . supplying technical material of value to your everyday operations . . . just as soon as home radio receivers are again available, you'll get all circuit data first in SERVICE.

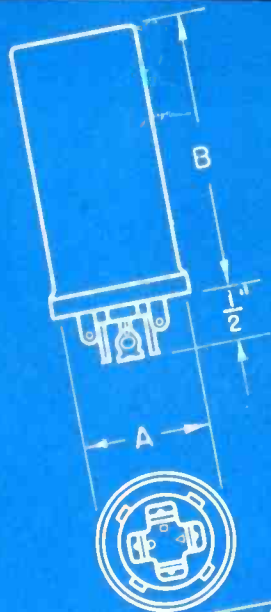
ADVERTISERS IN THIS ISSUE SERVICE INDEX—FEBRUARY, 1945

ADAPTOL CO.	32
Agency—HART LEHMAN, ADVERTISING	
AEROVOX CORPORATION	28
Agency—AUSTIN C. LESCARBOURA & STAFF	
BURLINGAME ASSOCIATES	36
Agency—HART LEHMAN, ADVERTISING	
BURSTEIN-APPLEBEE CO.	30
Agency—FRANK E. WHALEN ADV. CO.	
CENTRALAB	5
Agency—GUSTAV MARX ADV. AGENCY	
CITY RADIO CO.	38
CLAROSTAT MFG. CO., INC.	39
Agency—AUSTIN C. LESCARBOURA & STAFF	
CORNISH WIRE CO.	28
Agency—HART LEHMAN, ADVERTISING	
DEALERS TOOL SUPPLY	38
Agency—BARRONS ADV. CO., INC.	
DRAKE ELECTRIC WORKS, INC.	28
Agency—WILLIAM HOFFMANN & ASSOCIATES	
ELECTRO-VOICE MFG. CO.	29
Agency—SHAPPE-WILKES INC.	
GENERAL CEMENT MFG. CO.	39
Agency—TURNER ADV. AGENCY	
GENERAL ELECTRIC CO.	32
Agency—MAXON, INC.	
THE GENERAL INDUSTRIES CO.	35
Agency—FULLER & SMITH & ROSS, INC.	
THE HALLDORSON CO.	34
Agency—SANDER RODKIN ADV. AGENCY	
HALLICRAFTERS CO.	1
Agency—BURTON BROWNE, ADVERTISING	
HICKOK ELECTRICAL INSTRU. CO.	22
Agency—WHITE ADV. CO.	
JENSEN RADIO MFG. CO.	9
Agency—BURTON BROWNE, ADVERTISING	
McELROY MFG. CORP.	38
Agency—SHAPPE-WILKES INC.	
M. V. MANSFIELD CO.	38
MEISSNER MFG. CO.	6
Agency—GARDNER ADV. CO.	
NATIONAL CARBON CO., INC.	7
Agency—J. M. MATHES, INC.	
NATIONAL ELECTRONIC SUPPLY	36
Agency—LOUIS B. DIDIER	
NATIONAL UNION RADIO CORP.	Back Cover
Agency—HUTCHINS ADV. CO., INC.	
RADIART CORPORATION	34
Agency—KENNETH H. KOLPIEN	
RADIO CORPORATION OF AMERICA	19
Agency—KENYON & ECKHARDT, INC.	
RAYTHEON MFG. CO.	3
Agency—BURTON BROWNE, ADVERTISING	
JOHN F. RIDER PUBLISHER, INC.	31
Agency—LANSFORD F. KING	
SIMPSON ELECTRIC CO.	37
Agency—KREICKER & MEOAN, INC.	
SOLAR CAPACITOR SALES CORP.	Inside Back Cover
Agency—O. S. TYSON & Co., INC.	
SPRAGUE PRODUCTS CO.	17
Agency—THE HARRY P. BRIDGE CO.	
STANDARD TRANSFORMER CORP.	30
Agency—BURNET-KUHN ADV. CO.	
SUPREME INSTRUMENTS CORP.	40
Agency—O'CALLAGHAN ADV. AGENCY, INC.	
SYLVANIA ELECTRIC PRODUCTS INC.	10
Agency—NEWELL-EMMETT CO.	
TECHNICAL DIV. MURRAY HILL BOOKS, INC.	23
Agency—THE HARRY P. BRIDGE CO.	
TRIPLETT ELECTRICAL INSTRU. CO.	4
Agency—WESTERN ADV. AGENCY, INC.	
U. S. TREASURY DEPT.	8
UNITED TRANSFORMER CO.	27
Agency—SHAPPE-WILKES INC.	
UNIVERSAL MICROPHONE CO.	15
Agency—RALPH L. POWER AGENCY	
VACO PRODUCTS CO.	30
Agency—DUANE WANAMAKER—ADVERTISING	
WARD LEONARD ELECTRIC CO.	33
Agency—E. M. FREYSTADT ASSOCIATES	
WEBSTER PRODUCTS	Inside Front Cover
Agency—WILLIAM HOFFMANN & ASSOCIATES	

MEMO TO *Purchasing Dept.*

For postwar, recommend we standardize on Solar's hermetically-sealed, patented special twist-prong base Type DY electrolytic. They're properly protected against moisture.

E.M.



**ENGINEERING
SPECIFY
Solar
DEPARTMENT**

LEADING MANUFACTURERS
EVERYWHERE

PART NO.	SOLAR PART NO.	CAPY MFD.	WKG. VOLTS	DIMENSIONS		DATE
				"A"	"B"	
B50-1	DY-61	20*20	150	1"	2"	1/4/45
B50-2	DY-92	20*20	450	1"	3-3/8"	DWG. No. 51 B50
B50-3	DY-94	10*10	450	1"	2-1/2"	ISSUE
B50-4	DY-132	15*10*20	350-350-25	1"	2-1/2"	
B50-5	DY-141	10*10*20	450-450-25	1"	3"	
				DRAWN	<i>E.O.H.</i>	
				TRACED	<i>M.</i>	
				APPROVED	<i>J.C.</i>	



Prominent engineers consistently show their preference for Solar Capacitors. Solar pledges continued production of superior quality capacitors to merit that preference. Solar Capacitor Sales Corporation, 285 Madison Avenue, New York 17, N. Y.



CAPACITORS &
ELIM-O-STATS



REMEMBER THOSE POPULAR N. U. DEALS?



*After the War
More than Before!*

THE FAMOUS National Union Equipment Plan made it a cinch to get instruments, meters and tools for your shop. No wonder America's radio service dealers went for this plan in a big way—were given 60,000 pieces of the finest test equipment through N. U. deals!

Yes, more N. U. deals will make it easier than ever for you to equip your shop. N. U. will be ready to give you the

most modern instruments and meters for servicing the new radios, radio-phonographs, television receivers and industrial electronic devices. Plan to get your new shop equipment this easy way . . . through your nearby National Union Distributor.

**NATIONAL UNION RADIO
CORPORATION, NEWARK 2, N. J.**

Factories: Newark and Maplewood,
N. J.; Lansdale and Robesonia, Pa.



NATIONAL UNION

RADIO AND ELECTRONIC TUBES

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