

FEBRUARY
1947
35c

RADIO NEWS

Super Converter
7 Magnifying Converter
AC-DC Adapter
4 element Beam
Capacitor
5 T
1x4mc Handy Talker
100
is all plain
100
1x4mc Handy Talker



"WAVEMETERS COVERING AMATEUR FREQUEN

"TESTING"

RM-56-J41366-47
LAURENCE THORSON
DALLAS WIS

RADIO SERVICE TECHNICIANS

use the **BLILEY CCO..**

for

instant channel selection

and frequency accuracy



Ask your Bliley
Distributor for
Bulletin 32

SUPPLIED COMPLETE WITH 7 CRYSTALS,
TUBES AND CONCENTRIC OUTPUT CABLE.

The Bliley CCO (crystal controlled oscillator) is the only test instrument available to radio service technicians that features—

DIRECT CRYSTAL CONTROL

- with instant channel selection of the five most commonly used intermediate frequencies—175 kc, 262 kc, 370 kc, 455 kc, and 465 kc.
- at 200 kc for r-f alignment.
- at 1000 kc for short wave alignment.

Bliley
CRYSTAL CONTROLLED OSCILLATOR

Finger tip adjustment is provided by a three position modulation selector and a five step attenuator, with vernier output from 0 to 15 volts. An external socket accommodates extra crystals that may be needed for special requirements.

There is nothing complicated about the Bliley CCO. Simply connect it to the receiver to be tested and select the frequency desired. The crystals are instantly on frequency as soon as the oscillator is energized. It will save you hours of time, eliminate guess work and increase your prestige as a radio service technician.

The CCO is a "techniquality" product of the same engineering skill and craftsmanship that have kept Bliley Crystals foremost in dependability in the frequency control field for over 15 years.

BLILEY ELECTRIC COMPANY • UNION STATION BUILDING, ERIE, PENNSYLVANIA

I WILL SEND YOU
BOTH FREE

NEW 64 PAGE BOOK

64-page illustrated book describes many fascinating jobs Radio, Television, Electronics offer, shows big kits of Radio parts I send you, tells how I give you practical experience building real Radio circuits at home in spare time, how you make extra money fixing Radios while still learning; contains letters from many men I trained, telling what they are doing, earning. FREE. Mail Coupon below!

SAMPLE RADIO LESSON

I will also send you my Lesson, "Getting Acquainted With Receiver Servicing," FREE, to show you how practical it is to learn Radio at home in spare time. It's a valuable Lesson. Study it—keep it—use it—without obligation! Tells how "Superhet" Circuits work, gives hints on Receiver Servicing, Locating Defects, Repair of Loudspeaker, I.F. Transformer, etc. 31 illustrations. Mail Coupon below!



SEE FOR YOURSELF HOW I TRAIN YOU AT HOME TO BE A RADIO TECHNICIAN

Do you want a good-pay job in Radio—or your own money-making Radio Shop? Mail Coupon for a FREE Sample Lesson and my FREE 64-page book, "How to Be a Success in RADIO—Television, Electronics." See how N.R.I. gives you practical Radio experience at home—building, testing, repairing Radios with **BIG KITS OF PARTS** I send!

Many Beginners Soon Make Good Extra Money in Spare Time While Learning

The day you enroll I start sending **EXTRA MONEY JOB SHEETS**. You **LEARN** Radio principles from my easy-to-grasp, illustrated lessons—**PRACTICE** what you learn with parts I send—**USE** your knowledge to make **EXTRA** money fixing neighbors' Radios in spare time while still learning! From here it's a short step to your own full-time Radio Shop or a good Radio job!

Future for Trained Men is Bright in Radio, Television, Electronics

It's probably easier to get started in Radio now than ever before because the Radio Repair business is booming. Trained Radio Technicians also find profitable opportunities in Police, Aviation, Marine Radio, Broadcasting, Radio Manufacturing, Public Address work. Think of even greater opportunities as Television and Electronics become available to the public! Send for free books now!

Find Out What N.R.I. Can Do for You

Mail Coupon for Sample Lesson and my 64-page book. Read the details about my Course. Read letters from men I trained, telling what they are doing, earning. See how quickly, easily you can get started. No obligation! Just **MAIL COUPON NOW** in an envelope or paste it on a penny postal. **J. E. SMITH, President, Dept. 7BR National Radio Institute, Pioneer Home Study Radio School, Washington 9, D. C.** Our 33rd Year of Training Men for Success in Radio.

VETERANS

You can get this training right in your own home under G. I. Bill. Mail coupon.

I TRAINED THESE MEN

Averages Better Than \$3,000 A Year

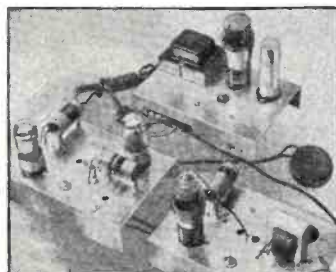
"I now have a shop and am doing fine. I average better than \$3,000 per year, and certainly give NRI much of the credit." — **RAYMOND F. DAVIS**, Ashburn, Georgia.



Made \$612 In 12 Mos. Spare Time

"Soon after I finished my experimental kits lessons I tackled my first Radio service job. The neighbors were very cooperative. I soon had all the repair jobs I could handle in spare time. I have made \$612 in the past 12 months in spare time." — **J. W. CLARK**, Wilmington, North Carolina.

Build Radio Circuits Like These With Kits I Send



Good for Both FREE

MR. J. E. SMITH, President, Dept. 7BR National Radio Institute, Washington 9, D. C. Mail me FREE, without obligation, Sample Lesson and 64-page book about how to win success in Radio—and Television, Electronics. (No salesman will call. Please write plainly.)

Age.....
 Name.....
 Address.....
 City..... State.....
 (Please include Post Office zone number)

Approved for Training under GI Bill

Chairman of the Board and Publisher
WILLIAM B. ZIFF

President
B. G. DAVIS

Secretary-Treasurer
ARTHUR T. PULLEN

Vice-Presidents

GEORGE BERNER
Advertising and Sales Director

MICHAEL H. FROELICH
Editorial Director

H. J. MORGANROTH
Production Director

H. G. STRONG
Circulation Director

Art Director
HERMAN R. BOLLIN



THE COVER: Final assembly and testing of wavemeters to be used in conjunction with the proper adjustment and operation of ham transmitters. The Bud Radio, Inc. plant at Cleveland is the scene of this operation.

EDITORIAL

OLIVER READ, W9ETI
Editor

WM. A. STOCKLIN
Asst. to the Editor

H. S. RENNE, Ex. W8PTS
Technical Editor

RAY FRANK, W9JU
Amateur Radio Editor

FRED HAMLIN
Washington Editor

PAUL H. WENDEL
Eastern Editor

GAITHER LITRELL
Western Editor

P. B. HOEFER
Assistant Editor

ARTHUR E. HAUG
WALTER STEINHARD
Staff Photographers

R. S. KUPJACK
Staff Artist

ADVERTISING

Advertising Manager
L. L. OSTEN

Midwestern Advertising Manager
JOHN A. RONAN, JR.

Manager, Eastern Division
CHARLES R. TIGHE

Manager, Western Division
WILLIAM L. PINNEY

BRANCH OFFICES

NEW YORK (1)
Empire State Bldg., W17-0400

LOS ANGELES (14)
815 S. Hill St., TUCKER 9213

WASHINGTON (4)
International Bldg., EXecutive 2502

TORONTO
21 King Street, East

LONDON
Ziff Davis, Ltd., Gramplans Bldg,
Western Gate, London, W.6

RADIO NEWS

First in radio

Average Paid Circulation over 130,000

Reg. U. S. Pat. Off.

FEBRUARY, 1947

FOR THE SERVICEMAN-DEALER

Retailing Basics That Pay Off.....	Dr. Louis Bader	42
Transmission Line Systems for FM and Television Home Receivers	C. Spear	44
Service Associations Can Be Successful.....	Dave Krantz	48
Crystal Diode Reduces Probe Size.....	Albert Bein	52
Consumers Are Sore.....	G. E. DeNike	53
The RN Circuit Page.....		70

FOR THE AMATEUR

Superregenerative Frequency Converter.....	P. V. Trice, W3QHS and M. Barat, Jr., W3KIL	39
An Inexpensive 4-Element Array.....	Vincent C. Hale	47
144 mc. Handie-Talkie.....	C. T. Haist, Jr., W6TWL	54
Simple 10-Meter Converter.....	C. W. Roeschke, W9PFB/5	56
A 5-Tube Ham Super.....	C. V. Hays, W6RTP	62
Simple Code Practice Oscillator.....	Rufus P. Turner, W1AY	88

OF GENERAL INTEREST

Radar on the Great Lakes.....	Norman A. Schorr	35
A.C.-D.C. Audio Amplifier.....	George Eannarino	40
Capacity Operated Relays.....	R. G. Rowe, W2FMF	50
Television Takes to the Air.....	Jordan McQuay	57
Distortion Analyzer.....	J. T. Goode	60
A New Synchronous Motor.....	H. H. Everett	84

DEPARTMENTS

For the Record.....	The Editor	8	Within the Industry.....	126
Spot Radio News.....	Fred Hamlin	18	Technical Books	130
Short-Wave.....	K. R. Boord	64	Letters from Our Readers.....	150
What's New in Radio.....		72	Manufacturers' Literature	160



COPYRIGHT 1947
ZIFF-DAVIS PUBLISHING COMPANY
Editorial Offices, 185 North Wabash Ave., Chicago 1, Ill.
Member of the Audit Bureau of Circulations
VOLUME 37 • NUMBER 2

RADIO NEWS is published monthly by the Ziff-Davis Publishing Company, 185 N. Wabash Ave., Chicago 1 Ill. Subscription Rates: in U.S. and Canada \$4.00 (12 issues), single copies 35 cents; in Mexico, South and Central America, and U. S. Possessions, \$4.00 (12 issues); in British Empire, \$5.00 (12 issues)—all other foreign countries \$5.00 (12 issues). Subscribers should allow at least 2 weeks for change of address. All communications about subscriptions should be addressed to: Director of Circulation, 185 N. Wabash Ave., Chicago 1, Ill. Entered as second class matter March 9, 1938, at the Post Office, Chicago, Illinois, under the Act of March 3, 1879. Entered as second class matter at the Post Office Dept., Ottawa, Canada. Contributors should retain a copy of contributions and include return postage. Contributions will be handled with reasonable care but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever revisions and by-line changes that are necessary. Payment made at our current rates, covers all authors', contributors', or contestants' rights, title, and interest in and to accepted material, including photos and drawings.

hallicrafters PRESENTS THE

SX-42

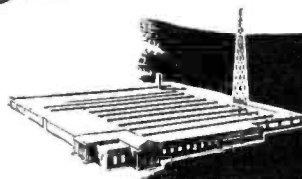
Another first!
Greatest continuous frequency coverage of any communications receiver — from 540 kc to 110 Mc

This is the long-awaited Hallicrafters SX-42, a truly great communications receiver. The tremendous frequency range of the SX-42, *greater than ever before available in a receiver of this type*, is made possible by the development of a new "split-stator" tuning system and the use of dual intermediate frequency transformers. Packed with advance features that every ham and every other radio enthusiast desires, the SX-42 clearly lives up to the Hallicrafters ideal of "the radio man's radio."

From now on watch Hallicrafters — the name that's remembered by the veteran, preferred by the radio amateur. See your distributor for demonstration of the SX-42 and for colorful literature describing this great set in complete technical detail.



Because of the precise and thorough engineering that must be done on the SX-42 and because the parts supply has not been continuous, top production peaks have not yet been reached. In the immediate future deliveries will necessarily run behind the demand, but the SX-42 is definitely worth waiting for.



hallicrafters RADIO

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

Sole Hallicrafters Representatives in Canada:
Rogers Majestic Limited, Toronto-Montreal

BUILDERS OF

Skyfone

AVIATION RADIOTELEPHONE

SALES CHAMPIONS



The Radio of
TO-MORROW ... TO-DAY!

by **FADA**



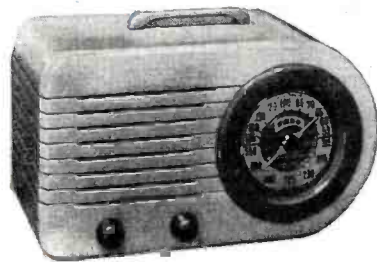
MODEL P82

Tri-power portable Superheterodyne with Hi-Gain tuned RF stage in rich two-tone simulated leather covered wood cabinet. 5 tubes plus rectifier tube.



MODEL 602

New Superheterodyne AC Table Model Radio Phonograph Combination with Automatic Record Changer in a Cabinet of Beautiful Mahogany Veneers.

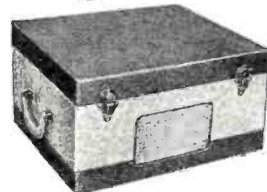


MODEL 1000

AC-DC Superheterodyne in beautiful gem-like "Fado-Lucent" cabinets. Five Tubes plus Rectifier Tube.



FADA 5-tubes—plus-rectifier-tube models are equipped with the new FADA "Sensitive-Tone" ... assuring greater sensitivity and clearer reception.



MODEL 633

New Portable Electric Phonograph in smart Deluxe two-tone luggage case. Plays 10 or 12 inch records with the lid closed. Incorporates advanced engineering developments.

YOU CAN ALWAYS DEPEND ON

FADA

Radio

Famous Since Broadcasting Began!

FADA RADIO AND ELECTRIC COMPANY, INC., LONG ISLAND CITY, N. Y.

NOW SPRAYBERRY RADIO TRAINING

GIVES YOU

8 BIG KITS OF RADIO EQUIPMENT

WITH A COMPLETE 6 TUBE SUPER-HETERODYNE RECEIVER



YOU LEARN RADIO SERVICING
THROUGH INTENSIVE "SHOP-BENCH" PRACTICE

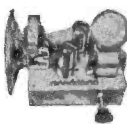
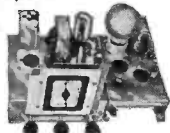
YOU DO EXPERIMENTS, CONSTRUCTION, TROUBLE-SHOOTING

I'll show you how to perform over 175 instructive Experiments—how to build countless Radio Circuits. You'll learn a new, fast way to test Radio Sets without mfg. Equipment.

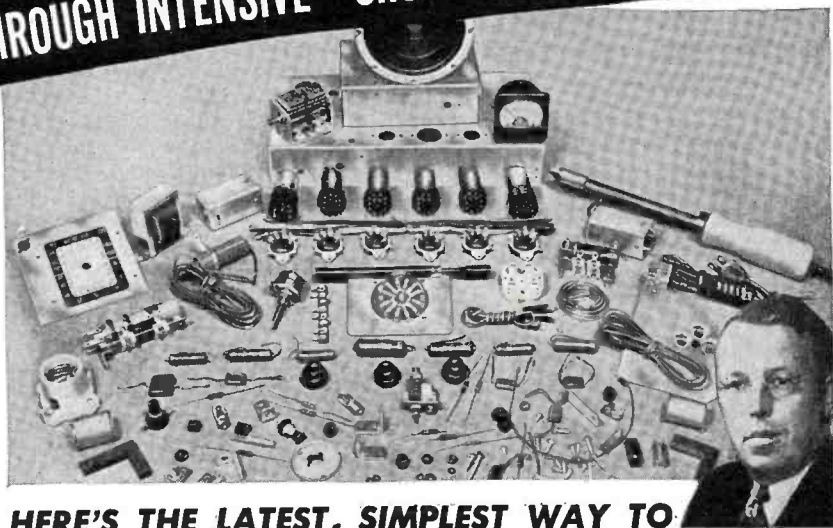


I give you a fine, moving-coil type Meter Instrument on Jewel Bearings—with parts for a complete Analyzer Circuit Continuity Tester. You learn how to check and correct Receiver defects with professional accuracy and speed.

You'll get valuable experience and practice building this Signal Generator and multi-purpose Tester. Makes a breeze out of fixing Radios and you don't have to spend money on outside, ready-made equipment.



Soldering, wiring, connecting Radio parts . . . building circuits with your own hands—you can't beat this method of learning. When you construct this Rectifier and Filter, Resistor and Condenser Tester, etc., you get a really practical slant on Radio that leads to a money-making future.



HERE'S THE LATEST, SIMPLEST WAY TO TRAIN at HOME for a GOOD LIVING in RADIO-ELECTRONICS & TELEVISION

I train your mind by putting you to work with your hands on a big 6-Tube Superheterodyne Receiver. And, believe me, when you get busy with real Radio Parts—8 big Kits of them—you really LEARN Radio and learn it RIGHT! You get the practical stuff you need to be useful in Radio, and that's what it takes to make money. You don't have to worry about what to do with these 8 Kits of

with real "Shop" practice, makes every subject plain and easy to understand and remember.

A BUSINESS OF YOUR OWN . . . OR A GOOD RADIO JOB

Soon after you begin Sprayberry Training, I'll send you my sensational BUSINESS BUILDERS. You'll find out how to get and do neighborhood Radio repair jobs for nice profits and rich experience while learning. This sort of work can easily pave the way for a Radio Service business of your own. But with Sprayberry Training, you're not limited. You can swing into any one of the swiftly expanding branches of Radio-Electronics INCLUDING Radio, Television, FM, Radar, Industrial Electronics. Be wise! Decide now to become a fully qualified RADJO-ELECTRONICIAN. Get full details about my Training at once! Mail coupon below for my 2 big FREE Books.

SEND FOR THESE FREE BOOKS



"How to Read Radio Diagrams and Symbols"

Here's a valuable and wonderfully complete new book which explains in simple English how to read and understand any Radio Set Diagram. Includes translation of all Radio symbols. Send for this volume at once! It's free! Along with it, I will send you another Big Free book describing in detail my Radio-Electronic Training.

SPRAYBERRY ACADEMY OF RADIO

F. L. Sprayberry, President, Room 2527 Pueblo, Colorado

Please rush my FREE copies of "How to MAKE MONEY in RADIO, ELECTRONICS and TELEVISION," and "HOW to READ RADIO DIAGRAMS and SYMBOLS."

Name Age

Address

City State

(Mail in envelope or paste on penny postcard)

MAIL COUPON TODAY!

February, 1947



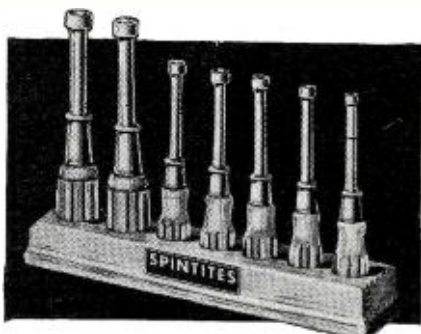
PARTNERS IN TIME!

Today, time saved means more than minutes—it means markets. There's no surer way to speed production than by the use of time-saving tools. That Spintite wrenches achieve this, is proved by their acceptance on the assembly lines of the radio industry.

A few simple twists of the screwdriver type Spintite speed parts into place with a minimum of waste motion.

Ranging in size from 3/16" to 5/8", Spintites are available to fit square, hex, or knurled nuts.

When time is of the essence, there's no substitute for Spintites.



T-73 Set, has 7 sizes of hex heads. Shock-proof handles, and cold forged sockets assure safety and strength.



STEVENS • WALDEN
INCORPORATED
Worcester • Massachusetts

8

For the RECORD.

BY THE EDITOR

THE recent survey among our readers has now been completed. From the results we have been able to determine individual preferences for editorial material. The response was most gratifying. In fact, there were several thousand returns on these questionnaires, filled out very completely and containing many concrete and worthwhile ideas for articles, new developments, servicing instructions and amateur gear. So enthusiastic was the response that we have undertaken a compilation of the suggestions and were able to select many outstanding requests for early publication.

While it is impossible to completely satisfy each and every reader every month, we do strive for an editorial balance which will fulfill the needs of the majority. The tremendous growth of RADIO NEWS confirms our belief in maintaining a well-balanced format.

Many of you made the suggestion that every article published should be completed on one or two pages without having to dig into the back of the book for what we call "runback." Unfortunately, this is not mechanically workable in most cases. If each ad were a full page, this could be done. At any rate, we are attempting to streamline our constructional articles so that whenever possible they will be completed without any runback. This, of course, will make it far easier for the reader to follow the text and to immediately refer to the accompanying diagrams.

Hundreds of our salesman-dealers are becoming more and more concerned with the future sales of radios, television sets, parts and accessories. Accordingly, we are now preparing a new series of articles which will present, in simplified form, the basic formulas that have been successfully worked out in selling that type of merchandise.

We have also found that thousands of readers are vitally interested in simplified "how to make it" articles. A new department therefore will be set up to cover this interest and the staff will build and describe such units for those who are intrigued with simple gadgets and electronic equipment.

An ever-growing interest is being shown by the amateur for u.h.f. transmitter design and technique. For the most part, these "hams" have had previous experience on the 160 meter band. They are interested primarily in local rag chews and are not too much concerned with a DX contact.

New and unique applications for the miniature tubes have been requested by our readers. At this writing, many

types are not available but when they are we'll print plenty of articles on ultra-compact receiving and transmitting equipment making use of these "tiny bottles."

Other helpful suggestions were made—too numerous to mention. I should like to express my thanks to all of you for your fine cooperation in helping to design your radio magazine along the lines that will be of the greatest interest and assistance to you. We are planning to send such questionnaires periodically in order to keep pace with your interests. With twice the circulation of any other radio publication, the task of satisfying everyone becomes a real problem. This is particularly true when we consider that radio to us is no longer a mere entertainment media. Our profession and hobby has branched out into a very large electronic group. Accordingly, there are those who have found their niche in some highly specialized branch of radio-electronics who require an entirely different type of material than those of us who have remained in one particular branch of radio for some time.

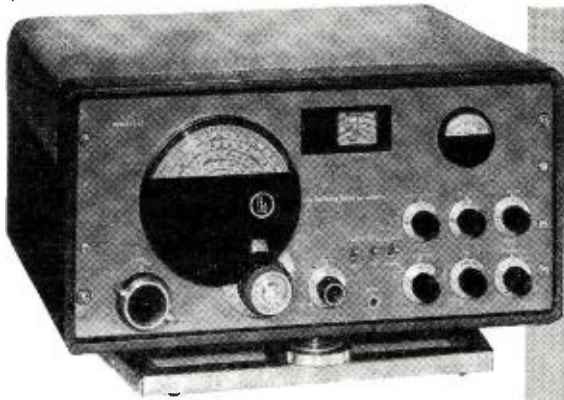
The Citizens' Radiocommunication band is a good example of what to expect in the way of new services and developments. Since keen interest has already been shown in this service, many radio men have already begun to lay the ground work for future sales and service of two-way units. Let's not overlook the ever-growing interest in television. You can sell, in advance, by telling your customers about TV. Make it known that you will be able to supply them with sets and to install and maintain them when television programs are available in your town.

Yes, we are indeed in a new era of radio. The annual Radio Parts and Electronic Equipment Shows, Inc. is fully cognizant of the desirability of showing the myriad of new products to the radio serviceman, the amateur and even the public at large. A special Open House Day has been inaugurated in connection with the Show to be held in Chicago next May which will enable many radio-minded men and women to get a preview of things to come. We think it is a splendid idea and will do much to gain prestige for the serviceman and amateur. We'll see many of you there in person and we want you to make yourselves known.

We will again publish the RADIO NEWS DAILY at the Show this year as a service to the radio industry. Be sure to get your complimentary copy.

O.R.

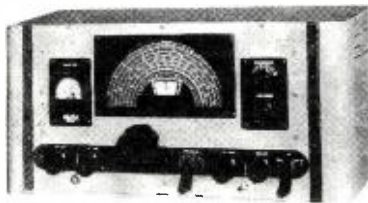
RADIO NEWS



NEW!

HALLCRAFTERS SX-42

Here's the NEW SX-42—the receiver that sets a new standard in radio performance. Covers everything: Frequency range of 540 KC. to 110 MC. brings you high-fidelity broadcast reception—world-wide Short-wave coverage—PLUS true high-fidelity FM broadcast reception (all FM frequencies), and hi-fi phono reproduction. The new SX-42 is brilliantly designed to bring you more features, more operating thrills than you've ever thought possible. Wide-vision no-glare dials, AM-FM signal level meter, six-position selectivity control, dual IF system, separate sensitivity and volume control, NEW SIMPLIFIED controls for family use. Designed for top-flight reception—in the home, or for Amateur and Commercial communication work.
Net, less Speaker..... \$275.00



THE RME 45

The famous RME 45 Receiver delivers peak reception on all frequencies—550 to 34,000 KC. Features full-vision calibrated dial using a single control for two-speed tuning. Includes five Amateur bands with ample band-spread. Has DB-calibrated signal level meter; 5-step variable crystal filter; Automatic Noise Suppression; stable, variable-pitch beat oscillator, and a host of other features. Housed in handsome streamlined metal cabinet with matching speaker.
Net, with Speaker..... \$198.70

Other Communications Receivers

Hallcrafters S-38.....	\$47.50	RME-84.....	\$98.70
Hallcrafters S-40A.....	89.50	RME VHF-152 Converter.....	86.60
Hallcrafters S-41G.....	36.75	RME DB-20 Preselector.....	68.20
National NC-46.....	97.50	National HRO.....	274.35
NC-46 Speaker.....	9.90	Hammarlund SPC-400X.....	342.00

Net F. O. B. Chicago. Prices subject to possible change.

Order Your
Communications Receiver
from ALLIED!
IMMEDIATE DELIVERY

on most models

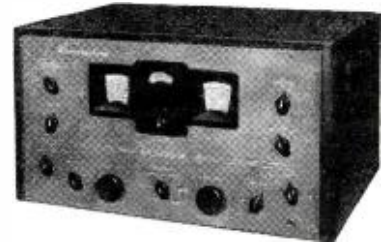
Time Payments

Trade-Ins Accepted



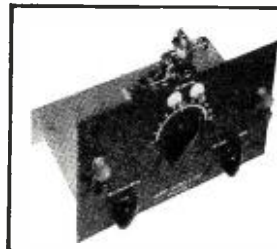
NATIONAL NC-2-40D

One of National's top receivers. Covers 490 KC. to 30 MC. range in 6 tuning bands. Has definite, accurate calibration for all bands. Features efficient single-dial control. Famous for its stable high frequency circuits. Frequency drift is reduced to a negligible value by temperature compensation. Has automatic band-in-use indicator. Wide-range adjustable series-valve-noise limiter. Flexible crystal filter. Special r.f. coupling circuits maintain full sensitivity.
Net, less Speaker..... \$225.00
Speaker in matching cabinet, Net.. \$16.44



HAMMARLUND HQ-129-X

Designed to meet the most critical demand of professional operators. Full range, .54 to 31 MC. accurately calibrated. Has 4 calibrated Ham bands and one arbitrary scale. Variable selectivity crystal filter. Low-drift beat oscillator for code and locating stations. Antenna compensator. Voltage regulation. Automatic noise limiter. Compensated oscillator to reduce drift during warm-up. Earphone jack. Three i.f. amplifier stages. Two audio stages. Speaker supplied in matching metal cabinet.
Net, with Speaker..... \$173.25



SPECIAL! NEW 2-METER TRANSCEIVER KIT

For the new 2-meter band! Uses 6N4 as mod.-osc. in transmit position and as super-regen. det. in receive position; 7C5 as mod. in transmitting, and as power audio amp. in receiving. Supplies current for single button carbon mike; has output transformer for coupling to speaker or headphones. Requires 250 v. at 75 ma., 6.3 v. at .65 amp. for power. Kit when completed measures 6" x 5" x 9". Includes all necessary parts and tubes (less mike, speaker and power supply). No. 83-220. NET..... \$18.95
Power Supply Kit. Includes all parts necessary to build power supply for transceiver. No 83-371. NET \$10.25

FREE! ALLIED'S Latest Catalog


ALLIED RADIO CORP., D. L. Warner, W91BC
 833 W. Jackson Blvd., Dept. I-BB-7
 Chicago 7, Illinois

- Enter order for.....Model.....
- Enclosed \$..... Full Payment Part Payment (Balance C.O.D.)
- Send full information on Communication Receivers and Time Payment Plan, without obligation;
- Send FREE 1946 ALLIED Catalog.

Name.....
 Address.....
 City.....Zone.....State.....

ALLIED RADIO
Everything in Radio and Electronics

PUTTING ELECTRONICS TO WORK
with
Government Owned Surplus



To help you incorporate the many advantages of electronics in your business, the War Assets Administration is making available its enormous inventory of tubes and equipment now.

Qualified distributors all over the country have been appointed by WAA to represent it. In every field where electronic application has proved its worth, these distributors maintain inventories and have the technical "know-how" to service your needs.

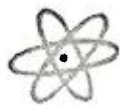
Get in touch with your nearest distributor and see how government-owned war surplus can help you—electronically. Or—if it is more convenient—write to

ELECTRONICS DIVISION
OFFICE OF AIRCRAFT DISPOSAL

WAR ASSETS ADMINISTRATION

425 Second St., N.W.

Washington 25, D. C.



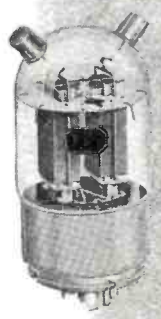
Millions and millions of electronic tubes are at your disposal. Pictured are some of the types which are available to you.



RECTIFYING
(NO. 866A)



CATHODE RAY
(NO. 38P1)



TRANSMITTING
(NO. 815)

VOLTAGE REGULATOR
(NO. VR150)



RECEIVING
(NO. 65K7)

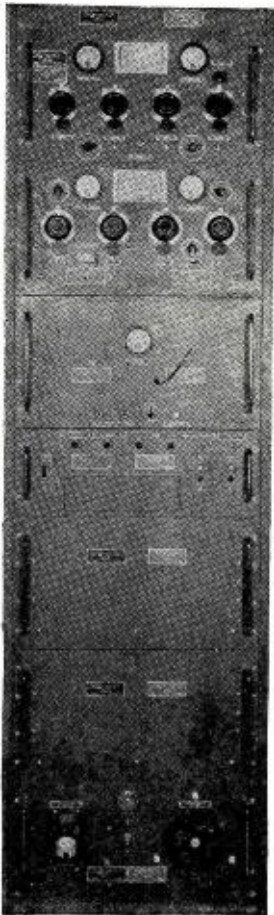


RECEIVING
(NO. 6L6)

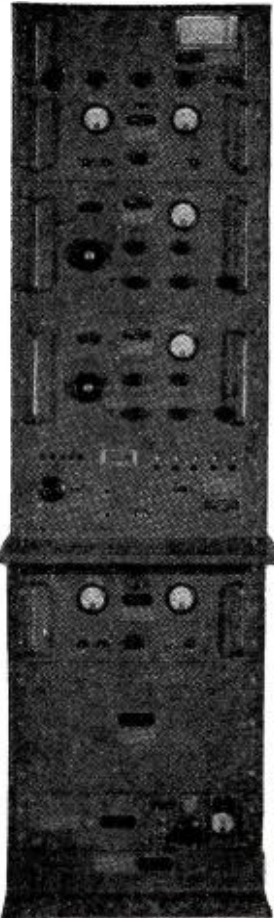
tubes! tubes! tubes!

"NO ELECTRONIC DEVICE IS BETTER THAN ITS TUBE"

880



Transmitter



Receiver

MODERN COMMUNICATION and PRODUCTION

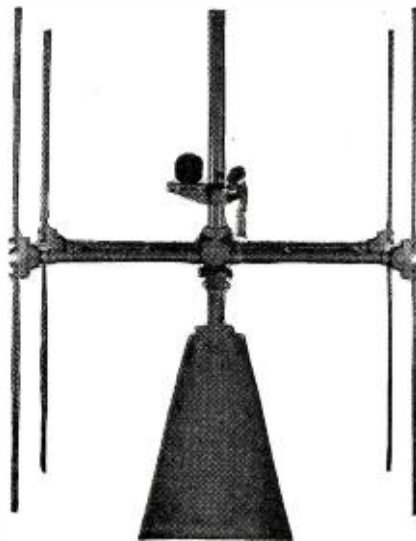
depend on

Electronics

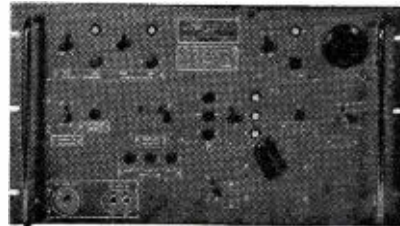
Today—virtually all methods of high-speed communication use electronic tubes. In the industrial field, heating, welding and various methods of control are being done better and faster because of electronics. From big broadcasting stations to tiny hearing aids—from induction heating to voltage regulation—the science of electronics is playing a major role in industry.



Microphone



Matching Stub and Antennae



Control Unit



Headset

these Authorized Distributors will serve you:

Listed here are the names and locations of WAA appointed distributors. Not all of them will have complete stocks but it will pay you to consult them on your electronic problems.

Automatic Radio Mfg. Co., Inc.
120 Brookline Avenue
Boston 15, Massachusetts

Communication Measurements Laboratory
120 Greenwich Street
New York 6, New York

Tobe Deutschmann Corporation
Canton, Massachusetts

Electronic Corporation of America
353 West 48th Street
New York 19, New York

Electro-Voice, Inc.
Buchanan, Michigan

Emerson Radio & Phonograph Corporation
123 Duane Street
New York 7, New York

Essex Wire Corporation
1601 Wall Street
Ft. Wayne 6, Indiana

General Electric Company
Building 267-1 River Road
Schenectady 5, New York

Hommarlund Mfg. Company, Inc.
460 West 34th Street
New York 1, New York

Hoffman Radio Corporation
3741 South Hill Street
Los Angeles 7, California

Hytron Radio & Electronics Corporation
76 LaFayette Street
Salem, Massachusetts

E. F. Johnson Company
206 Second Avenue S. W.
Waseca, Minnesota

Newark Electric Co., Inc.
242 West 55th Street
New York 19, N. Y.

Majestic Radio & Television Corporation
125 West Ohio Street
Chicago 10, Illinois

Raytheon Manufacturing Company
60 East 42nd Street
New York 17, New York

Smith-Meeker Engineering Company
125 Barclay Street
New York 7, New York

Sylvania Electric Products, Inc.
Emporium, Pennsylvania

Technical Apparatus Company
165 Washington Street
Boston 8, Massachusetts

Tung-Sol Lamp Works, Inc.
95 Eighth Avenue
Newark 4, New Jersey

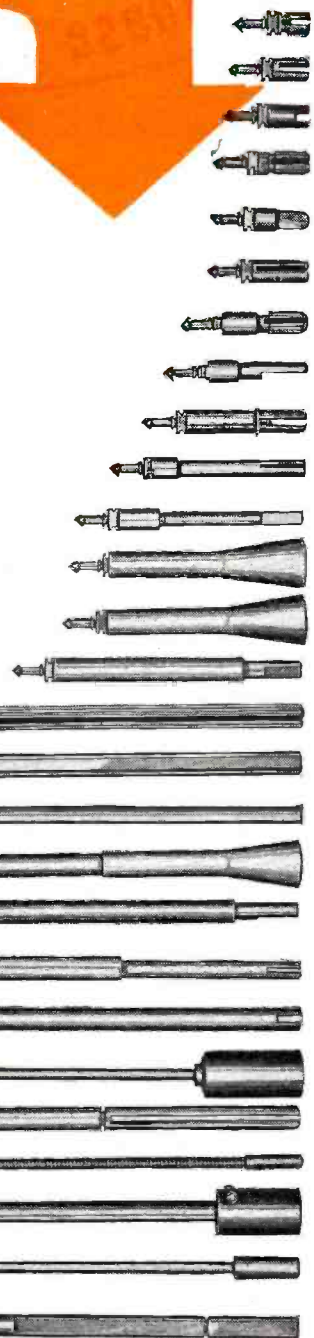
American Condenser Co.
4410 Ravenswood Avenue
Chicago 11, Illinois

WAR ASSETS ADMINISTRATION

**A UNITED STATES GOVERNMENT AGENCY
FOR THE DISPOSAL OF SURPLUS PROPERTY**

880

Mallory Offers 12 Clutch Type Controls for Use in Auto Receivers



MALLORY offers the widest range of resistance values in clutch type controls to fit every need. Four different values are available in the Universal Midget line (100M ohms, 250M ohms, 500M ohms, 1 megohm), and eight values in popular combinations of overall and tap resistances in our Tapped Midget line.

Add these to the Plug-In Shafts you see at the right, and you can replace original controls in any auto set you name—not merely replace them but *duplicate them mechanically and electrically*. Get the complete story from your Mallory distributor.

You Expect More . . .
and Get More . . .
from Mallory

**INSIST ON
MALLORY—THE
COMPLETE
CONTROL
LINE**

NO WOBBLE—this ring prevents it!



All Mallory Plug-In Shafts are made with a small ring as shown above. That's why they can't wobble or work loose—why they fit as securely as a fixed shaft.

P. R. MALLORY & CO., Inc.
MALLORY

VIBRATORS . . . VIBRAPACKS* . . . CAPACITORS
. . . VOLUME CONTROLS . . . SWITCHES . . . RESISTORS
FILTERS . . . RECTIFIERS . . . POWER SUPPLIES.

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SUPERIOR IS AT YOUR SERVICE

with a **COMPLETE LINE** of **TEST INSTRUMENTS**



IMMEDIATE SHIPMENT

Please place your order with your regular radio parts jobber. If your jobber does not handle our line kindly write for a list of jobbers in your state who do distribute our instruments or send your order directly to us.



Now you can **SEE** and **HEAR**

The signal with the new **CA-12 SIGNAL TRACER**

Always ready for instant use it takes less than five seconds to begin using this versatile unit. No maze of special cables—the Model CA-12 uses only one connecting cable. No line cord—the CA-12 operates on self-contained batteries. No tuning controls of any kind are used in this model.



FEATURES:

- Comparative intensity of the signal is read directly on the meter—Quality of the signal is heard in the speaker.
- Simple to operate—only one connecting cable—no tuning controls.
- Highly sensitive—uses an improved vacuum-tube voltmeter circuit.
- Tube and resistor capacity network are built into the detector probe.
- Built-in high gain amplifier—Alnico V. speaker.
- Completely portable—weight 8 pounds—measures 5 1/2" x 6 1/2" x 9".

The Model CA-12 comes complete with Detector Probe, test leads, self-contained batteries and instructions. Comes housed in heavy gauge crystalline cabinet with beautiful two tone etched front panel. **NET PRICE \$3485**



The New Model **670 SUPER METER**
A Combination VOLT-OHM MILLIAMMETER plus CAPACITY REACTANCE, INDUCTANCE and DECIBEL MEASUREMENTS.

SPECIFICATIONS:

D.C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500 Volts.
A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts.
OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts.

D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5 Amperes.
RESISTANCE: 0 to 500/100,000 ohms 0 to 10 Megohms.
CAPACITY: .001 to .2 Mfd. .1 to 4 Mfd. (quality test for electrolytics)
REACTANCE: 700 to 27,000 Ohms 13,000 Ohms to 3 Megohms.
INDUCTANCE: 1.75 to 70 Henries, 35 to 8,000 Henries.
DECIBELS: -10 to +18, +10 to +38, +30 to +58.

The Model 670 comes housed in a rugged, crackle-finished steel cabinet complete with test leads and operating instructions. Size 5 1/2" x 7 1/2" x 3". **NET \$2840**

The New Model **650 SIGNAL GENERATOR**

Ranges: 100 Kilocycles to 35 Megacycles on Fundamentals; 25 Megacycles to 105 Megacycles on Harmonics.

- RF obtainable separately or modulated by the Audio Frequency.
 - Audio Modulating Frequency—400 cycles pure sine wave—less than 2% distortion.
 - Attenuation—3-step ladder type of attenuator (T pad).
 - Uses a Hartley Excited Oscillator with a Buffer Amplifier.
 - Tubes: 6J5 as R.F. Oscillator; 6SA7 as modulated Buffer and Mixer; 6SL7 as audio oscillator and rectifier.
- Complete with coaxial cable, leads and instructions. **NET \$4875**



The New Model **450 TUBE TESTER**

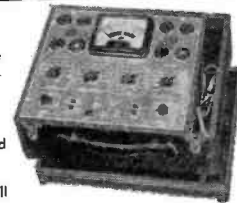
Speedy operation—assured by newly designed rotary selector switch which replaces the usual snap, toggle, or lever action switches.

- Tests all tubes up to 117 volts.
- Tests shorts and leakages up to 3 Megohms in all tubes.
- Tests both plates in rectifiers.
- New type line voltage adjuster.
- Tests individual sections such as diodes, triodes, pentodes, etc. in multi-purpose tubes.
- Noise-Test—detects microphonic tubes or noise due to faulty elements and loose internal connections.
- Uses a 4 1/2" square rugged meter.
- Works on 90 to 125 volts 60 cycles A.C.

EXTRA SERVICE—May be used as an extremely sensitive condenser Leakage Checker. A relaxation type oscillator incorporated in this model will detect leakages even when the frequency is one per minute. **\$3950**

The New Model **600 SET TESTER**

A NEW COMBINATION TUBE TESTER AND MULTI-METER. A complete testing laboratory all in one unit. Test tubes. Reads A.C. Volts, D.C. Volts, D.C. Currents, Resistances and Decibels.



TUBE TESTER SPECIFICATIONS:

- Speedy operation—assured by newly designed rotary selector switch.
- Tests all tubes up to 117 Volts.
- Tests shorts and leakages up to 3 Megohms in all tubes.
- Tests leakages and shorts of any one element against all elements in all tubes.
- Tests both plates in rectifiers.
- Tests individual sections such as diodes, triodes, pentodes, etc., in multi-purpose tubes.
- New type line voltage adjuster.

MULTI-METER SPECIFICATIONS:

D.C. VOLTS: (At 1,000 Ohms Per Volt) 0 to 7.5/15/75/150/750/1,500 Volts.
A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts.
D.C. CURRENT: 0 to 1.5/15/150 Ma., 0 to 1.5 Amperes.
RESISTANCE: 0 to 2,000/20,000/200,000 Ohms, 0 to 20 Megohms.
DECIBELS: (Based on zero decibels equals .006 Watts into a 500-Ohm line.) -10 to +18 D.B., +10 to +38 D.B., +30 to +58 D.B. **\$6250**

The New Model **400 ELECTRONIC MULTI-METER**

A combination vacuum-tube voltmeter and volt-ohm milliammeter plus capacity, inductance, reactance, and decibel measurements.

SPECIFICATIONS:

D.C. V.T.V.M. VOLTS: (At 11 Megohms Input Resistance.) 0 to 3/15/30/75/150/300/750/1500/3000 Volts.
D.C. VOLTS: (At 1,000 Ohms Per Volt.) 0 to 3/15/30/75/150/300/750/1500/3000 Volts.
A.C. VOLTS: (At 1,000 Ohms Per Volt.) 0 to 3/15/30/75/150/300/750/1500/3000 Volts.
D.C. CURRENT: 0 to 3/15/30/75/150/300/750 Ma., 0 to 3/15 Amperes.
RESISTANCE: 0 to 1,000/10,000/100,000 Ohms; 0 to 1/10/1,000 Megohms.
CAPACITY: (In MFD.) .0005—2, .05—20, 5—200.
REACTANCE: 10 to 5M (Ohms), 100—50M (Ohms), .01—5 (Megohms).
INDUCTANCE: (In Henries) .035-14, .35-140, 35-14,000.
DECIBELS: -10 to +18, +10 to +38, +30 to +58. **NET \$5250**



SUPERIOR INSTRUMENTS CO.

Dept. RN 227 FULTON ST., NEW YORK 7, N. Y.



MODEL 4706

The Regent

Post war is a term that can be applied, honestly and proudly, to this 1947 Air King model. Beauty and good taste mark the design and finish of the cabinet. Appealing lines, artistic proportions, and the contrasting dial all contribute to the Regent's visual appeal. When you first see the Regent, you like it instinctively. When you hear it you know your first impression was right.

*You—and your customers—
will appreciate these keen-value features*

Precision, die-cut antenna for maximum signal . . . Modern illuminated, white-on-black airplane tuning dial gives maximum readability, and forms artistic design element of the set . . . Loud-speaker of Alnico No. 5 alloy gives exceptional

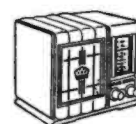
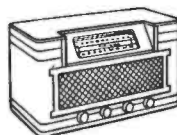
volume without tone distortion . . . Beam Power Pentode Audio System brings new tone and definition to familiar programs. The Regent is a 6 tube Superheterodyne (including rectifier). Operates on AC or DC, and is available in Ivory (illustrated above) and Walnut Plastic Cabinets.



The Royalty of Radio Since 1920

AIR KING RADIO

Division of HYTRON RADIO & ELECTRONICS CORPORATION, Brooklyn, N. Y.



★ WE HAVE A LIMITED NUMBER OF DISTRIBUTOR AND DEALER TERRITORIES OPEN ★

**JUST
OUT**

VOLUME XV

**ONE FEATURE ALONE
WILL REPAY THE ENTIRE
COST TO YOU...
TIME, AND TIME, AND
TIME AGAIN!**

For years and years on end—for as long as 1946 receivers are in use—Volume XV will continue to pay you annual cash benefits by providing authorized time-saving servicing data complete and bound in a systematic form, always ready for easy reference. For 16 years Rider Manuals have proved their value. For 16 years they have constantly been improved; the owners of Volume I, purchased 16 years ago are still deriving benefits from it. A library of Rider Manuals is a lifetime-profit-paying-investment.

Volume XV incorporates the latest Rider "first"—"clarified schematics," a plus service on which we have spent tens of thousands of dollars in order to save you hundreds upon hundreds of hours each year. Also, with each copy of Volume XV there is included the separate book "How it Works," a practical guide to the theories of operation of the new technical features of the latest receivers. It explains the functions of those "gimmicks" and "gadgets" which can cause time-wasting headaches if not recognized and understood. These and other exclusive analyses by our engineers will be found in "How it Works" another Rider "first."

Many post-war sets are equipped with record players and changers; these are covered in Volume XV.

All the popular brands of "Ham" communication receivers are included in Volume XV.

You are brought up to date on all Scott receivers by Volume XV.

Yes, on the 1984 pages of Volume XV, covering the sets of 121 American Manufacturers and the 150 pages of "How it Works" you will find the data and services that will make it pay its profitable way for years to come.

Be sure of your copy. Avoid disappointment, place your order with your jobber today.

OTHER RIDER MANUALS

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

"clarified schematics"
"clarified schematics" do a job which you have had to do on every multi-band receiver and combination set coming into your shop. "clarified schematics" break down the composite diagrams of hundreds of complicated multi-band receivers, providing you with exclusive, individual schematics of each and every circuit as it exists with each turn of the wave band or equipment switch. With a "clarified schematic" before you, you save the time heretofore spent tracing out an original schematic to find which components are in operation under different positions of the wave band switch. We have saved this time for your shop, by doing it for you in our laboratories. Alone, this one feature will repay the entire purchase price of Volume XV and return an additional cash profit on your investment year after year.



**YEAR AFTER
YEAR AFTER YEAR
RIDER MANUALS**

Keep pouring profits for Servicemen

JOHN F. RIDER PUBLISHER, INC. • 404-4th AVENUE • NEW YORK 16, N. Y.

Export Div.: Rocke-International Corp., 13 E. 40 St., N. Y. C. Cable: ARLAB

OTHER RIDER BOOKS

Inside the Vacuum Tube Solid concept of theory and operation	\$4.50
Understanding Microwaves Provides foundation for understanding	6.00
Radar Entertaining, revealing, in lay language	1.00
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
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



This new Rider Book, soon to be announced, will be of lasting usefulness to everyone interested in any phase of radio.

February, 1947

17

Bob Henry says:

MOST MODELS IN STOCK

For Immediate Delivery

Most models listed below are in stock . . . ready for immediate delivery:

Hallcrafters S38 complete..	\$ 47.50
Hallcrafters S40A.....	89.50
Hallcrafters SX 42.....	275.00
Hammarlund HQ-129X and speaker.....	168.00
Hammarlund SP-400-X and speaker.....	342.00
National NC-2-40D (complete with speaker).....	241.44
National HRO-5TA1 and HRO-5RA1.....	274.35
National NC-46.....	97.50
National 1-10A with tubes and coils.....	67.50
RME-45 complete.....	198.70
RME-84 complete.....	98.70
Pierson KP-81 complete....	342.00
Panoramic panadapter complete.....	99.75
Temco 75GA transmitters..	495.00
Meck 60T transmitters.....	150.00
Gordon, Amphenol, other rotary beams.	
Millen 90800 ECO.....	\$42.50
Millen 90800 exciter	37.50
Millen 90281 power supply.	84.50
Millen 90902 scope.....	42.50

The new Hallcrafters and Collins receivers, transmitters, VFO, etc. as fast as available. Prices subject to change.

THE delivery situation is much improved. I can make immediate delivery of most receivers and other apparatus. Take advantage of the extra service and selection you get by dealing with me, based on my reputation as the world's largest distributor of short wave receivers. Send me your order now. Send five dollars and I will ship at once C.O.D. Or order on my 6% terms. I finance the terms myself to give you better service and save you money. Trade-ins accepted. Tell me what you have to trade, and let's make a deal. Besides having all amateur receivers and transmitters, I also have a complete stock of all other amateur apparatus and parts, also test equipment, etc. I have real bargains in the really good war surplus. Write, phone, wire or visit either of my stores.

BOB HENRY

WOARA

HENRY RADIO STORES

BUTLER, MISSOURI, AND
LOS ANGELES 25, CALIF.

"WORLD'S LARGEST DISTRIBUTORS
OF SHORT WAVE RECEIVERS"

18

Spot Radio News

★ Presenting latest information on the Radio Industry.

By FRED HAMLIN

Washington Editor, RADIO NEWS

TO OUR READERS

A sufficient supply of the glue ordinarily used in binding the January, 1947, issue of Radio News was not available at the time the magazine was being printed and therefore a substitute material was used on some of the copies. In some cases this substitute adhesive used for binding failed to do a good job of holding the magazine together.

Any reader having such a copy may return it to us for replacement. We regret the inconvenience resulting and assure you that it was in no way due to carelessness.

FM, LIKE WE SAID last time, is getting organized on a national basis from headquarters in Washington and with the enthusiastic blessing of no less than the Federal Communications Commission. First steps toward activating a group of FM station executives was taken at the National Association of Broadcasters convention in Chicago in the early winter, and a complete organization, with program, was drawn up at the first all-FM convention, held in Washington early in January.

PUBLICIZING AND PROMOTING

FM nationally is the first order of business in the new outfit, which bears the name "Frequency Modulation Association," with headquarters at 810 International Building, Washington 4, D. C. Scores of FM station heads have already joined under the leadership of the Washington-led group which spark-plugged the FMA. These included Roy Hofheinz, Leonard Asch, Wayne Coy, W. R. David, Everett L. Dillard, Gordon Gray, F. A. Gunther, Ira A. Hirschmann, E. J. Hodel, C. M. Jansky, Jr., R. F. Kohn, and Stanley Ray.

FCC ENTHUSIASM FOR FM and an FM station organization was summed up by chairman Charles R. Denny. Denny recently told FMA: "An organization such as yours, concentrating on the building of FM, can perform one of the most valuable services in the history of broadcasting. Those of us close to radio are excited over this revolutionary improvement, but to the vast majority of listeners, FM is still just another alphabetical combination. It is highly gratifying to know that your group has embarked on a crusade to carry the story of FM to every radio listener in the land." That the crusade will have financing was indicated early in the FMA's career. "Our dollars will be spent for FM promotion," said its steering committee. An all-out national publicity campaign may be expected during the spring, summer, and fall as a result.

IF YOU HAVE ANY FURTHER

DOUBT about FCC's attitude toward FM, listen to Commissioner Ewell K. Jett: "FM," he declared recently, "is now established on a sound, permanent postwar basis. In all, we at the FCC expect some two thousand of these FM stations in the next few years—nearly twice as many as the present number of standard stations." He sounds a note of warning to the general public, however: "FM receiver production is troubled by the same shortages that afflict so many other industries. But FM sets are coming on the market in increasing numbers. The latest estimate is that at least five million will be produced next year." Mr. Jett's advice to the prospective buyer of a new radio: "If I were buying one today, I would certainly not buy one that did not include FM."

SPEAKING OF PRODUCTION,

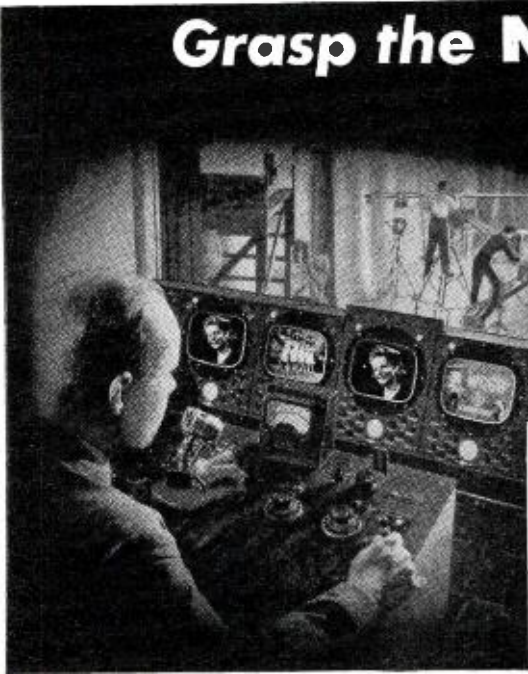
every indication at year-end was that it will continue generally good, despite supply and labor difficulties. Latest complete figures—for October—showed shipments that month at a new all-time peak. Domestic radio sets, including phonograph and record players, increased 20 per-cent to 1,800,000 units over September, according to the Civilian Production Administration.

COLOR TELEVISION—whether it will come into its own tomorrow or years hence—may develop into the jackpot radio question of the year. It was brought up with fanfare before the FCC in December largely at the urging of the Columbia Broadcasting System. While RCA and NBC, both working in the color field, favor taking more time to perfect their methods. Frank Stanton, president of CBS, went so far as to declare that Columbia could start colortelecasting within a few weeks, if FCC permits are forthcoming. "Substantial, regular" programs were predicted "within a year." . . . Reason for the FCC hearings was the Columbia request for FCC to set standards for

RADIO NEWS

Grasp the **NEW OPPORTUNITIES** in

RADIO ELECTRONICS AND TELEVISION NOW!



Modern Radio – FM Broadcast and Reception – Television – Industrial Electronics; Power, Control, Communications – new equipment and methods demand new technical ability and experience. Keep up to date with the latest.

MODERN RADIO EQUIPMENT FOR YOU TO USE AND KEEP



The very essence of National Shop Method Home Training is EXPERIENCE. You get actual experience by working with modern Radio and Electronic equipment—building many types of circuits. You may build a fine, long distance MODERN SUPERHETERODYNE, signal generator, miniature radio transmitter, audio oscillator, etc.—many other standard actual operating pieces of equipment—conduct cathode ray and other experiments. This practical work advances with your training—YOU LEARN BY DOING!

Shop Method Home Training

By a Real Established Resident School with its own FM Studios, Shops and Laboratories.

TRAIN WITH ADVANCED TECHNIQUE

The good jobs in Radio Electronics now go to the men who are equipped to handle them. It takes training and experience. National Schools, one of the oldest and largest trade schools in the country, makes it possible for you to get this training right in your own home IN YOUR SPARE TIME.

National maintains modern resident training Studios, Shops and Laboratories where instructors and engineers are working constantly to improve training methods. SHOP METHOD HOME TRAINING is a logical extension of this practical system.

A FREE lesson that shows you how practical and systematic this new training method is will be sent you without obligation. You may keep and use this lesson to prove to yourself just how practical National Training really is.

Get one of the many NEW JOBS that demand new techniques and methods in Modern Radio. Get your share of the NEW BUSINESS that servicing the new sets and equipment demands. Experts agree that Radio, Television and Electronics present opportunities

much greater than ever before!

Radio is expanding with far-reaching improvements in reception. No one knows yet how great the Television market will be. Electronics will touch almost every walk of life—in industry and in the home.

TURN YOUR INTEREST IN RADIO INTO A CAREER THAT WILL ASSURE YOU SUCCESS AND SECURITY.

FIND OUT WHAT NATIONAL TRAINING CAN DO FOR YOU

Where do you stand today in modern industrial progress? What does the future hold for you? You owe it to yourself to investigate this opportunity. With National Training YOU GET AHEAD FAST—you may step into a good position or start a business of your own, with little capital, even before you complete your National Course.

Fit yourself for a career of independence, good earnings, success and security in one of the fastest growing fields in industry. For full information, just send your name and address on the coupon and mail it TODAY.

FREE LESSON



APPROVED FOR TRAINING UNDER GI BILL



Get This Book FREE

This big book presents the facts about the field of Electronics and your opportunities in it together with full information about the advanced National Training. Read it and make up your own mind that National Training will equip you for a great future. No salesman will call on you from National. The book is FREE with your sample lesson. Clip and mail the coupon TODAY!

See What National Training Has Done For These Men

National Shop Method Home Training wins good jobs, independence and security. Take the word of National men who have established records in their favorite Radio, Television, or other branches of Electronics.



From O. K. Ivey, Washington, D. C., comes this endorsement: "I believe National offers the best course to be had ... Keep up the good work."

Here's a statement from B. R. Wright, Blackfoot, Idaho: "Due to my training at National I was selected to instruct in the laboratory work of Navy and Marines."



Clifford Hannah, Portage La Prairie, Manitoba, Canada, writes: "My training has brought results as I'm in line for another raise thanks to National's encouragement and thorough training."



Joseph Michel, Jr., Granite City, Illinois, writes: "I am enthused with National training. I am now earning \$225 a month as a radio operator and technician and \$20 a week more in my shop at home."

Read what other enthusiastic students have written about National Training in the big 40 page book we will send you.

NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST. 1905



MAIL OPPORTUNITY COUPON FOR QUICK ACTION

National Schools, Dept. Z-RN

(Mail in envelope or paste on penny post card)

4000 South Figueroa Street, Los Angeles 37, California

Mail me FREE the two books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

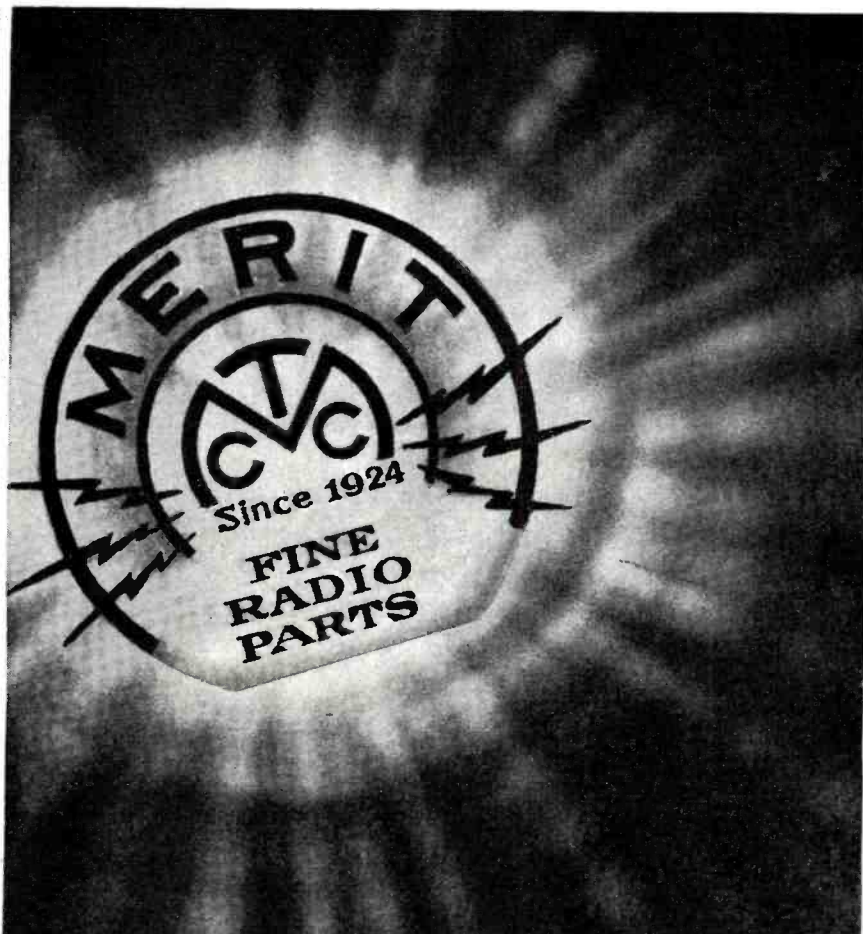
NAME AGE

ADDRESS

CITY STATE

Include your zone number

Check here if veteran of World War II



**When it comes to trans-
formers, "will do" is not
a sufficient standard. Eco-
nomy, as well as highest
efficiency requires the best.**

**This is the meaning of
Merit Quality.**

**EXPORT DEPARTMENT:
1791 Howard Street, CHICAGO 26, U. S. A.
Cable Address: MERIT**



MERIT COIL & TRANSFORMER CORP.

TELEPHONE
4427 North Clark St. Long Beach 6311 CHICAGO 40, ILL.

SPOT RADIO NEWS

color television commercial broadcasts "immediately" on 480 to 920 megacycles, bands now classed as experimental. Opening these bands would give color opportunity to develop into national networks, another prediction that Stanton felt Columbia could make good in the near future. He added that CBS had spent approximately two million dollars in experimenting during the last two years. . . . What the ultimate decision would be, nobody was willing to predict as this went to press. A good bet; some kind of television with color in the commercial field by 1948.

FOREIGN RADIO ACTIVITIES

will come into the electronics news again in April, with a number of interesting developments promised. Occasion will be the International meeting of the Marine Radio Aids to Navigation groups from interested nations. The meeting will last two weeks, convening first in New York City, followed by a gathering at New London, Conn., where marine radio aids will be demonstrated to the 250 U. S. and foreign delegates expected to attend. Three ships will be used in the demonstrations, one from the Coast Guard, one from the U. S. Maritime Commission, one from the Coast and Geodetic Survey. What will be demonstrated has not been crystallized, but you can count on seeing radar, sonar, loran, and advanced types of ship-to-shore radio in action. . . . Also on the international docket for the immediate future are the international radio conference, scheduled for May, place yet undecided, but probably San Francisco; the international plenipotentiary conference in July, and, following, a meeting of high frequency experts, scheduled tentatively for August or September. No locations have been chosen for the last two. . . . The May meeting will be to revise the regulations of the 1939 Cairo conference, while the plenipotentiary gathering will amend and change the 1932 rulings of the Madrid convention. Participating nations at all three meetings will approximate the membership of the United Nations.

SHORAN WILL BE ONE OF THE THINGS

to watch with interest at the New London, Conn., meeting, although it is just the opposite of an aerial device. Kept under blankets by the Navy and Army during the war and still obscured by military red-tape, it is the pet of the Coast and Geodetic Survey, which uses it for mapping the ocean bottom. Geodetic has four sets, costing \$50,000, and wish they could get more. It operates on a one-way echo principle, a hydrophone (waterproof microphone) sending a sound to a land-based receiver. Underwater sound has been found to travel best at 4200 feet, and hydrophones are set at that level if possible, with cables carrying the sounds to shore from the hydrophone base. . . .

RADIO NEWS



**Opportunity
Ahead...
FOR TRAINED MEN
ONLY!**

Enjoy Security and Good Pay! Step Ahead of Competition Into a BETTER RADIO JOB with CREI Technical Home Study Training

Protect your future today. Enjoy the recognition, the interesting, well-paid positions that Radio-Electronics offers men who meet the challenge with modern technical training. FM, Television, Facsimile and other electronic communications systems for both government and industry will require thousands of highly trained expert radio communications engineers and technicians.

NOW is the time to take the time to prepare yourself for these important career jobs. CREI home study training can show you the way by providing you with the "tools" with which to build a firm foundation of ability based on a planned program of modern technical

training.

In our proved method of instruction you learn not only how but why! This is real, honest-to-goodness practical engineering training that leads to better jobs and more rapid promotions... the type of training for which many thousands of professional radiomen have enrolled during the past 19 years.

It costs you nothing to read the interesting facts. Write for free booklet today.

VETERANS! CREI TRAINING IS AVAILABLE UNDER THE "G. I." BILL!

Capitol Radio Engineering Institute

An Accredited Technical Institute

Dept. RC-2, 16th and Park Road, N. W., Washington 10, D. C.

Branch Offices:

NEW YORK (7) : 170 BROADWAY SAN FRANCISCO (2) : 760 MARKET ST.

"STRAIGHT FROM THE SHOULDER"

Ralph Waldo Emerson said, "Know Thyself"—and never was there a time when the professional radioman needed to heed that advice more than today. I've watched radiomen come and go for over a generation—and the ones who are on "top" today are the ones I'd have picked 10 years ago. They were always getting ready for the "job ahead." It's truer today than ever before! Profit by the experiences of others—prepare *today* for your opportunities *tomorrow*.

E. H. Ruffin
President of CREI



If you have had professional or amateur radio experience and want to make more money, let us prove to you we have the training you need to qualify for a better radio job. To help us intelligently answer your inquiry—PLEASE STATE BRIEFLY YOUR BACKGROUND OF EXPERIENCE, EDUCATION AND PRESENT POSITION.

GROUND OF EXPERIENCE, EDUCATION AND PRESENT POSITION.

**MAIL
COUPON
FOR FREE
36-PAGE
BOOKLET**

CAPITOL RADIO ENGINEERING INSTITUTE RC-2
16th & Park Rd., N.W., Dept. RC-2, Washington 10, D.C.

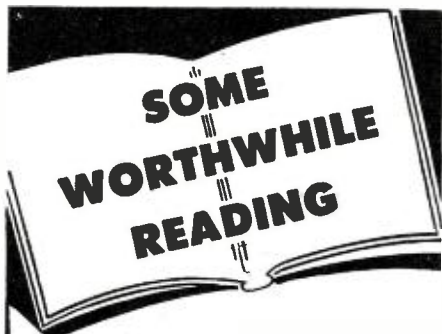
Gentlemen: Please send me your free booklet, "Your Opportunity in the New World of Electronics," together with full details of your home study training. I am attaching a brief resume of my experience, education and present position.

NAME.....

STREET.....

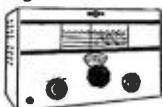
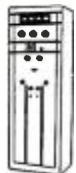
CITY.....ZONE.....STATE.....

CHECK PRACTICAL RADIO ENGINEERING COURSE PRACTICAL TELEVISION ENGINEERING
 I am entitled to training under the G.I. Bill.



HARVEY has been appointed authorized dealer for the new Collins line of transmitters and receivers. These units are precision built to the highest standards. We are now taking orders on the whole line for quick delivery.

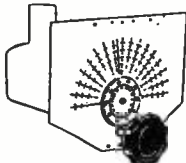
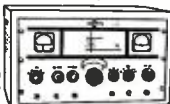
The Model 30K-1 Transmitter, complete with the 310A-1 Exciter and all tubes, is a complete transmitter ready to operate. Input is 500 watts on cw, 375 watts on phone. Operating controls in Exciter unit.



\$1250

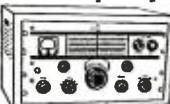
32V-1 150-watt transmitter (120 watts on phone) complete with tubes. Uses the highly stabilized and accurate Collins VFO. \$475

70E-8 VFO. It is new, versatile and extremely accurate. Overall accuracy and stability are within 0.015%. Can be used for all bands up to 7/8 meter with doublers. Complete with calibrated dial. You can build a good band-switching exciter unit with the 70E-8 that will make multi-band operation a pleasure.



\$40.00

Collins 75A Receiver. The receiver to end all receivers! 80-40-20-15-11-10 meter bands. Straight line tuning. Dial calibrated in frequency. 50db image rejection on all bands, uses double conversion. Permability tuned, extremely high stability, uses separate oscillator for mixers. Complete with tubes, crystals and speaker. \$375



Send your order in now for earliest delivery. All prices quoted are Net, F.O.B. New York and are subject to change without notice.

Telephone: LOnacre 3-1800

HARVEY
RADIO COMPANY INC.
103 West 43rd St., New York 18, N. Y.

Navy is using it in its Pacific-air-sea rescue project, by triangulating messages picked up by the phones. A plane in trouble or lost may drop a bomb that explodes at the 4200-foot level, and the phone pickups, when graphed on a map, give the plane's exact location in a few seconds. Hydrophones are being strategically located so that rescue ships may reach distressed planes in three or four hours after a bomb call for help has been dropped. Shoran is accurate within twenty-five feet, Coast and Geodetic scientists report.

RETURNING HOME, the recent coal strike pointed the way toward a radio revolution which might have resulted in all the school kids of the nation staging a strike of their own. With schools closing, Justin Miller, president of the National Association of Broadcasters, urged members from coast to coast to offer broadcasting facilities for classroom work. A lot of stations took him up on the suggestion, including Denver, where school-free kids were suddenly brought up short by the announcement that lectures and lessons would be broadcast. We can only imagine their reaction, but it did not reach any high boil, owing to the end of the strike. Seriously, radio stood ready to do a magnificent emergency job, as Mr. Miller's statement to the broadcasters indicated. "This (strike) situation," he said, "presents a valuable opportunity for the individual broadcasters to demonstrate again their desire and ability to operate in the public interest. Dr. John W. Studebaker, U.S. Commissioner of Education, endorses our recommendation that stations in affected areas contact the superintendent of schools and offer the services of broadcasting in meeting the emergency."

FOREIGN ACTIVITIES in all fields of radio would seem to be booming, according to reports received by an interested Washington bureau. Surprising—to us, at least—is word from England that there are now from 25,000 to 30,000 television sets in the hands of the public over there, with the broadcasters giving full programs daily, including plays and coverage of news and sports events. (FCC estimates only 10,000 sets in the U.S. as of year-end, 1946.) Reason for the British lead in the field is that they started television ahead of us before the war, and had a comparable jump on the market when the shooting stopped. From Africa comes word via the Department of Commerce that the Union of South Africa may furnish a profitable, substantial market for U.S. electronic products in the future. Total estimated number of radio sets in operation are half a million. Radio is popular—communities are isolated in many instances, and use the air to keep posted and entertained. The Union suffered less than

almost any other place from the war—prospered, indeed, on gold mining, wool, hides, and other native products. U.S. products are popular and war restrictions did not permit purchase of new equipment. Imports are under no special restrictions if they are in the radio field.

NO RESTRICTIONS on importing radios into Argentina is a rule favorable to U.S. marketers, although State Department and other experts warn that anyone desiring to go into the Argentine should make a close study of all rules and regulations before attempting it. Estimates of consumption, while varying, are all good. A reasonable guess would be about a million receivers, more than half radio-phonograph combinations. War-born radio manufacturing plants in the country offer potential competition to outsiders, and high tariffs have been raised to protect the home industries. "Imported goods continue to retain a reputation for higher quality," says a Department of Commerce authority, "and United States firms can therefore still compete successfully, although high tariffs tend to restrict the market."

HAMS CONTINUE TO DEVELOP all kinds of gadgets, notably the recent job of reconversion by 33-year-old Edward McIntyre, a Naval research laboratory employe by day, a ham by night, at his home in Silver Springs, Md. He's converting a surplus tail-warning radar set from a B-29 into a domestic home-to-auto radio hook-up. McIntyre estimates that his set will have a range of from ten to twenty miles, and has an FCC experimental permit to operate it. How he's making it work is still a mystery, but if you want to hook up with him his ham station is W3KHJ.

THE CITIZENS RADIOCOMMUNICATION service—under which McIntyre got his experimental license—is shaping up under FCC supervision. Latest Commission move, begun in the early winter, is to get together with manufacturers to prepare technical requirements for equipment to be used in the field. FCC got the ball rolling by suggesting a list of requirements, but emphasized that the suggestions were not "to be regarded as proposed rules but as a preliminary proposal designed to organize discussion and comment." Suggestions from the industry were aired at subsequent meetings in Washington, and final rules should be forthcoming before spring. . . . Chief nut for the manufacturers to crack, according to FCC, was the ability of citizens' equipment to operate, "under all practical service conditions, on a frequency or frequencies within the allocated bands 460-470 mc." Whatever the final rules, FCC is agreed with everybody else that "the possible uses of this service (Continued on page 163)

NATIONAL RADIO PRODUCTS 1947

THE NEW 1947 CATALOGUE

The new National Catalogue describes hundreds of parts designed for amateur use. Many items are new, some are unique. The old favorites are there, proved and improved over the years. New or old, the products in the new National Catalogue will improve your rig.

CATALOG NO. 700
NATIONAL COMPANY, INC.
MALDEN, MASSACHUSETTS, U.S.A.



Metropolitan

fills Mail Orders Same day received!

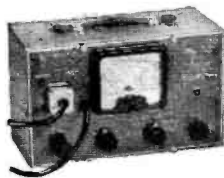
McMURDO SILVER INSTRUMENTS



The New McMurdo Silver Model 905 "SPARX" DYNAMIC SIGNAL TRACER
Frequency range from 20 cycles to over 200 megacycles
NET..... \$39.90



The New McMurdo Silver Model 904 CAPACITANCE RESISTANCE BRIDGE
1/4 mmfd/ohm through 1,000 mfd/megohms 0-50% power factor.
NET..... \$49.90

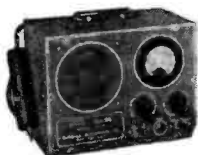


The New McMurdo Silver Model "Vomax" VACUUM TUBE VOLTMETER
One of the finest test instruments of its type.
NET..... \$59.85

SUPERIOR INSTRUMENTS



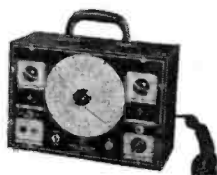
The New Model 670 SUPERIOR SUPER METER
Combination volt-ohm milliammeter plus capacity reactance inductance and decibel measurements.
\$28.40



The New Model CA-12 SIGNAL GENERATOR
Visible and audible signal detection... reducing the time to locate source of trouble to an absolute minimum. Complete with Probe, Test Leads, self-contained Batteries and Instructions..... \$34.85



The New Model 450 SUPERIOR TUBE TESTER
"Speedy Operation" assured by newly designed rotary selector switch which replaces the usual snap toggle or lever action switches.
NET..... \$39.50



The New RCP Model 705 SIGNAL GENERATOR
From 95 Kc to 100 Mc, continuously variable. Planetary drive condenser. Self-contained electronic modulation 400c sine wave for external use.
NET..... \$49.50



The New RCP Model 802N COMBINATION TUBE & SET TESTER
DC Voltmeter 0 to 1000 at 1000 ohms per volt. AC Voltmeter 0 to 1000 DC Milliammeter 0 to 1000. Ammeter 0 to 10. D.B. Meter—8/15/15 to 29/29 to 49/32 to 55 decibels.
NET..... \$59.50

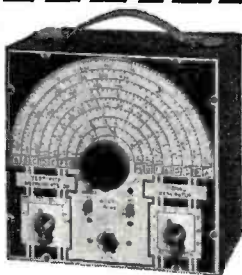


Model 669-IF WESTON Ohmmeter
Widely used for production testing of armature and field resistances of small motors, etc. List price \$25.50.
Net..... \$14.85

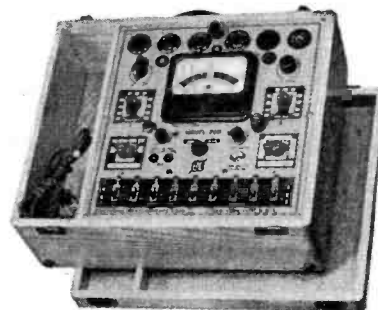
The New B-45 SIGNAL GENERATOR

Self-modulated—provides a highly stable signal. Generates R.F. frequencies from 150 Kc. to 50 Mc. on Fundamentals and from 11 Mc. to 50 Mc. on Harmonics. R.F. is obtainable separately or modulated by the Audio frequency. Television, AM & FM speedily aligned. Modulation accomplished by grid-blocking action which effectively aligns amplitude and frequency modulation as well as television.

Direct-reading—all calibrations are etched on the front panel. Complete with shielded test lead, self-contained batteries and instructions. NET \$27.75



The New Model 200 MUTUAL CONDUCTANCE TUBE TESTER



Here, FOR THE FIRST TIME, is a true, mutual conductance type tube tester with complete flexibility, and at a price no higher than that charged by other manufacturers for the ordinary emission type.

Note the unflinching accuracy with which it classifies the tubes under test, on the REJECT-GOOD scale. There is absolutely NO DANGER of BAD tubes reading "good" and GOOD tube reading "bad" on this E.M.C. Series 200 Tube Tester, as there is on all of the old-fashioned emission type testers.

- 3" Meter in sloping counter case.... \$49.85
- 3" Meter in hand-rubbed carrying case..... \$53.85
- 4 1/2" Meter in sloping counter case..... \$52.85
- 4 1/2" Meter in hand-rubbed carrying case..... \$56.85

CHECK THESE FEATURES

1. Checks mutual conductance on a calibrated micromho scale, as well as on a REJECT-GOOD scale.
2. Checks five element tubes as pentodes.
3. Checks tubes for gas content.
4. Sufficient plate current to check both emission and mutual conductance.
5. Detects both shorted and open elements.
6. Complete switching flexibility allows all present and future tubes to be tested, regardless of location of elements on tube base.
7. Tests tubes for radio frequency and other noise.
8. Tests all tubes from .75 volts to 117 filament volts.
9. Tests all octal, octal, and miniature tubes.
10. Tests cold cathode, magic eye, and voltage regulator tubes, ballast resistors.
11. Instrument is protected with fuse, which is easily replaceable from front of panel.
12. Individual sockets for each tube-base type eliminates possible errors.
13. Checks individual sections of multiple-purpose tubes.
14. Attractive four-color panel with plenty of eye-appeal. Wrinkle background for durability.

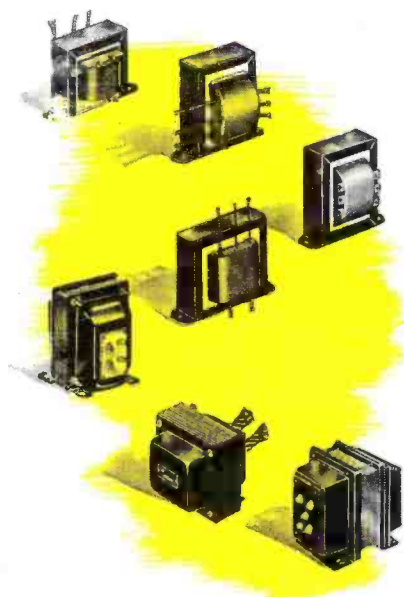
WATERMAN Pocket-size Oscilloscope.....	\$55.00	SUPERIOR CA-11 Signal Tracer.....	\$18.75	R C P 664 Electronic Multi-Tester.....	\$45.00
DUMONT 274 Five-Inch Oscilloscope.....	99.50	SUPERIOR 650 Signal Generator.....	48.75	R C P 668 V.T.V.O. Capacity Meter.....	73.01
SUPREME 543 Multi-Tester.....	18.95	SUPERIOR 400 Electronic Multi-Tester.....	52.50	R C P 665 VT "Billionaire".....	92.61
SUPREME 589 Tube & Battery Tester.....	48.95	SUPERIOR 600 Combination Tube & Set Tester.....	62.50	MONITOR Crystalliner Signal Generator.....	57.50
SUPREME 599 Tube & Set Tester.....	62.50	R C P 448 Multitester.....	24.50	SHALLCROSS 630 Wheatstone Bridge.....	75.00
SUPREME 565 Vacuum Tube Voltmeter.....	63.50	R C P 322 Dynoptimum Tube Tester.....	41.50	SHALLCROSS 637 Kelvin Wheatstone Bridge.....	100.00
SUPREME 576 Signal Generator.....	68.95	R C P 461-P Sensitive Multi-Tester.....	42.63	SHALLCROSS 638-2 Kelvin Wheatstone Bridge.....	150.00

Write for FREE 1947 Catalog of Complete line of Test Equipment.

Terms: 25% deposit, balance C.O.D. or full payment with order.

Metropolitan ELECTRONIC & INSTRUMENT CO.
Dept. R, 6 MURRAY STREET Cable Address: METRONICS
NEW YORK 7, N. Y., U. S. A. Phone: BArlay 7-5556

where you see the
 name **STANCOR**
 you can count on
SERVICE



The famous black-and-yellow STANCOR emblem stands for SERVICE . . . in guaranteed transformer performance . . . and in the friendly helpfulness of the Authorized STANCOR Distributor . . . who stands behind the product he sells. . . . Yes, wherever you see the STANCOR emblem you know you will find the most complete selection of Replacement and General Purpose Transformers . . . advanced designs . . . and the universal application that make STANCOR first with radio service men. . . . You bet you can look to STANCOR . . . for the standard of performance that assures you of satisfied customers.

standardize on

STANCOR



TRANSFORMERS

STANDARD TRANSFORMER CORPORATION · 1500 N. HALSTED ST., CHICAGO 22, ILL.

Announcing a new

THORDARSON

Transformer

Line!



Now... a completely new line, embodying the same dependable, quality-performance features which have been built into Thordarson Transformers since 1895. Designed to meet the same requirements and applications previously served by our older, more extensive lines, these modern units, while fewer in number, are broader in application and are engineered for every electronic need. Backed by 52 years of transformer manufacturing experience, they are your assurance of top-notch performance under all conditions.

Some of these new Thordarsons are already at your jobbers. Others are being turned out as fast as present-day manufacturing conditions permit. Ask your jobber for full information today or write for new free transformer catalog.

MEISSNER, THORDARSON,
RADIART PRODUCTS IN
PHOTO-FACT FOLDERS

EXPORT ADDRESS
SCHEEL INTERNATIONAL, Inc.
4237-39 N. LINCOLN AVENUE • CHICAGO 18, ILLINOIS
CABLE HARSHEEL

**ELECTRONIC
DISTRIBUTOR**

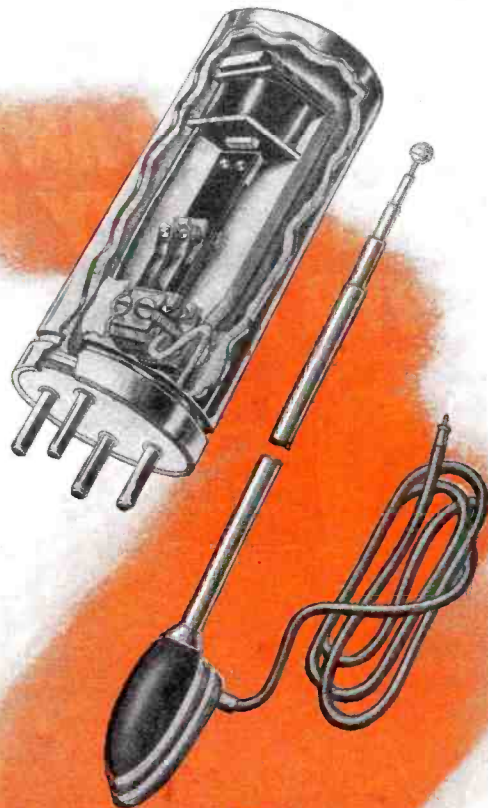
RADIART

VIBRATORS...

Effectively sealed against air and moisture seepage, thus preventing point oxidation. All-riveted assembly guarantees long-lived dependability.

AERIALS...

The finest aerial line ever offered. Patented Anti-Rattler feature eliminates grease packing . . . insures operation in all kinds of weather. For all cars.

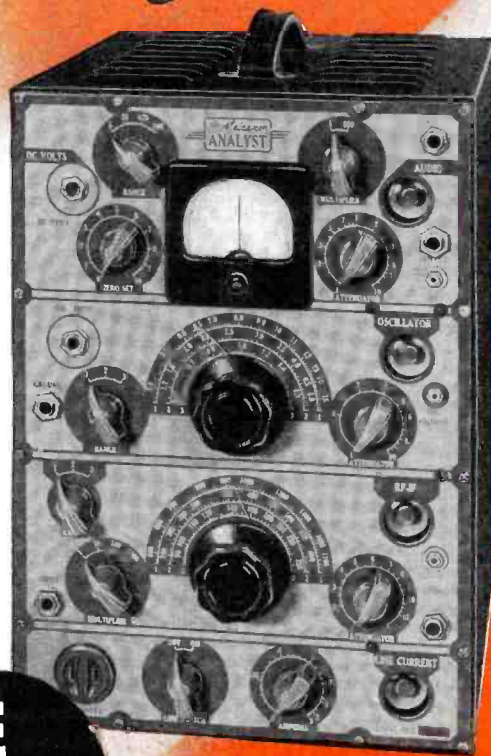


MEISSNER

ANALYST

THE MODERN SERVICE INSTRUMENT

Designed to handle the receivers of today, yesterday and tomorrow with equal facility. Tests by the signal tracing method . . . fastest and most reliable method to date. See it at your jobber's today.



MAGUIRE
INDUSTRIES
INCORPORATED

AND INDUSTRIAL SALES DEPARTMENT
936 N. MICHIGAN AVE. • CHICAGO 11, ILLINOIS

Two Ghirardi books THAT TEACH YOU TO DO ANY REPAIR JOB ON ANY RADIO EVER MADE!



Meet Alfred A. Ghirardi—the man who makes Radio easy to learn!



MODERN RADIO SERVICING

THE BOOK THAT GIVES COMPLETE MODERN Professional TRAINING

Once in a blue moon a technical book is written that is so important, so complete and so easy to understand that it is used and recommended universally by members of a profession. Ghirardi's MODERN RADIO SERVICING is exactly that kind of a book as radio men everywhere will quickly tell you! **TEST INSTRUMENTS, TROUBLE-SHOOTING, REPAIR**

Actually, MODERN RADIO SERVICING is the only single, inexpensive book giving a complete, easy-to-understand course in modern Radio repair work in all of its branches—branches that lead right through to all types of Electronic equipment. Written so simply you can understand it without an instructor! Read from the beginning, it takes you step by step through all phases of the

work. Used as a reference book by busy servicemen, it serves as a beautifully cross-indexed volume for "brushing up" on any type of work that may puzzle you.

ONLY \$5 COMPLETE

Included is a thorough explanation of all Test Instruments, telling exactly how they should be used and why (it even gives complete data for making your own Test Equipment if you prefer!); Receiver Troubleshooting Procedure and Circuit Analysis; Testing and Repair of Components; Installations; Adjustments; etc., etc.—also, How to Start a Successful Radio-Electronic Service Business. 1300 pages, 720 self-testing review questions, 706 helpful illustrations and diagrams. Only \$5 complete (\$5.50 foreign).

HOW TO TEST A RADIO IN 2 MINUTES or less!

Want to repair your own radios—without months of specialized service training? Want to repair sets for friends for fun or profit? Or, if you are already a radio serviceman, do you want to learn how to diagnose radio troubles in 2 minutes or less and fix sets **TWICE AS FAST** and **TWICE AS PROFITABLY**—without a lot of unnecessary testing? Then order Ghirardi's **RADIO TROUBLE-SHOOTER'S HANDBOOK** today—on a 5-Day Money-Back Guarantee!

START A SERVICE BUSINESS .. GET A BETTER PAYING JOB!

There's a real future for you in servicing—and Ghirardi's MODERN RADIO SERVICING is just the book to start you on it without delay. And remember: Radio is just the beginning! What this big book teaches you about Radio servicing, Test Instruments, and modern technical procedure is exactly the training you need to fit you to "grow up" with the fast-expanding Electronics profession in all of its servicing phases! It gives you real PROFESSIONAL Training . . . for only \$5 COMPLETE!

RADIO TROUBLE-SHOOTERS' HANDBOOK

MAKE MONEY REPAIRING RADIOS

This 4 lb. Handbook Shows Exactly How to Diagnose and Repair Common Troubles in Practically Every Radio in Use

Speed up radio repair work! Eliminate needless, tedious testing! Handle common radio troubles fast and profitably. Make spare time money repairing sets for friends and neighbors—without a lot of costly equipment or experience.

Symptom of the radio to be repaired. Four times out of five, the HANDBOOK will show you step by step just what to do—in a fraction of the usual time. Ideal for either busy service shops or service beginners. Pays for itself in time saved on the very first job.

HUNDREDS OF SERVICE HINTS

Over 300 additional pages include service hints; i-f alignment peaks for over 20,000 superhets; transformer trouble data; the finest tube information you've ever seen; color codes; and hundreds of graphs, diagrams, charts, etc.—all carefully indexed so you can find what you need in a hurry. Price only \$5—on 5-DAY MONEY-BACK GUARANTEE BASIS. Use Ghirardi coupon at bottom of adjoining page.

SAVE TIME ON EVERY JOB

Ghirardi's famous 744-page, manual-size RADIO TROUBLE-SHOOTER'S HANDBOOK shows what to do—exactly how to do it. Over 400 pages give common trouble symptoms, their causes and remedies for over 4800 receiver, auto radios and record changers of 202 different manufacturers. Just look up the Make, Model and Trouble

YOUR MONEY BACK IN 5 DAYS

Murray Hill Books, Inc., Dept. RN-27, 232 Madison Ave., New York 16, N. Y.

Enclosed find \$..... for books checked; or send C.O.D. (In U.S.A. only) for this amount plus postage. If not fully satisfied, I may return the books within 5 days and receive my money back.

3rd Edition RADIO TROUBLESHOOTER'S HANDBOOK \$5 (\$5.50 foreign) Ghirardi's MODERN RADIO SERVICING \$5 (\$5.50 foreign)

Special MONEY-SAVING COMBINATION: MODERN RADIO SERVICING and RADIO TROUBLESHOOTER'S HANDBOOK (both books) \$9.50 (\$10.50 foreign).

Name.....
Address.....
City & Dist. No..... State.....

Special MONEY-SAVING OFFER

Get both of these big books at our special Money-Saving price—a complete servicing library of over 2040 pages for only \$9.50. (\$10.50 foreign.)

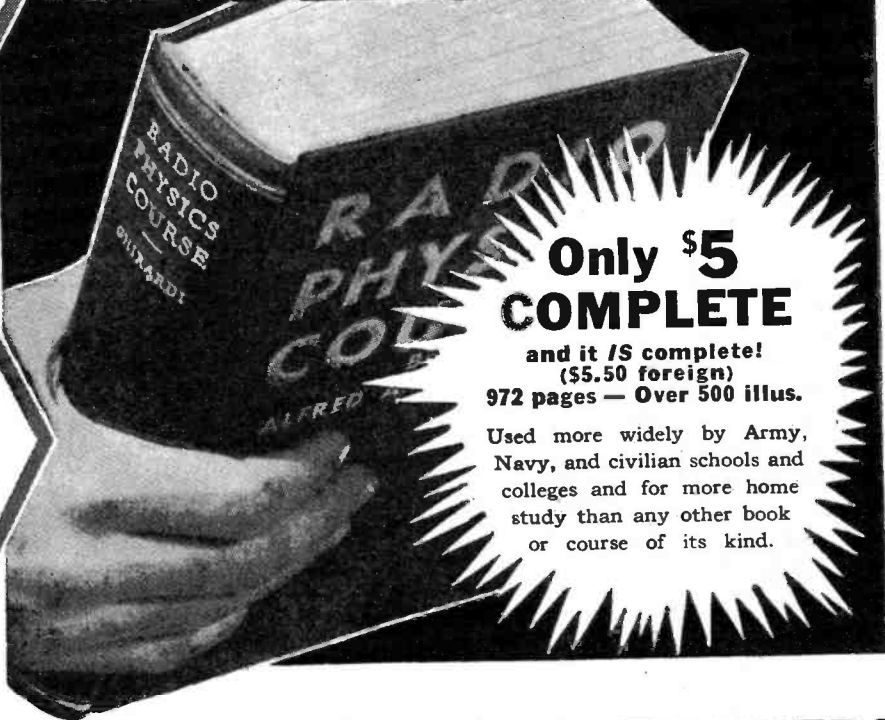
723 OUT OF 817!

Recently, a group of 817 radio instructors, students, repair men, radio men in the armed forces, in broadcast stations, big manufacturing plants, etc. were asked what they think of the various books and courses for the study of basic Radio-Electronics. 724 of these men — NINE OUT OF TEN—said that, in their opinion, GHIRARDI'S RADIO PHYSICS Course was their first choice — far better than any other AT ANY PRICE!

"IT'S THE BEST OUT OF 20" SAYS CHIEF ENGINEER

From F. S. Bailey, Chief Engineer, Radio Operator's School, Brownsville, Texas comes this sweeping endorsement of Radio-Electronic's greatest basic training book. "We find Ghirardi's RADIO PHYSICS COURSE the best book out of 20 or more that we have tried—both as a complete course in Radio Physics, and for all other branches. It is best for beginners as well as those who already know something about Radio . . . It is giving our students the very best for their money!"

Who said it costs a lot of money to LEARN RADIO-ELECTRONICS?



Only \$5 COMPLETE

and it IS complete!
(\$5.50 foreign)
972 pages — Over 500 illus.

Used more widely by Army, Navy, and civilian schools and colleges and for more home study than any other book or course of its kind.

THE BOOK THAT MAKES IT EASY FOR BEGINNERS TO LEARN AT HOME . . . without an instructor



Send the coupon today! Examine Ghirardi's RADIO PHYSICS COURSE in your own home! See for yourself how this giant book at ONLY \$5 gives

complete basic training that can pave your way to a good-paying job or a business of your own in Television, Frequency Modulation, Facsimile, Broadcasting, Communications, Radio Servicing, Industrial Electronics and so on down a long list of glittering opportunities.

This one big 972-page, profusely illustrated book gives just the training you need — ALL YOU NEED—easier, better, faster and at FAR LESS COST. It backs up theory with actual practice. No previous training necessary. It starts right in at the beginning. Every step is made crystal clear in both text and over 500 illustrations. Many beginners who never even saw a circuit diagram before have completed it in a few weeks. Thousands of Ghirardi-trained men now hold important Radio-Electronic positions. No training AT ANY PRICE is more widely endorsed by the experts themselves!

AS SIMPLE AS A-B-C

Ghirardi's RADIO PHYSICS COURSE makes Radio-Electronics-Television amazingly easy to learn. Everything is explained carefully and thoroughly in a clear, easy style. No involved mathe-

matics! No lessons to wait for. You get your training QUICKLY while the big money-making opportunities still beckon on every side. You'll be amazed and pleasantly surprised to find how soon RADIO PHYSICS COURSE has you understanding every phase of this fascinating subject—how it enables you to grasp subjects that other books and courses make seem highly complicated. Best of all, you buy it on an UNRESERVED 5-DAY MONEY-BACK GUARANTEE BASIS. Every cent will be cheerfully refunded if you are not more than satisfied. You cannot lose! Send coupon today!

YOUR MONEY BACK IN 5 DAYS

if Ghirardi's RADIO PHYSICS COURSE doesn't teach you Radio-Electronic-Television fundamentals EASIER, FASTER and at LESS COST than any other book or course. You be the judge!

ALL THE FACTS ON A LITTLE-KNOWN SUBJECT . . . Now Available



Don't buy, specify, use or replace Capacitors blindfolded! Save time, save money, and increase your service efficiency by really knowing all about this vital subject! No Radio-Electronic component is more important or less understood than the Electrolytic Capacitor and many new and improved types are now fast coming into general use. This new book, THE ELECTROLYTIC CAPACITOR, by Alexander M. Georgiev at last explains the entire subject. It tells what types to use and where and how to use them properly. Explains the advantages and disadvantages of each—how to make emergency repairs and includes a wealth of other invaluable data. Over 200 pages. 80 illustrations. Only \$3 (\$3.25 foreign).

Murray-Hill Books, Inc., Dept. RN-27, 232 Madison Ave., New York 16, N. Y.

- Enclosed please find \$5 (\$5.50 foreign) for which rush me a copy of A. A. Ghirardi's 972-page RADIO PHYSICS COURSE BOOK or
- Send C. O. D. for \$5 (no foreign C. O. D.'s) plus postage. In either case, it is understood I may return the book within 5 days of its receipt and have my money refunded if not fully satisfactory.
- THE ELECTROLYTIC CAPACITOR, \$3 (\$3.25 foreign). \$..... enclosed or Send C. O. D. (U. S. A. only) for this amount plus postage.

Name.....

Address.....

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

Check The Savings On These

RADIO TUBES

ALL BRAND NEW...

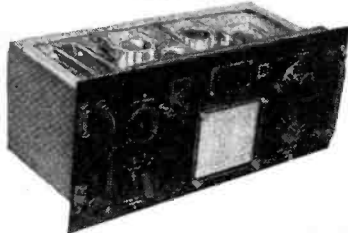
ALL IN CARTONS!

SUN RADIO

HOME OF
NATIONALLY
FAMOUS
RADIO PARTS

UP TO
80%
OFF!

**WAR
SURPLUS
EQUIPMENT**
At a Fraction of
Original Gov't.
Cost!



R.F. TUNING UNIT

Comes in a beautiful black crackled aluminum cabinet with two Variable Transmitting Condensers and two Vernier dials, one heavy duty ceramic four position wafer switch, two or more mica condensers, 2,500 Working Volts and coils wound on porcelain ribbed forms.
Yours for only..... **\$3.89**

- No. TU5B 1500 to 3000 KC
- No. TU6B 3000 to 4500 KC
- No. TU7B 4500 to 6200 KC
- No. TU8B 6200 to 7700 KC
- No. TU10B 10,000 to 12,500 KC

Please specify model



LOW FREQUENCY RECEIVER

BC-344

Brand new, operates on 110 volts A.C. Complete with 10 tubes, 6" P.M. speaker, **\$85.60**



MICROPHONE

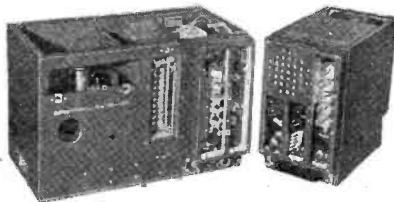
U. S. Army brand new single button carbon hand microphone "Shure" type with push to talk switch..... **\$1.99**



FOR IMMEDIATE DELIVERY

Hallicrafter SP44
Panoramic Adapter **\$99.50**

EASILY INSTALLED IN ANY SET



BC 683 FM—10 tube receiver less power supply..... **\$39.95**

BC 684 FM—35 Watt Transmitter less crystal and power supply..... **\$39.95**

Combination BC 683 and BC 684..... **\$69.95**
Tunes 27 to 38.9 Mc



COMPLETE 4 TUBE INTERPHONE AMPLIFIER

\$8.95

Comes in an aluminum cabinet 9 3/4 x 4 3/4 x 5 1/2 inches with two 12J5GT tubes and two 12A6, also General Electric Dynamotor 28DC Volt input and 250 VDC output at 60 MA. Complete instructions and diagram for high fidelity phonograph or speech for 110 Volt operation. This is the greatest offering made in War Surplus Electronics. Yours for only... **\$8.95**

●All items F.O.B. Washington, D. C. All orders \$30.00 or less cash with order. Above \$30.00, 25 percent with order, balance C. O. D. Foreign orders cash with all orders plus exchange rate.

ALL STANDARD BRAND TUBES

Number	Price	Number	Price	Number	Price
OZ4	\$.145	6F6	\$.095	12SJ7GT	\$.110
1A5GT	1.00	6F7	1.50	12SK7GT	1.10
1A7	1.80	6F8	1.10	12SL7GT	1.20
1B4	.80	6G8	1.00	12SN7GT	.95
1B7	.80	6H5	.75	12SO7GT	1.10
1C5GT	1.00	6J5	.80	12SR7	1.00
AQST	.617	6J7	1.15	14A7	1.50
1D5	.80	6J8	1.30	14B6	1.40
1D7	.85	6K6	.85	14B8	1.60
1D8GT	1.10	6K7	.80	14C5	1.60
1E4	.80	6K8	1.30	14C7	1.60
1E5	.90	6L5	1.10	14F7	1.50
1E7	1.00	6L6G	1.50	14H7	4.60
1F4	.80	6L7	1.40	14I7	1.60
1F5	.80	6N7	1.40	14N7	1.60
1F7	.90	6P5	.80	14Q7	1.20
1G6	1.30	6P7	1.40	14S7	1.60
1H4	.70	6Q7	1.30	14W7	1.85
1H5	1.50	6R7	1.40	14Y7	1.60
1J5	.75	6S7	1.20	18	1.25
1J6	.80	6SA7	1.00	19	1.00
1LA4	1.95	6SF5	.70	20	1.75
1LB4	1.95	6S17GT	.70	22	1.00
1LC5	1.95	6SK7GT	.80	24A	.90
1LD5	1.95	6SL7GT	1.00	25L6GT	1.10
1LH4	1.95	6SN7GT	.85	25	.75
1LN5	1.95	6SQ7GT	1.00	27	.70
1NS	1.30	6T7	1.00	30	1.00
1RS	1.25	6G5	.95	31	1.00
1S4	1.25	6U6GT	1.00	32L7GT	1.95
1S5	1.25	6U7	1.00	33	1.00
1T4	1.25	6V6	1.10	34	.80
1T5	1.50	6V7	1.00	35/51	1.00
1V	1.00	6W7	1.20	35W4	1.08
2A6	.75	6X5GT	1.00	35Z3	1.30
2B7	.75	6Y6G	1.00	37	.75
2E7	.85	7A4	1.00	38	.85
2K2/879	.90	7A5	1.00	39/44	.80
2Z2/684	.45	7A6	1.00	41	.85
3Q5	1.95	7A7	1.00	42	.85
3Q5	1.60	7B4	1.00	45	.80
3S4	1.25	7B5	1.00	46	1.00
5U4	1.00	7B6	1.00	49	.95
5V4	1.60	7B8	1.30	50L6	1.24
5X4	1.10	7C5	1.00	50	1.75
5Y3GT	.70	7C8	1.30	55	.50
5Y4	.75	7C7	1.00	56	.80
5Z3	.95	7E6	1.00	57	.75
6A5	1.70	7E7	1.30	59	.80
6A6	.80	7F7	1.30	76	.75
6A8	1.00	7H7	1.50	77	.75
6A5G	1.70	7J7	1.50	78	.75
6AC5GT	1.00	7L7	1.50	79	.85
6AF5	1.00	7N7	1.50	80	.60
6AF6	1.60	7Q7	1.00	81	1.50
6B4	1.50	7R7	1.30	82	.85
6B7	.95	7S7	1.50	83	1.30
6B8	1.00	7V7	1.80	83V	1.95
6C5	.95	7Y4	1.30	84/624	1.10
6C6	1.00	7Z4	1.30	89	.40
6C7	.45	12BE6	1.44	117L7GT	2.35
6C8	1.25	12F5GT	1.00	117Z6GT	1.60
6D5	.75	12J5GT	1.00	XX9	1.50
6D7	1.00	12SA7GT	1.30	XXFM	1.50
6F5	1.00	12SF5GT	1.00	XXL	1.50



HEADPHONES

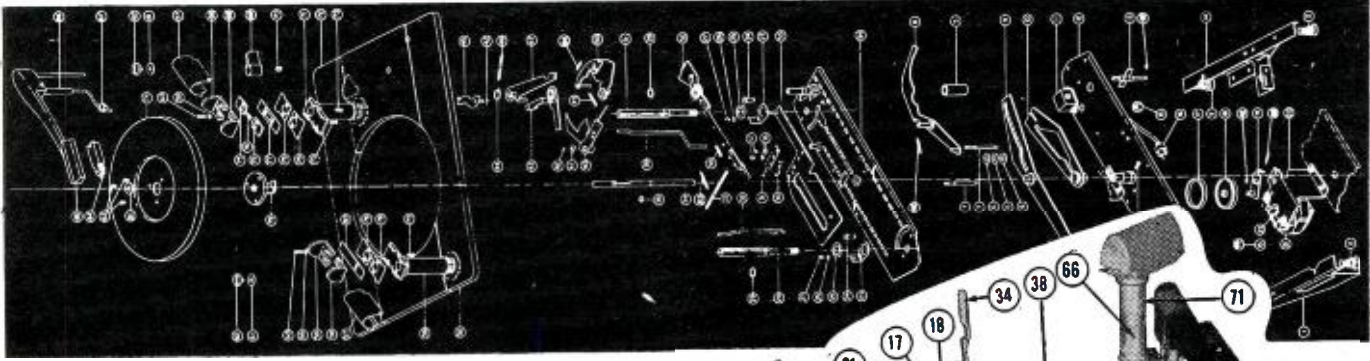
Signal Corps 4000 ohm magnetic headphones. Comes complete with Phono Plug, cord and leather-covered headband... Brand New. Please enclose 20 cents in stamps or coin to cover mailing and insurance. A \$14.50 value..... **\$1.87**

SUN RADIO

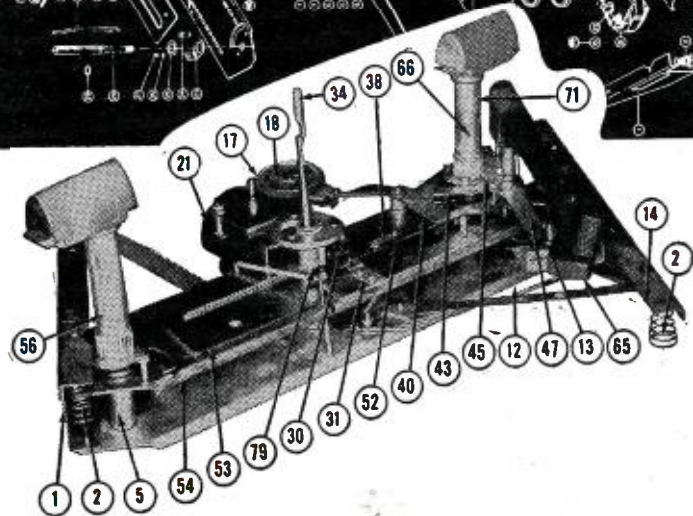
OF WASHINGTON, D. C.

938 F STREET, N. W. WASH. 4, D. C.

New! Exclusive!



PHOTOFACT FOLDERS^{*} analyze all post-war RECORD CHANGERS!



Post-war radio is barely a year old, but already there are 40 different record changers on the market. Do you know who makes them? How they operate? How to service them in case of breakdown? Do you know where you can get up-to-the-minute results of life tests that are now being run?

This vital information now becomes a regular PHOTOFACT FOLDER Service at no Extra Cost to You! Clear-cut photographs, exclusive big line drawings, parts lists, operation details, trouble-cause-and-remedy charts, tell you everything you need to know to do a workmanlike job—help you do twice as many repair jobs a day.

PHOTOFACT FOLDERS save valuable time in many other ways. They make it easy to

*Trade Mark Reg.

diagnose trouble, hunt defective parts, make adequate replacements in *all* the latest radios, phonographs, record changers, recorders, communication systems and power amplifiers. Data and photographs are made from actual examinations of instruments—not from reprinted or copied information.

The cost? Only \$1.50 for each set of 40 folders. Actually they cost you nothing, for they pay for themselves over and over again in time saved. **Over 25,000 radio service engineers now use and depend upon PHOTOFACT FOLDERS.** Why let service problems stump you? PHOTOFACT FOLDERS help you lick every one of them! See your nearest distributor or use the convenient coupon.

PUBLICATION DATES:

Set No. 11 January 10

Set No. 12 January 25

Cut this out and MAIL IT TO YOUR DISTRIBUTOR. If you do not know his name and address, send it directly to Howard W. Sams & Co., Inc., 2924 East Washington Street, Indianapolis 6, Indiana, and we will see that your nearest distributor gets it. In Canada, write to A. C. SIMMONDS & SONS, 301 King Street East, Toronto, Ontario. Canadian Price, \$1.75.

PLEASE PRINT

Send Vol. 2, Set No. 12 Send Vol. 2, Set No. 11

Send me Volume 1 (including Sets Nos. 1 to 10) with De Luxe Binder, \$18.39. Individual Sets Nos. 1 to 10, \$1.50 each.

Send me a De Luxe Binder (at \$3.39)

My (check) (money order) (cash) for _____ is enclosed.

(If you send cash, be sure to use registered mail.)

Name _____

Address _____

City _____ Zone _____ State _____

Company Name _____

My Distributor's Name _____

City _____

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

In Canada—write to A. C. SIMMONDS & SONS, 301 King Street East, Toronto, Ontario



EXPERIENCED SERVICE-MEN SAY —
"YOU CAN INSTALL KEN-RADS WITH
CONFIDENCE"

KEN-RAD RADIO TUBES



RAUDIO OWNERS expect more from their tubes today . . . better tone-performance, longer life. They know electronics has progressed with giant strides, and count on buying a share of the benefits with their repair-dollars.

Ken-Rads fulfill highest expectations. These quality tubes match your quality service. Ken-Rads are advanced in design—lead consistently in performance. General Electric *continuous* research assures this. G-E and Ken-Rad research works day-in, day-out to build greater shock-resisting

strength into tube design—toward more *rigidity* to prevent false responses from vibration and acoustical feedback—in the direction of improved *electrical constancy* throughout tube life.

To radio owners, such progress means better, more satisfying tone over a longer period of time. To you, it means *profits*, from a successful repair business based on a loyal, appreciative clientele.

Install Ken-Rads to reap the reward that comes from handling an up-to-the-minute **QUALITY** tube product!

178-F1-8880

Write for Booklet ETR-16, "Essential Characteristics," the most complete digest of tube information available.

KEN-RAD

DIVISION OF GENERAL ELECTRIC COMPANY

OWENSBORO, KENTUCKY

Amphenol

ALL-WAVE ANTENNA

GETS ALL THREE!

Purchasers of modern radios deserve good reception on all three bands—standard broadcast, short wave and frequency modulation. Until Amphenol engineers perfected this new all-wave unit, the only way to achieve this was to install three separate antennas, a costly and unsightly solution.

The FM section of this new 3-way antenna is a horizontally polarized dipole. It operates most efficiently between 88 and 108 mc.

A 65-foot length of Amphenol Polyethylene covered copper wire serves as the standard broadcast and short wave antenna. The polyethylene covering minimizes precipitation static and assures long life.

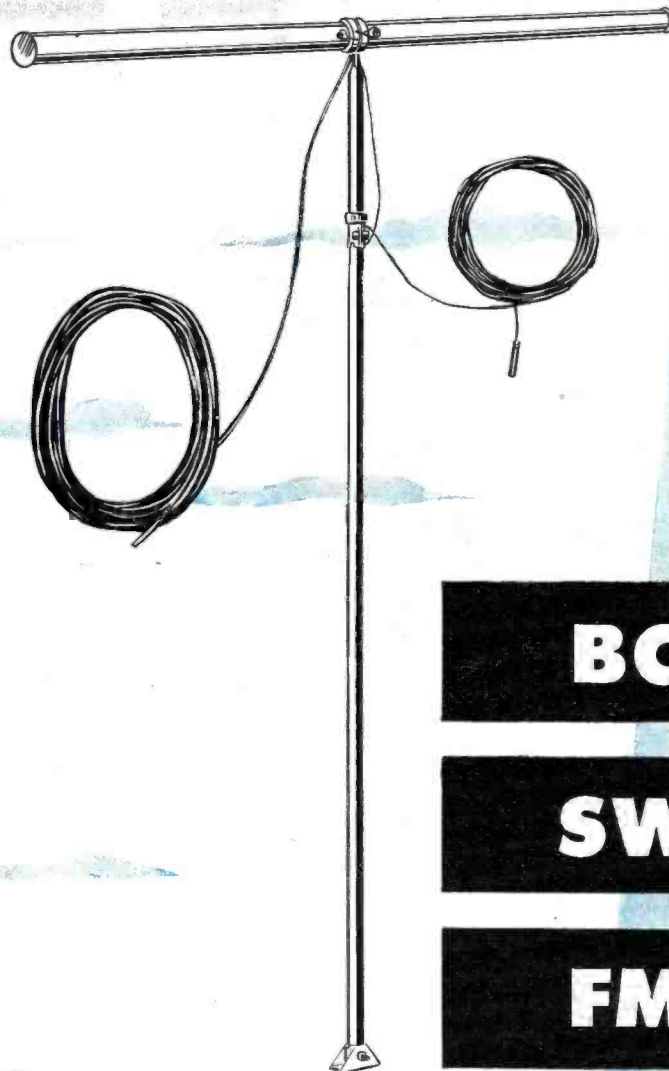
A specially designed series M derived low-pass filter automatically switches the energy from the proper antenna to receiver input.

Installation is simple. The mounting is a 1-inch steel mast 5-feet in length. All hardware is included. A guy clamp bolted to the mast provides for tripod guying.

Vinyl-jacketed Amphenol 52 ohm coaxial transmission line serves as a low-loss lead in and eliminates interference from transmission line pickup. Noisy areas are not a problem with this antenna.

In a comparative test with the best available standard double doublet (with matching transformer) the Amphenol All-Wave Antenna proved far superior in gain—as well as being interference free.

Write for complete technical data, or see your jobber for full information.



BC

SW

FM

AMPHENOL ALL-WAVE ANTENNA UNIT INCLUDES:

- ★ FM dipole with molded phenolic weatherproof filter housing
 - ★ Steel mast 5-feet long with guy clamp and adjustable insulator
 - ★ 50-foot Amphenol RG-5/U 52 ohm coaxial cable
 - ★ Antenna wire polyethylene covered
- ★ Built-in M derived network

AMPHENOL

AMERICAN PHENOLIC CORPORATION
CHICAGO 50, ILLINOIS

COAXIAL CABLES AND CONNECTORS • INDUSTRIAL CONNECTORS, FITTINGS AND CONDUIT • ANTENNAS • RF COMPONENTS • PLASTICS FOR ELECTRONICS

BACKED BY

YEARS OF

36
know-how



HQ · 129 · X

"This morning I had a VK on phone, driving the S-meter completely off scale."

Another says, "Finest receiver on the market." Thus run the comments on the HQ-129-X. And why shouldn't they—thirty-six years of craftsmanship and research engineering back up every Hammarlund product.

see

the HQ · 129 · X
at your dealer's

34

HAMMARLUND

THE HAMMARLUND MFG. CO., INC., 460 W. 34TH ST., NEW YORK 1, N. Y.
MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT



RADIO NEWS

Radar on the Great Lakes

By **NORMAN A. SCHORR**

Characteristics of six different types of radar installations now operating as test units aboard lake carriers.

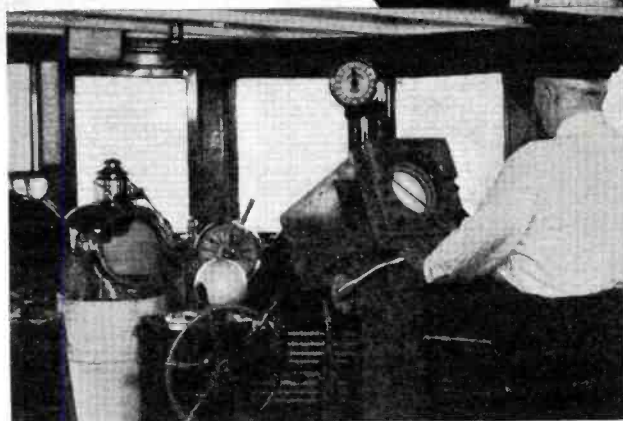
A DENSE fog suddenly descended on Lake Erie the morning of April 27, 1944. War shipping was at its height on this narrowest and most heavily-trafficked of the five Great Lakes. Within a few hours, two collisions occurred that cost the lives of 12 crew members and the loss of two cargo-laden ships. Without warning, the ore-carrier *James H. Reed*, collided head-on with the steamer *Ashcroft*, and sank quickly off Conneaut, O. Seventy-five miles west, the 4000-ton *Frank E. Vigor*, carrying a load of sulphur from Chicago to Buffalo, foundered and sank after colliding with the *Philip Minch*.

Accidents like these are rare in Great Lakes shipping history. In fact, they have occurred on Lake Erie an average of once in 20 years since the advent of steel vessels in 1886. Stringent traffic rules, a special system of whistle signals, carefully routed up and down courses, and more recently radio telephone, radio beams and direction finders have combined to hold down the number of accidents.

But still they have occurred—and when they do, the need for all-weather navigation instruments is emphasized.

Though collisions caused by fogs have been infrequent, it is not unusual for skippers to be forced to drop the hook and wait until adverse weather conditions lift. Fog is encountered frequently in the spring and fall, and

February, 1947



occasionally at other times. In the late fall, storms of sleet and snow can be expected. In a recent year more than 4,000,000 gross tons of cargo space were lost as a result of delays, collisions and groundings due to fog. Bad weather has held up ships for as long as 30 hours. As many as 100 boats have been fog-bound at the locks of the Sault Sainte Marie canal at one time.

Great Lakes shippers took an immediate interest in radar as soon as the first successful marine application became known. Experience of the Coast Guard with radar during the war was watched as closely as security regulations permitted. A few sets were installed for brief trial runs, but ex-

tensive equipment for thorough experimentation was not available. It was not until after V-J Day that the shippers through their Lake Carriers Association initiated an active program, called the Radar Operational Research Project, to develop radar equipment best suited for Lake operations.

They needed a navigation aid that would make possible close-range sailing in thick weather. Such a radar design would of necessity have high accuracy and definition at close quarters and would be capable of clearly showing shore lines, other ships, and the comparatively small buoys and channel markers.

It was decided that the radar re-

The ship "George F. Rand" was assigned to Raytheon for their radar installation. The wave guide run from the antenna to transmitter is 70 feet. The indicator, housing a 7" PPI, can be tilted 45 degrees vertically and rotated through 45 degrees horizontally.

Manufacturer	Band	Diameter of PPI (in inches)	Range Scales (in miles)	Transmitter Peak Power Output (in kw.)	Modulator	Pulse Length (in micro-seconds)	Pulse Repetition Rate (in cycles per second)	Antenna Construction	Beam Pattern at Half Power Points	Polarization	Rate of Antenna Rotation (in r.p.m.)	R.F. Transmission Line
GENERAL ELECTRIC	10 cm.	7	2, 6, 30	7	Plotron	0.5	1500	Truncated Parabola	Vertical: 17° Horizontal: 5°	Vertical	11	Coaxial
RADIO-MARINE	3 cm.	12	1.5, 5, 15, 50	30 or more	"Hard" tube 5D21	Short Range: 0.25 Long Range: 1.0	3000 750	Parabolic Cylinder	Vertical: 18° Horizontal: 1.7°	Horizontal	10	Wave Guide
RAY-THEON	10 cm.	7	1.5, 5, 15, 50	15 or more	Hydrogen Thyatron	0.4	1000	Truncated Parabola	Vertical: 12° Horizontal: 3.5°	Horizontal	7	Wave Guide
SPERRY	3 cm.	12	2, 10, 40	35	4C35	0.25	1000	Parabolic Cylinder	Vertical: more than 15° Horizontal: 2° or less	Horizontal	15	Wave Guide
WESTERN ELECTRIC	3 cm.	7	1-40 (variable)	40	Hydrogen Thyatron	0.5	1000	Truncated Parabola	Vertical: 15° Horizontal: 2°	Horizontal	12	Wave Guide
WESTINGHOUSE	3 cm.	7	2, 8, 32	15 or more	Hydrogen Thyatron	0.4 (maximum)	2000	Truncated Parabola	Vertical: 15° Horizontal: 2°	Horizontal	12	Wave Guide

Table 1. Characteristics of radar sets installed in Lake Carriers Association's Radar Operational Research Project.

search men and engineers should be brought in direct contact with Great Lakes navigation personnel, so that each group might become familiar with the problems of the other. To this end, radar manufacturers were invited to install sets aboard a Lake cargo vessel during the 1946 season. Six manufacturers accepted the invitation and each was assigned a different ship on which to make an experimental installation that would operate on the Lakes. Upon conclusion of test runs and evaluation of re-

sults, minimum operating specifications will be set forth.

Since the Lake Carriers Association represents 90 per-cent of the bulk cargo carried on the Lakes, this project is being followed with great interest in marine shipping circles, particularly with regard to inland waterway navigation.

The busy Great Lakes are connected chiefly by rivers and dredged channels, some of which are no more than 600 or 700 feet in width. On an average trip a freighter will spend 25 to 30

per-cent of the time traveling in these confined waters.

Among the most tortuous of these are in the entrance to the locks of the Sault Sainte Marie Canal between Lakes Superior and Huron; the Straits of Mackinac between Huron and Michigan; the St. Clair flats and Detroit River between Huron and Erie; and the Welland Canal between Erie and Ontario.

One of the narrowest and most inadequate of the dredged channels is the 700-foot wide Southeast Bend around Harsens Island, in the delta of the St. Clair River. It is in an area subject to sudden fog. Up and down traffic must squeeze through a 2½ mile stretch of reverse bends that afford slight clearance. Each season the Bend sees about 20,000 vessel passages, carrying 90 to 100 million tons of ore, coal, grain and stone.

Another tight spot is the 4½ mile long West Neebish Channel, down bound from the Sault Canal. There, shores are as low or lower than a vessel's deck. Three miles of the channel are only 600 feet wide. Then it narrows for 5000 feet to a width of only 300 feet, and a depth of 24 feet, 8 inches—blasted through rock.

Typical ones of the larger bulk cargo vessels are 600 feet or more long, 60 feet wide and travel at a speed of 11 to 13 land miles per hour. All in all there are about 800 commercial vessels of both American and Canadian registry plying the Lakes, almost half of them major type vessels.

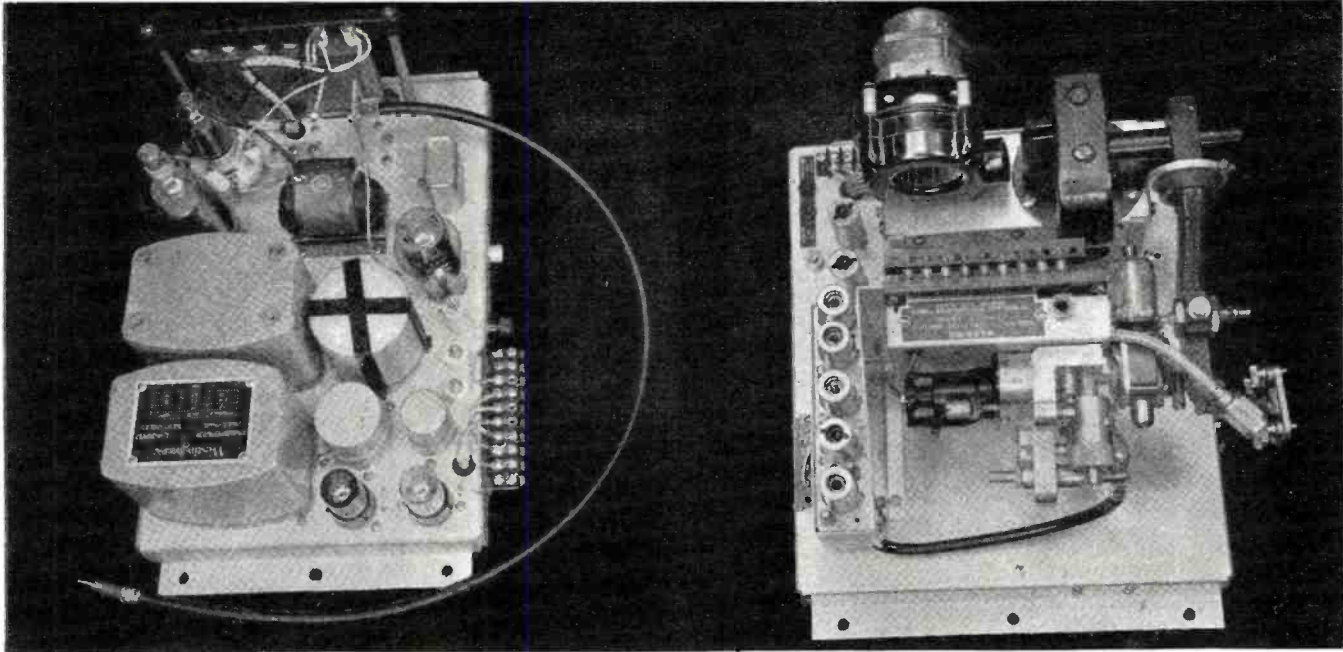
During busy times there is a two-way procession of ships going through the man-made locks and channels sometimes only 15 minutes apart. It is not difficult to visualize how impairment of visibility as a result of fog, sleet or other thick weather can seriously hamper traffic and even paralyze all navigation.



Indicator binnacle of the Sperry Gyroscope set houses 12" PPI and associated controls. Visible are range selector switch, variable range marker, bearing cursor, anti-clutter selector switch, and azimuth scale illumination control.

The parabolic reflector in the scanner component of the Sperry Gyroscope marine radar is 48 inches by 18 inches and rotates 360 degrees in azimuth at about 15 revolutions per minute. Contained in the splash-proof box are a driving motor (split-phase ½ horsepower squirrel cage induction motor) and a type 5G synchro generator.





Modulator section of the Westinghouse set is located in the weatherproof base of the antenna pedestal. Action of the sine-wave oscillator, blocking oscillator, and thyratron tube, all shown in the picture, triggers the magnetron 2000 times per sec.

Radio frequency head of the Westinghouse set is also installed in the lower section of the antenna pedestal. It contains the magnetron oscillator, the crystal detector, local oscillator, and the high-frequency circuits associated with them.

During fogs, a phenomenon known as "aberration of sound" often occurs and contributes to make navigation more hazardous. On such occasions, "dead spots" appear on the Lakes. In these areas whistle signals from approaching vessels either cannot be heard or are distorted so that they seem to come from a source other than their true one.

Other aspects of Great Lakes shipping that affect the job that radar is being called on to perform:

Extreme length of travel in the Lakes from Duluth to Montreal is more than 1300 miles, but the main movement of ships is over the 1000-mile run between the upper Lakes and Lake Erie. Sailing season averages eight months, from about April to December, when the Lakes are free of ice. During this period a bulk cargo vessel may travel a distance equal to 2½ times the earth's circumference at the equator, making port at least twice a week, for about 4 to 5 hours at a time.

Compared to similar salt water vessels, these Lake carriers are somewhat larger and travel a few miles faster. During the war they delivered 4½ times the total tonnage carried by all of America's merchant marine fleet on salt water.

The master of one of these vessels cannot sail down the winding course of a river or channel by setting a compass course as is done in ocean sailing. He must follow a course marked by buoys of various sorts. At night his course is indicated by red and green lights on top of these markers, in addition to a heading taken on the range lights. When the skipper reaches an open lake area the widely separated up and down courses are followed by compass bearings in reference to special shore lights.

Unlike the salt water master he cannot call on a harbor pilot, and a tug or two, to guide him into each of the 80-odd major ports on the United States and Canadian shores. He himself controls all the ship's movements from the time she raises anchor in the spring until she is laid up at the end of the season. An additional navigation problem is presented by the fact that many of the Lakes harbors are located at mouths of rivers.

This was the picture when the radar manufacturers entered the program last year.

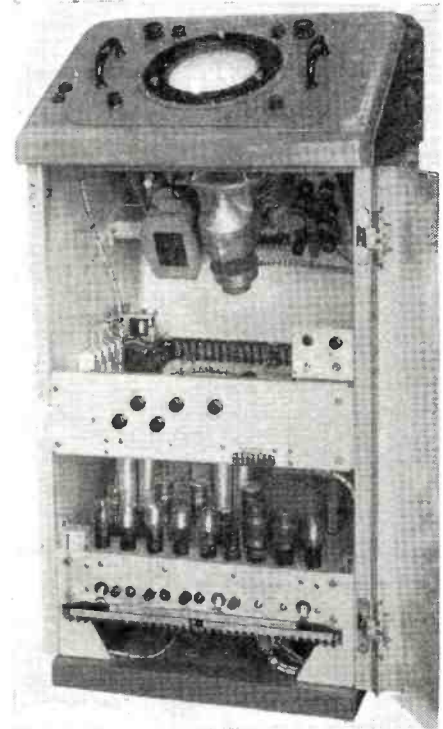
The surface search sets they installed are principally simplified versions of the military and naval designs in widespread use during the war. They are designed for reliable operation without the attention of technical personnel. A navigator can operate a radar set after an hour of practice. Installed to give a maximum over-all view of the horizon, they furnish a continuous radar picture of the waters surrounding a ship, detecting the presence and location of shore-lines, buoys, lighthouses and other vessels, with respect to the radar-equipped ship.

Unlike military radar sets which included the so-called A-type indicator, the simplified marine radar sets depend solely on the PPI (Plan Position Indicator) to give the ship's navigator range and bearing information. This is accomplished by transmitting short pulses of ultra-high frequency radio energy at a rapid rate. These powerful radio waves are concentrated in a beam that is narrow in the horizontal plane and comparatively wide in the vertical plane. They strike objects in their path and are scattered. A small fraction of the original waves is reflected back to the rotating antenna, which in the interval between pulses serves as the receiving antenna. The

reflected waves are amplified and fed to the fluorescent screen of a cathode ray tube where they are translated into spots of light.

Factors governing the determination of a range reading include an object's size, shape, reflectivity, height, radar sensitivity and the wavelength of the radar set. But in general, radar horizon is the basic limiting factor for maximum range readings. In other words, a large object will loom higher

Indicator console in the Westinghouse installation. Below the seven-inch PPI and its controls and circuits are the low voltage power supply and the intermediate and video frequency amplifiers.



A GE parabolic reflector installed atop the pilot house of the "Ernest T. Weir." First Mate Gallagher and Captain Hartman are inspecting the installation.



Captain Hartman, a veteran of more than 40 years' service on the Great Lakes studies the PPI of the General Electric "electronic navigator" aboard ship.

on the horizon and will offer a larger reflecting surface; hence it will be able to be detected at greater distances.

Since radio waves travel at a constant speed of 186,000 miles per second—like light—measurement of the time it takes for a signal to travel out and bounce back gives a reliable reading of range, or the distance between the ship and the object. On the sets in this project, readings are accurate to within approximately one or two percent.

The face of the scope is calibrated in miles. Maximum range can be varied, in steps, depending on how large an area the operator wishes to scan. Concentric marker rings, equally spaced, can be superimposed on the screen of the cathode ray tube to aid in estimating range. The minimum range at which an object can be detected is 100 yards and the maximum with any of the sets is 50 miles.

Transmitting a pulsed high-frequency signal is accomplished in this way: A high voltage pulse of microsecond duration causes a magnetron to oscillate. The resultant signal is sent to the antenna through a wave guide or coaxial system and directed into space by a reflector.

Reflected energy is returned to the transmitter and detected in an r.f. section, where an i.f. signal is produced according to the superheterodyne principle. The i.f. signal is then

amplified and detected. This time a video signal is the result and it is sent to the PPI indicator circuits, modulating a narrow electron beam. This beam shows up as a line of light on the scope face, and as it rotates, leaves a trail of objects visible to the observer as bright spots.

In order that range information be accurate, indicator circuits are timed to start the electron beam's radial sweep each time the magnetron emits a pulse. As a burst of energy leaves the antenna the beam in the tube starts its movement toward the rim, and completes its journey in the interval between pulses. It is in this interval that the reflected signal is picked up by the antenna and fed to the PPI.

Rotation of the antenna is linked to the magnetic deflection coils around the CRT, thus synchronizing the rotation of the electron beam. Since the high frequency energy travels in straight lines and at such great speeds, the reflections show up in proper bearing.

As the antenna's beam sweeps across the bow of a ship, a radio line called a "heading flasher" is intensified on the PPI. When the picture is stabilized with North at the top of the scope, this flasher indicates ship's direction or heading.

Equipment for azimuth stabilization is provided with some sets to furnish

a bearing with respect to true North. This is possible when a ship is equipped with a gyro-compass.

The radar picture is a continually changing one, and therefore the direction of any moving object may be noted. The path of another ship can be "observed" through a fog; and together with the use of navigational charts and standard techniques of seamanship, safe travel is made possible under adverse conditions.

In addition, an indication of an object's physical composition also can be learned from the blobs of light on the scope face. Shore lines are clearly outlined; rain appears as feathery masses. Buoys show up as small, but distinct dots. Ships may be accurately outlined, but more frequently resemble oval-shaped objects. A tug towing a barge often can be distinguished from two separate ships.

To help the receiver provide an accurate scope picture under varying conditions, it is equipped with STC (sensitivity time control), FTC (fast time constant) and AFC (automatic frequency control circuits).

STC suppresses "sea return," which is the reflection of signals from waves or particles of water. These signals impair observation of close target objects in rough weather. The STC circuit increases the receiver gain automatically with range, and is usually available to the operator in steps.

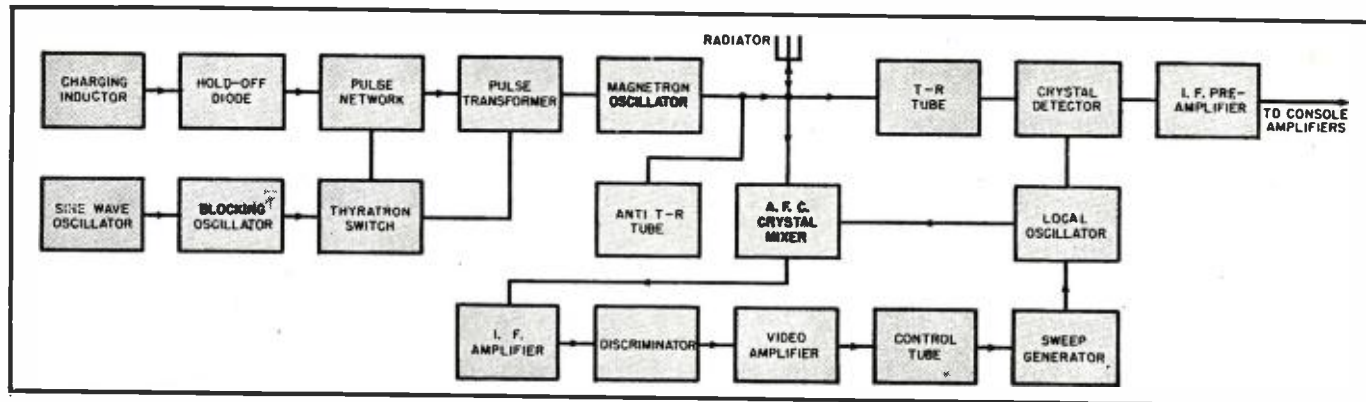
FTC breaks up large signals caused by interference or by closely-grouped targets. It is particularly useful in detecting objects like channel buoys in heavy "sea return" or heavy rain.

Automatic frequency control stabilizes receiver tuning with respect to the magnetron frequency.

Since one antenna is used for transmission and reception, the sensitive receiver must be protected during transmission periods. This is accomplished by a transmit-receive tube which fires and effectively short-circuits the receiver every time an outgoing pulse travels toward the antenna. To prevent any reflected power from being wasted by going to the quiescent magnetron between pulses, an anti-transmit-receive tube that presents a large impedance to the signal is employed.

The sets are designed to operate on
(Continued on page 144)

Modulator and r.f. head of Westinghouse radar set, including microwave section, a.f.c. control, and preamplifier.



Superregenerative Frequency Converter

This inexpensive, easy-to-build converter will extend your present communications receiver into the v.h.f. and u.h.f. region.

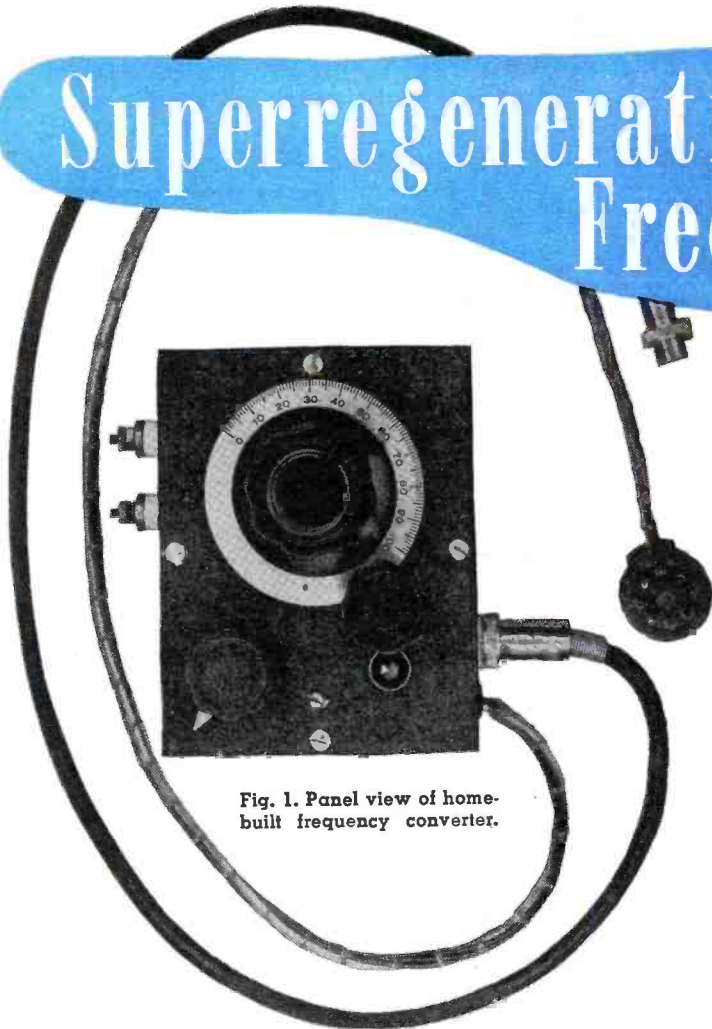


Fig. 1. Panel view of home-built frequency converter.

By

P. V. TRICE, W3QHS
and
M. BARAT Jr., W3KIL

THE unit to be herein described provides a novel and inexpensive means of securing good reception of signals on the ultra-high and very-high frequency bands. The ultimate range which can be reached, must, of necessity, be determined by the type of tube used. The apparatus shown and described here was constructed primarily for use in the 144 mc. band but, if desired, the v.h. frequencies could be reached by the substitution of a Lighthouse tube. The principle involved, which consists of selecting a suitable quench frequency harmonic from the converter and feeding it through a low-frequency r.f.-audio outfit (receiver), is not basically new. Many ultra-high experimenters have, no doubt, at some time or other, noticed that the u.h.f. signals they were listening to on their superregenerative receiver, were, at the same time, receivable at a certain point on the near-by broadcast receiver. However, the signal from the latter was always distorted beyond the point of intelligible reception. This distortion was the result of the superregenerative receiver (local oscillator) over-

loading the input stages of the low frequency b.c. set.

In this converter, the distortion is eliminated by keeping the actual plate voltage applied to the tube to the minimum necessary to keep the self-quench action in effect; and by means of extremely loose coupling between the output of the converter and the input of the low-frequency receiver, controlling the amount of drive to the in-

put of the low-frequency stages, and thus obtaining normal, distortionless reception.

Although the quench frequency may occur somewhere between 10 and 100 kc., depending on the particular set, let us assume, for the sake of simplicity, that the fundamental quench frequency is 50 kc. Then as shown in the chart (Table 1) the harmonics
(Continued on page 133)

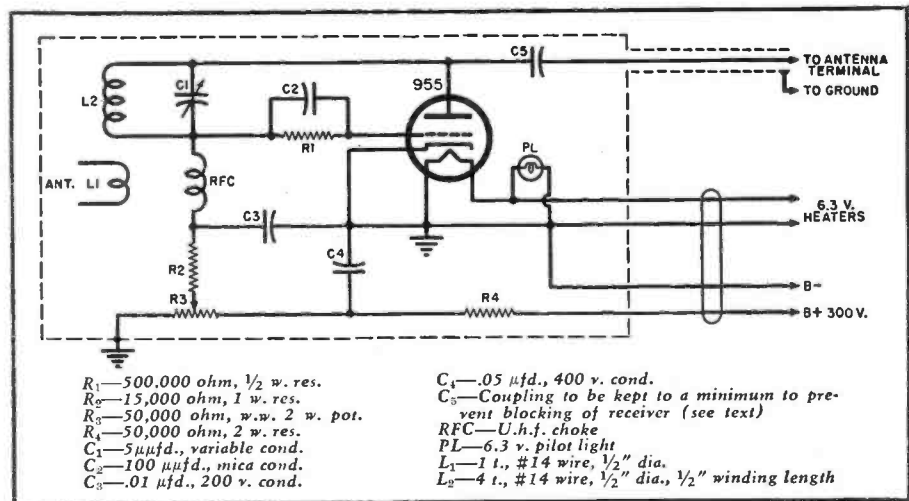
PRINCIPLE OF OPERATION

In the superregenerative frequency converter circuit, self-quenched, or one using a separate quench oscillator, the frequency of the incoming signal is changed to a new radio frequency (harmonics, see Table 1) that can be amplified and detected. The frequency is changed by means of the quenching process, the introduction into the circuit of an alternating voltage of a frequency above the audible range (20 to 200 kc.) in such a way as to vary the detector's operating point. As a consequence of the introduction of this quench or interruption frequency, the detector produces harmonics (Table 1) of the quench frequency which contain the modulation of the incoming signal. This quench frequency and/or its harmonics can be amplified thru a low frequency receiving system or radio frequency amplifier and the original modulation recovered.

This converter results in improved selectivity, sensitivity, and signal to noise (hiss) ratio. It detects and converts AM and FM signals, and acts as a limiter and a.v.c.

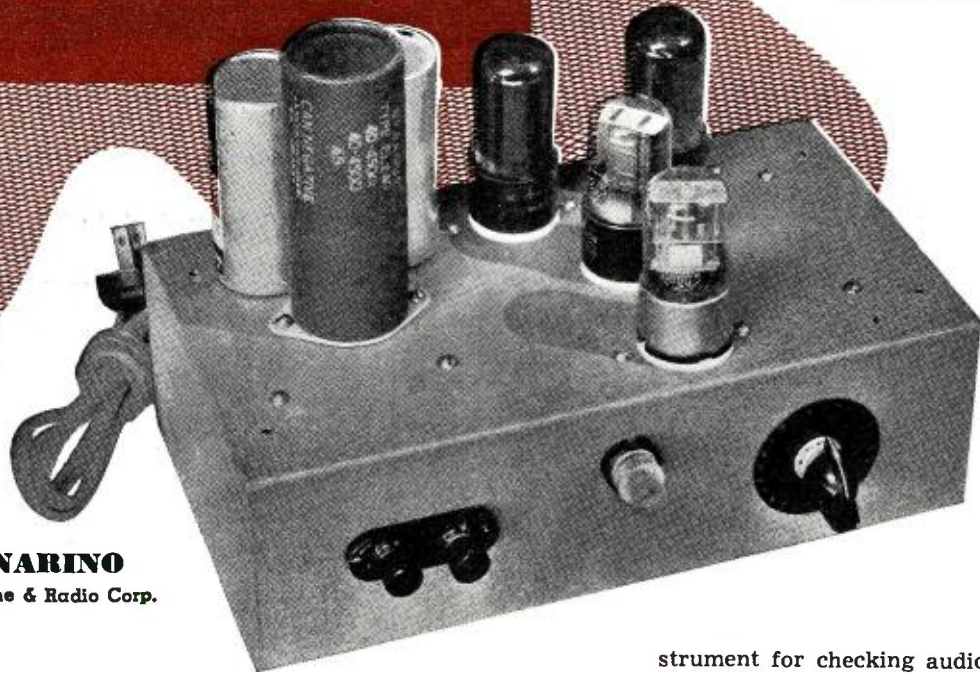
This conversion is not a heterodyne process, thus is able to convert direct to frequencies low enough that a stable, high gain amplifier may be used. It does not contain spurious r.f. signals known as "images," since conversion is a one step conversion and the high frequency does not have to be tuned so that other signals of another frequency will produce an output.

Fig. 2. Diagram of 144 mc. converter. Frequency range may be extended by substituting a "Lighthouse" tube. "A" and "B" voltages may be obtained direct from receiver.



A.C.-D.C. AUDIO AMPLIFIER

Front-top view of completed amplifier. Note in particular that all transformers have been eliminated.



By

GEORGE EANNARINO

Field Eng., Federal Telephone & Radio Corp.

This 10 watt, 4-tube audio amplifier using the new selenium rectifiers is easy and economical to build.

THIS transformerless power supply, four-tube audio amplifier having a maximum power output of 10 watts has the added feature of incorporating a miniature selenium rectifier in place of a conventional vacuum tube. Use of the selenium rectifier not only enables this amplifier to weigh less, cost less, and occupy less space, but also due to the long life and high current carrying capacity of this rectifier, improves its performance and reduces power supply failures to a minimum.

Sensitive enough for crystal microphone or phonograph pickup and with only a 10% distortion between the frequencies of 40 to 15,000 cycles at 8 watts output, this amplifier should find extensive application in home receivers, telephone equipment, loudspeaker systems, and low power voice transmitters. Here is a compact, inexpensive amplifier, which can also be used as a self-sustained component in all types of combination sets, a pre-speech amplifier or modulator in amateur voice transmitters, or a test instrument for checking audio systems.

strument for checking audio systems.

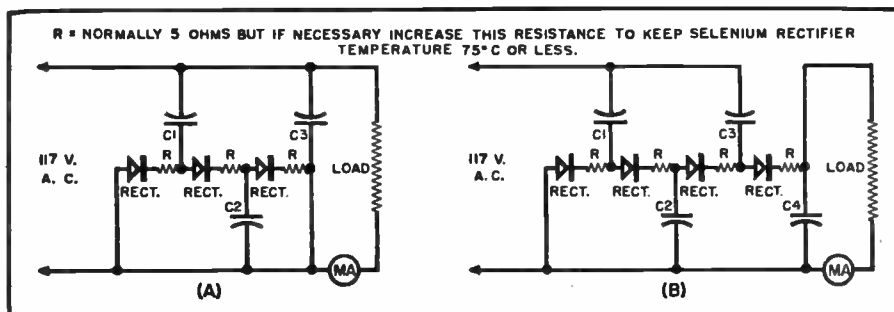
This amplifier can readily be incorporated into the original design of such equipment and offers the manufacturer an opportunity to cut his costs, speed production, and stimulate sales. Use of the selenium rectifier not only reduces the weight and size of the product, but also simplifies assembly and therefore saves production time.

As indicated on the schematic diagram, Fig. 2, this amplifier consists of three stages using four tubes—a 12SQ7 as the first audio, a 12J5 as the inverter, and two 50L6's in push-pull as the output. These circuits are conventional and it is only in the power supply, where no transformer is required, that this amplifier does not follow conventional design.

Elimination of the power transformer is accomplished by the use of two selenium rectifiers in a voltage doubler circuit which supplies 200 v.d.c. at 125 ma. to the two 50L6 output tubes. No filament is required either, since all the filaments are connected in series and are placed across the a.c. line. Thus a large saving in weight, space and expense is obtained without any loss in efficiency or performance of the amplifier.

The use of a rectifier in voltage multiplier circuits is in itself not novel and has been used before. However, when applied to vacuum tube rectifiers, this design is highly impractical. There are two reasons for this. In the first place, with the tube heaters connected in series in this type of chain circuit, there exists dangerously high potential differences between

Fig. 1. (A) Voltage tripler circuit using three 200 ma. selenium rectifiers. With 40 μ d. for C_1 , C_2 , and C_3 , a d.c. output of 325 volts can be obtained with a load of 200 ma. (B) Voltage quadrupler circuit using four 200 ma. selenium rectifiers. With 40 μ d. for C_1 , C_2 , C_3 , and C_4 , a d.c. output of 425 volts can be obtained at 200 ma.



heaters and cathodes of the rectifier tubes at the high voltage end of the system. This difficulty might, of course, be obviated by the use of heater supply transformers but this destroys the simplicity of the system.¹ However, since selenium rectifiers do not use filaments, this problem does not exist when they are used. Low current rating, resulting in poor voltage regulation, is the second reason for the inadaptability of vacuum tubes to this type of a circuit.

From the theory of power supplies² it is known that the degree of regulation will depend to a great extent on the size of the condenser immediately following the rectifier (shunt condenser input-filter circuit). The size of this condenser, in turn, is limited by the current carrying capacity of the rectifier. Since a selenium rectifier will safely pass more current—both transient and steady state—a larger condenser can be used and improved voltage regulation obtained.

The voltage doubler circuit used in this amplifier is shown in the schematic diagram (Fig. 2). The maximum voltage output that could be obtained at 150 ma. is approximately 255 volts when a 40 μ fd. condenser is used. Since only 205 volts are needed for the plates of the 50L6's a 22 ohm safety factor resistor and a 200 ohm dropping resistor are inserted in the circuit. The function of the 22 ohm resistor is both to drop the voltage and to limit the peak condenser charging current, thereby increasing the life of the selenium rectifiers.

Of course this circuit may be modified to meet any individual requirements. For instance a simple method whereby the 10 watts maximum output can be increased to 15 watts is to replace the 50L6 tubes with 6L6 and the 150 ma. selenium rectifiers with the 200 ma. type. Likewise lower powered amplifiers can be constructed using the a.c.-d.c. power supply circuit shown in Fig. 3.

If even higher powered outputs are desired a voltage tripler or even quadrupler circuit, shown on Figs. 1A and 1B, can be utilized. The voltage tripler circuit can be used to power a 20 watt maximum output amplifier. In this case the same amplifier circuit is used except that a 6SQ7, 6J5 and two 6L6's replace the 12SQ7, 12J5 and two 50L6's, and a filament transformer is added to the power supply.

It should be noted that when these transformerless circuits are used, as indicated in Fig. 2, an isolated ground (chassis not d.c. ground) must be used. The reason for this is that the standard practice in most communities in the United States requires that one side of the house wiring be connected to ground at the electric meter. It is readily seen that if the power plug is so inserted in the outlet that the chassis is connected to the ungrounded side, the full line voltage can occur between chassis (if isolated ground is

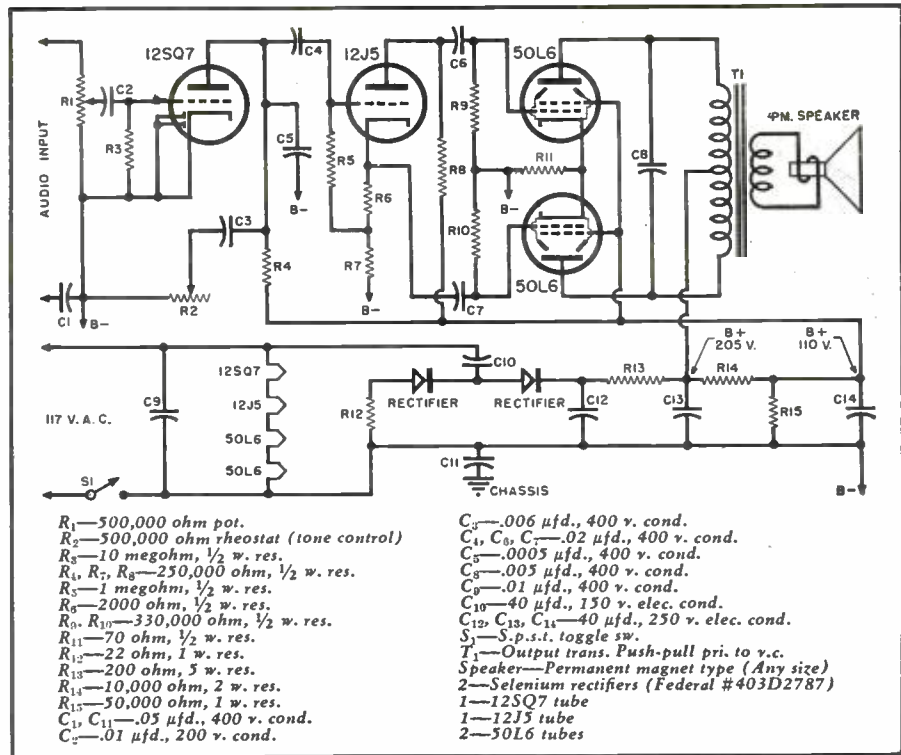


Fig. 2. Schematic diagram of 4-tube, 117 volt a.c.-d.c. audio amplifier.

not used) and any other grounded conductor such as a waterpipe, radiator system or outlet face plate.

In order to use this unit in conjunction with other equipment a .05 μ fd. condenser should be connected between the isolated ground and the chassis. This will provide adequate radio frequency grounding or by-pass of the power line¹ and at the same time, if the .05 μ fd. value is adhered to, it will prevent the chassis from being at a high d.c. or 60 cycle potential.

—30—

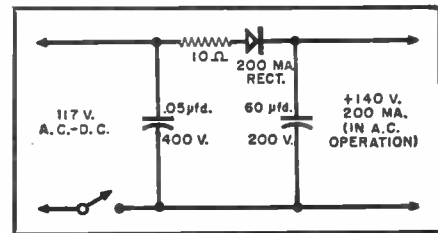
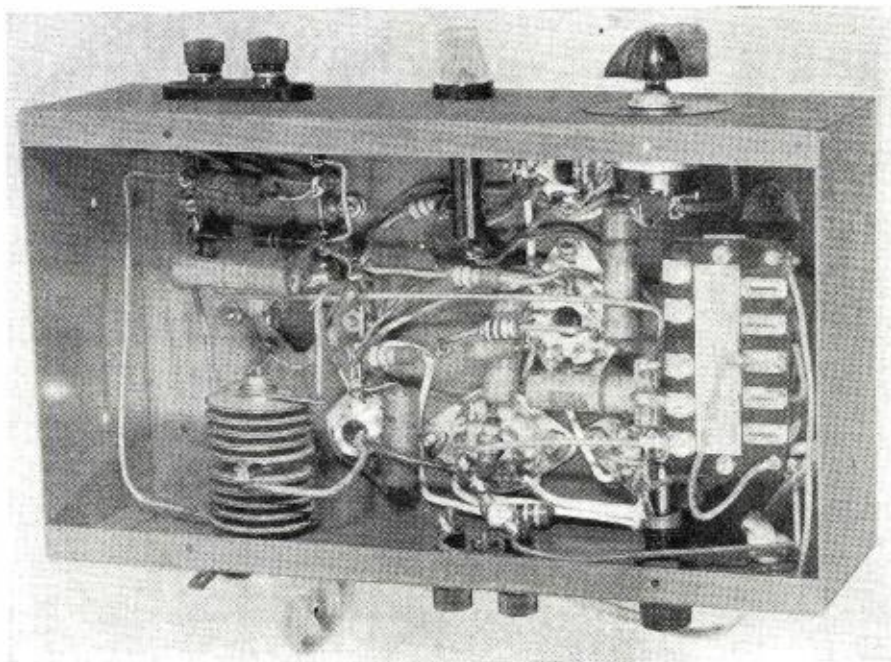


Fig. 3. Schematic diagram of an a.c.-d.c. selenium rectifier power supply which can be used to operate a 6 watt audio amplifier, using same circuit shown in Fig. 2.

Under-chassis view of amplifier shows position of the two selenium rectifiers.



¹ "Mallory Technical Manual"—page 59.
² Terman, F. E. "Radio Engineering"—pages 491-498.

Retailing Basics



What merchandise shall I carry?



How shall I dress my store?

That Pay Off

By **DR. LOUIS BADER**

Assoc. Professor of Marketing
New York University

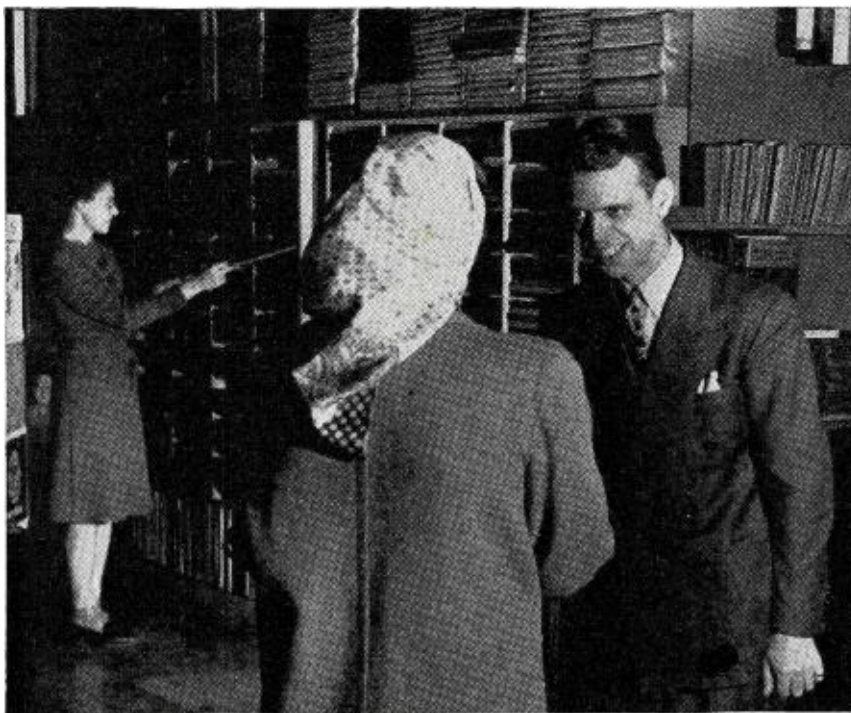
Although the points stressed by the author are not new, they are of sufficient importance to be reemphasized for both old and new dealers.

ONE of the most important problems a dealer has to face is how to get customers into his store to buy radios and appliances. This is the crux of successful retailing—sales promotion. Related to it is another problem which should be dealt with first, i.e., Dealer Sales Quotas and Allocation.

Manufacturers and national distributors estimate a total sales potential based on studies of recognized trading areas. A quota is set for each area. Dealers are then selected, usually with the understanding that they are to secure, from the areas they cover, a certain amount of business. When all of the dealers' quotas are added together the total should equal the manufacturers' sales potential. That much planning the manufacturers and national distributors must do.

The assigned quota for each item that the dealer handles should be made the *central point or core* of his sales promotion plan. Without such a point his sales promotion work may become chaotic, seem difficult to understand, and may be ineffective.

The foresighted dealer, unless in the country, will allocate a sales quota for each residential block in his area. The dealer's own marketing survey will furnish data for each block and provide complete information on the number of families, their incomes, and the condition of their homes. The dealer who carries a full line of appliances ought to sell \$1200 to \$1500 worth of merchandise to each family during the next five or six years, assuming that the period is one of full prosperity. It is also assumed that the trading area will average 1500 to 1600 occupied wired homes. Under these conditions and in a normal market, the aggressive and well-equipped



The manner in which you and your employees greet your customers goes a long way toward establishing your company's reputation.

dealer with sufficient capital, should do between \$200,000 and \$400,000 worth of business annually. A dealer with an especially full line of the smaller, and in some cases, "impulse buying" items might increase his sales volume and profits materially regardless of the size of the trading area. Conversely, stiff competition might reduce his share considerably.

In connection with the sales quota, the dealer should work out some simple system of control which would enable him to keep tabs on his block

sales as against expectations so that special attention could be given to those areas where sales do not meet the quota.

The over-all business that the manufacturer expects to secure is going to be divided among many types of dealers. Most department, furniture and variety stores are looking forward to establishing or re-establishing radio and appliance departments. They are usually very aggressive merchandisers. It is not too early, therefore, for other dealers to take stock

of themselves as merchandisers, to check over what successful merchants have done, and to emulate them.

Observations and talks with many successful business men have provided several interesting conclusions:

1. *Personality of the dealer and his salesmen.* We are convinced that this is the most important single factor in the success of retailers and many other business men. We all have personality, some people have the right kind and others the wrong kind for this work. The right kind of personality suggests to the customer that the dealer is a pleasant sort of person who is sincerely interested in him and his desires. The atmosphere of the store should indicate immediately to the customer that the dealer and his employees are at his service. The dealer and his clerk should show by their attitudes and actions that they really want to serve the customer and that the size of the order is a secondary consideration. Customers should be greeted with a genuinely pleasant inquiry as to what can be done for them; an interest should be shown in their conversation, and their opinions should be respected.

People cease to patronize certain stores when their wishes and feelings are ignored by the owner and/or his sales personnel. No one likes to be ridiculed, thus, real or implied slights which border on ridicule constitute a sure way to lose customers.

Not everyone who enters your store will be blessed with your good taste. If some of the requests for merchandise seem ludicrous to you or your staff, they must still be treated seriously and the customer should be assisted as courteously as your most cherished sales prospect. Never forget for a moment that the most important subject in the world to any person is himself. You can never make a customer unhappy by letting him talk about himself, his problems, his ideas or his dreams.

While the very thought of being subjected to the whims of your customers leaves you with chills running up and down your spine and a defensive attitude that would do credit to the Marines, these are personality traits which can be developed—in fact, must be developed if you are to become a successful retailer.

2. *The merchandise to carry.* Equally important to the success of a retail venture is the choice of suitable merchandise. The dealer must know his trading area intimately, what merchandise his clientele can buy, and will want to buy. He should carry the most complete line of goods that his trading area can sustain. In addition to complete lines, he must also select merchandise in the price ranges which his customers can afford. This may entail carrying several price ranges within each product line, but each line should be the very best value for the money the customer has to spend.

A great many people know the nationally advertised lines. Dealers will,

therefore, find it profitable to carry such lines. Since nearly all dealers seek brand lines, a particular dealer may not always secure the agency for the particular brand he would like to carry. In such cases he will take what he can get and be prepared to explain to prospective customers why *he has selected* the X washing machine rather than the Z machine. Each brand has its outstanding selling points and these then become the reason for the selection of that product by the particular dealer.

3. *The dealer's store.* It has been assumed that the progressive dealer will have selected the most advantageous location within his means, but his responsibility toward his store and his customers does not cease with this consideration.

The appearance of the store, both inside and out, is vital to securing and maintaining a good business reputation. First of all, the alert dealer will have a show window that does a real selling job. This is the customer's first contact with the organization—it must be effective. It goes without saying that the merchandise on display should be arranged in a neat and attractive array, and the over-all effect should be one of military cleanliness. This is important particularly in displays of appliances. The glossy white finishes of refrigerators, ranges, etc., will reflect every bit of dirt and soil on them.

The second point of contact with the dealer's store is the sales floor. Merchandise should be so arranged that demonstrations can be conducted easily without the necessity for removing merchandise from one part of the floor to another. Adequate provision should

be made for convenience outlets in order that appliances can be operated for the customer's benefit.

In arranging the sales floor as a traffic builder, thought should be given to the placing of merchandise and service centers to the rear of the store in order to draw traffic through the entire merchandise display. The public utility companies put the cashier's window at the rear of the show room; the supermarkets put meat and dairy products at the back of the store, etc. This arrangement pays off in the increase in the purchase of impulse items. The wide-awake dealer will investigate the possibility of rearranging his show rooms to conform with these time-tested selling techniques.

4. *The presence of the dealer on the floor of his store.* Most people like to feel important and a pleasant greeting from the owner of the radio and appliance store will go a long way toward creating the feeling of goodwill engendered by such attentions. The presence of the dealer on the sales floor has two important aspects; he conveys the impression that he is interested in his customers and he keeps his sales personnel on its collective toes.

5. *Advertising the store and the product.* Since every dealer will advertise in some form or another, the important thing for the dealer to decide is how much he is willing to set aside for this purpose each year. After this sum has been determined, a breakdown should be made according to the media to be used; newspapers, handbills, direct mail, radio, etc.

Many manufacturers and national distributors have already given the
(Continued on page 164)



A well-wrapped package in distinctive paper is a good advertisement for you.

TRANSMISSION LINE SYSTEMS

By C. SPEAR

for FM & Television Home Receivers

Conventional antenna systems with which most servicemen are acquainted in standard broadcast work will not suffice in FM and television installations. Each antenna system for these higher frequency bands must be individually "engineered."

THE trend toward the use of higher frequency bands for FM and television has accentuated the importance of an efficient transmission line system between antenna and receiver. For as the frequency goes up it becomes increasingly dif-

icult to feed an adequate signal from the antenna to the receiver and every effort must be made to conserve the comparatively little energy that is available. For this reason high gain directive antennas become necessary in many localities, and by the same logic highly efficient transmission line systems must be installed.

Fortunately, due to the advances made during the war in the high frequency cable field, low-loss transmission lines are available at low cost and if used properly will transmit the energy picked up by the antenna to the receiver without undue loss. However, the word "properly" has a great deal of significance, for another adverse effect of the increase in frequency is to make mismatching more critical and unless transmission lines are installed with a complete understanding of this phenomenon they may be useless.

This latter statement is intended only to emphasize the importance of the problem, and not in any way to

indicate a difficult or hopeless condition, for the remedy is both simple to perform and understand.

It is the objective of the author to unveil the mystery of matching and indicate the necessary calculations—requiring only a knowledge of fundamental multiplication and division, a straight edge, and some rule of the thumb procedures—with which the serviceman can solve virtually any of his transmission line problems.

Included in these h.f. cable line problems that can easily be solved are; how to match any antenna to any receiver whether it be FM, television, radar, instrument landing, Army, Navy or any other electronic device; the effect of mismatches in terms of power or signal lost and how they can be corrected; how to intelligently select the appropriate transmission line; the "net" gain of directive antennas. In addition to a discussion of these questions some of the terms frequently used in the field will be clearly defined and converted into simpler expressions.

"Decibels," one of the terms that will be used very frequently throughout this article, should be carefully defined. The decibel, abbreviated db., is a numerical means of expressing the ratio of two compared powers or voltages. The following formula shows the relation between db. and power: $db. = 10 \log P_1/P_2$, where P_1 and P_2 are the two powers compared; or in terms of voltages where E_1 and E_2 are the two voltages compared, $db. = 20 \log E_1/E_2$, assuming that the two voltages are measured across equal impedances.

For example, if a dipole antenna normally picks up 1 microvolt of signal, and, after adding directive arrays, it picks up 10 microvolts, then the gain of the antenna in db. due to the array is: $20 \log 10 = 20$ db.

Likewise, if a transmission line receives 10 milliwatts from an antenna, but delivers only 5 milliwatts to the receiver then the power lost in the cable is: $10 \log 2 = 3$ db.

In order to simplify the calculation

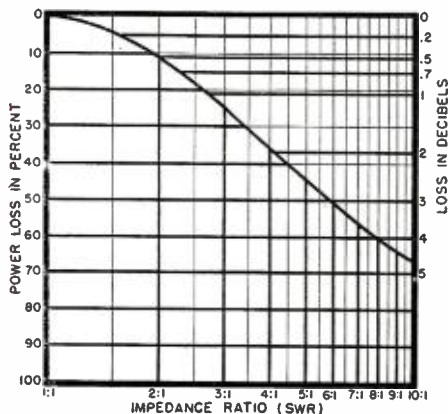
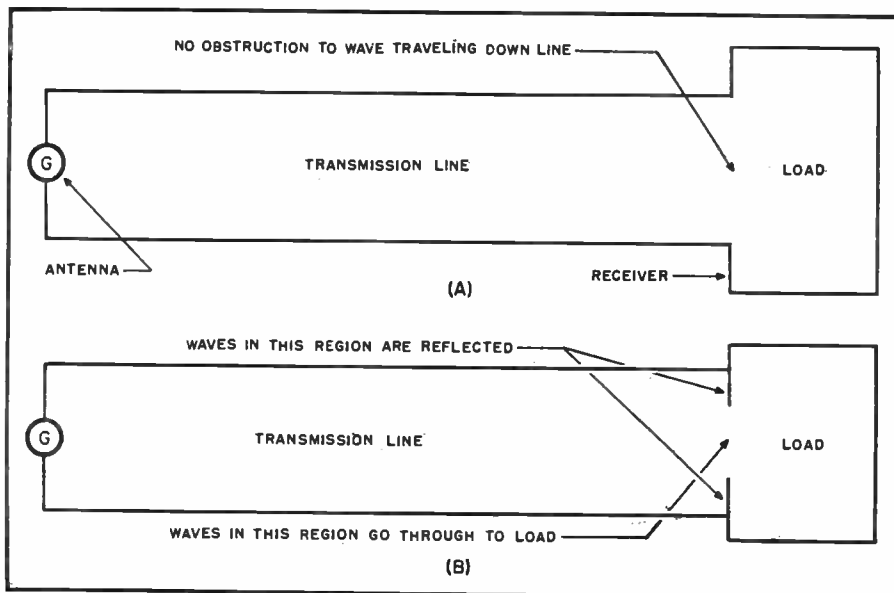


Fig. 1. Power loss that occurs when a mismatch of antenna to receiver exists.

Fig. 2. Semi pictorial representation of what an electrical wave experiences at end of transmission line. (A) Perfect match and (B) when mismatch occurs.



of the decibels gained or lost see the conversion table (Table 1). From this table the reader can convert db. into power or voltage ratios or vice versa without the need of logarithm tables or a slide rule.

There are three sources of power loss between antenna and receiver; mismatch between antenna and transmission line, attenuation or power loss in the transmission line, mismatch between transmission line and receiver.

Antenna Mismatch

One of the fundamental concepts of power transmission is that to obtain maximum power transfer, the output impedance of the generator (in this case the antenna) must be equal to the input impedance of the load (in this case receiver). Thus if the antenna resistance is 70 ohms, the receiver input should be 70 ohms, otherwise some of the power is lost. This is shown in Fig. 1, which is a graphic presentation of the signal voltage lost due to mismatch.

At the present time consideration of the antenna impedance is very important for two reasons. In the first place receiver input and antenna impedances may vary to a great extent due to the lack of standardization amongst the various manufacturers, and due to the fact that many surplus Army and Navy receivers, designed for use with special antennas, may be circulated for general use. Secondly the addition of directive arrays changes the antenna impedance, and therefore it is necessary to calculate the power loss due to mismatch in order to determine the net or effective gain of the antenna. For example a typical problem of this type might be:

Given: An antenna array which gives a 5 db. gain but changes the impedance from 300 ohms to 100 ohms. The original antenna was matched to the receiver—calculate the net gain.

Solution: From Fig. 1 we note that a 3:1 impedance mismatch ratio results in signal which is 25 per-cent or 1.2 db. less. The net gain is therefore only 3.8 db. It then becomes a matter of mathematics whether the extra expense is worth the resultant gain. Of course as the mismatch becomes greater, the effective gain decreases, and the array becomes useless unless a matching network is utilized. However the matching can be performed rather simply, and the details will be discussed later in the article.

Attenuation of the Cable

The limiting factor on the minimum amount of power loss possible in any transmission line system is the attenuation or power loss of the cable; for any power lost due to mismatch can be corrected by means of matching circuits, but there is no remedy for the power lost due to the attenuation of the cable. Though there is no fixed standard, cable attenuation is usually rated in db. per 100 feet by most manufacturers. However, the

LOSS		DB.	GAIN	
POWER RATIO	VOLTAGE RATIO		POWER RATIO	VOLTAGE RATIO
1.000	1.000	0	1.000	1.000
.977	.988	0.1	1.023	1.011
.955	.977	0.2	1.047	1.023
.891	.944	0.5	1.122	1.059
.794	.891	1.0	1.259	1.122
.631	.794	2.0	1.585	1.259
.501	.708	3.0	1.995	1.413
.398	.631	4.0	2.512	1.585
.316	.562	5.0	3.162	1.778
.251	.501	6.0	3.981	1.995
.199	.447	7.0	5.012	2.239
.158	.398	8.0	6.310	2.512
.126	.355	9.0	7.943	2.818
.100	.316	10.0	10.000	3.162
.010	.100	20.0	100.0	10.00
.001	.0316	30.0	1000.0	31.62

Table 1. Decibel conversion table. Power or voltage ratios can be converted to db. (or vice versa) without the need of logarithm tables or slide rule.

power loss is proportional to the length of the cable. That is, 100 times more power is dissipated in a 100 foot cable than in a one foot cable. Therefore cable is sometimes rated in db. per foot instead of per 100 feet so that it will sound more efficient. For example, a h.f. cable whose attenuation is 20 db. per 100 foot (a very high value) could be rated at 0.2 db. per foot or 0.016 db. per inch.

Another factor that affects the attenuation is the frequency at which it is used; for the power loss of any h.f. line increases approximately as the square of the frequency. This is an essential fact particularly at the present time, since many of the cables are rated at the old FM frequency range of about 45 mc., and many manufacturers have not had a chance to reevaluate their cables so as to rate them at the new FM frequency band centering around 100 mc. Thus a 4-db.-per-100-foot cable rated at 30 mc., would be rated at approximately 6.8 db. per 100 feet at 100 mc.

Matching the Transmission Line To Load

All the sources of power loss discussed heretofore are not limited to high frequency receiver equipment, but apply equally as well to all types

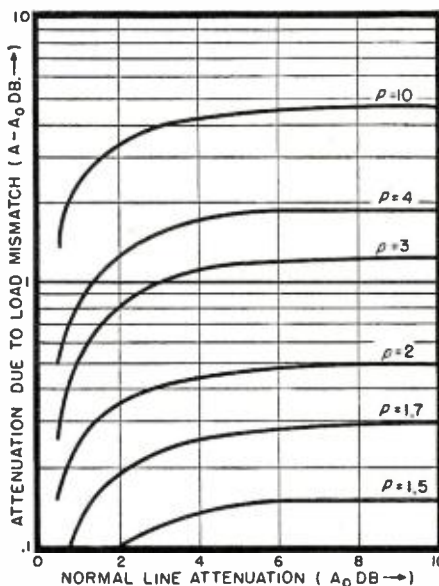
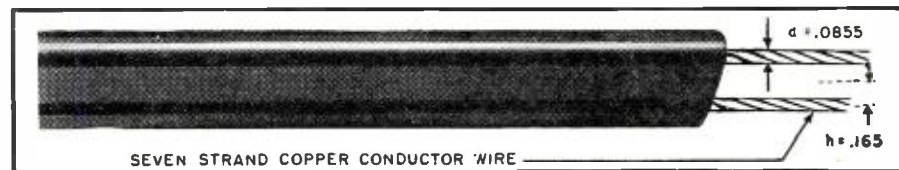


Fig. 3. Graph shows increment of attenuation as a function of the standing wave ratio (SWR) and normal line attenuation. Note in particular that the power loss due to transmission line mismatch does not become serious until the standing wave ratio is about 3:1.



Fig. 4. Method of matching antenna to receiver via a quarter-wave transformer.

Intelin type K-200 antenna lead-in wire. The characteristic impedance of this wire is 200 ohms, while the attenuation at 30 mc. is .4 db. per 100 feet.



of apparatus regardless of their frequency. However, very little attention has been given to them in the past because in the AM broadcasting range power was plentiful and there was no need for a highly efficient transmission system. Matching the transmission line to the load is a problem met only in high frequency receivers. For, in the megacycle range, the transmission line must be terminated in a load whose impedance is equal to the characteristic impedance of the line, otherwise reflection occurs causing standing waves, and a subsequent increase of power loss. (An exception to this statement is the special case of tuned lines—but this phenomenon has no significance in the problems considered in this article.) Therefore a 70 ohm line must be terminated in a 70 ohm

load or, from a more practical viewpoint, if the receiver input impedance is 70 ohms—then a 70 ohm transmission line should be used.

The idea of reflection and standing waves, and its relationship to power loss requires additional elaboration. Fig. 2 gives a pictorial representation of what an electrical wave experiences when it reaches the end of a transmission line for different load terminations. Fig. 2A indicates perfect matching, that is, all the power goes into the load—no obstacle in its way. Fig. 2B on the other hand shows a load which reflects about 50 per-cent of the wave. That is, the portion of the wave that travelled down the center, still goes unmolested into the load. The rest of the wave, however, hits the barrier and is reflected back

down the transmission line. Then it hits the generator and the process is repeated. Again 50 per-cent of the wave goes through and the rest is reflected once again. Of course the generator is continuously sending out waves so that there is always a wave travelling in both directions which causes the phenomenon of standing waves. The magnitude of these waves is dependent on the amount of reflection that occurs, and is called the standing wave ratio.

Obviously if no power is lost as the reflected wave travels up and down the transmission line, eventually all the power will be transferred into the load. However, if attenuation does occur, then a certain percentage of power is lost due to each reflection, and it is this power loss that is considered to be the attenuation due to standing waves or mismatch. The magnitude of this increased attenuation is therefore proportional to two parameters. In the first place it is dependent on the percentage of the wave that is reflected back (the standing wave ratio) and secondly, it depends on the attenuation of the cable.

The standing wave ratio can be calculated as a function of mismatch. For example, if a 70 ohm line is terminated in either a 140 or a 35 ohm load the standing wave ratio will be 2:1. Fig. 3 is a graphic representation of the increment of attenuation as a function of the standing wave ratio (SWR) and normal line attenuation. As indicated in Fig. 3 the power lost due to transmission line mismatch does not become serious until the standing wave ratio is about 3:1.

The following is a typical illustration of how these calculations may be helpful.

Given: A 70 ohm input receiver requiring a transmission line 100 feet long. Available are a 6 db. per 100 foot, 70 ohm line, a 4 db. per 100 foot, 100 ohm line and a 3 db. per 100 foot, 300 ohm line. Which line should be used?

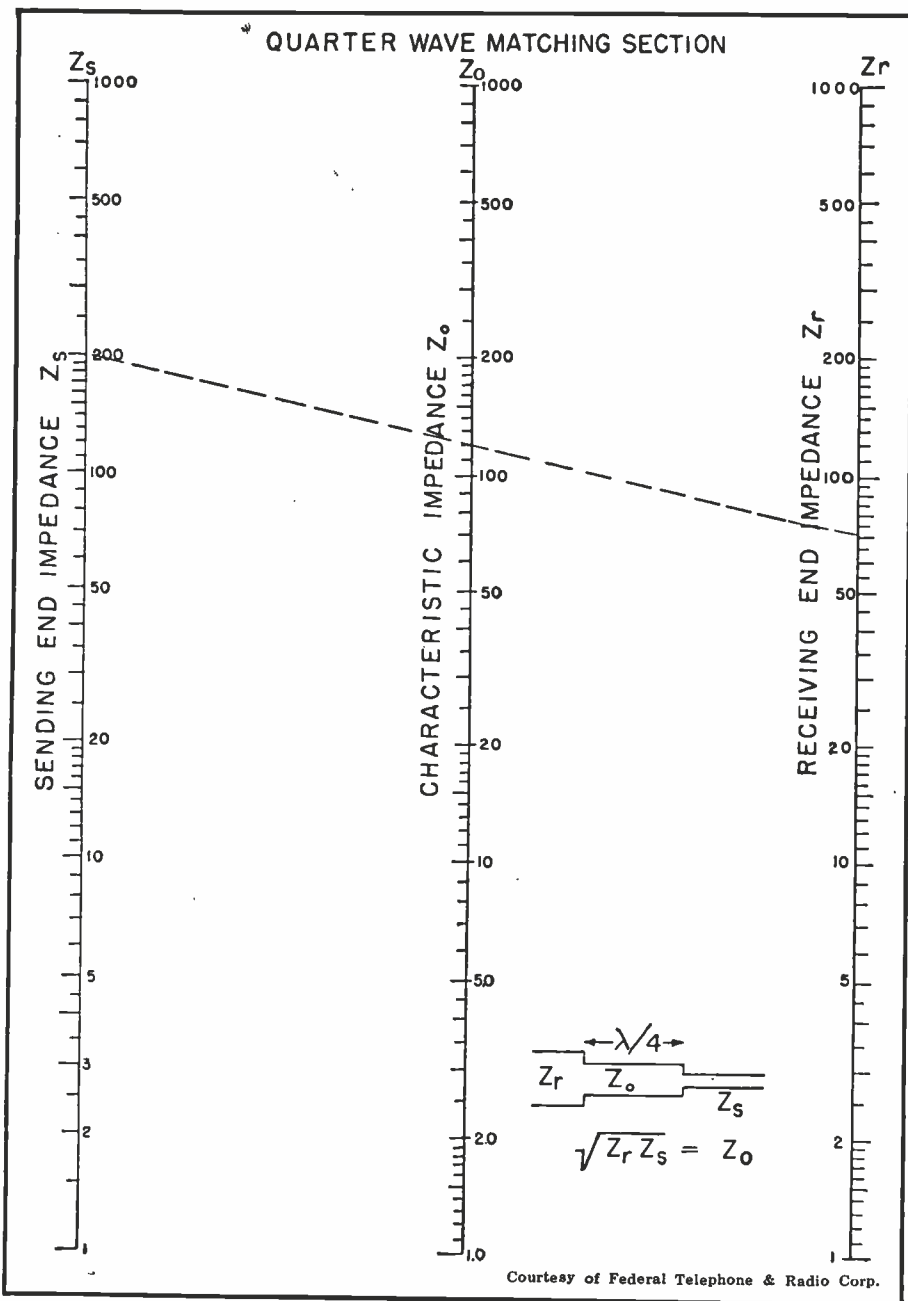
Solution: The power lost by the 6 db. line is 6 db. because it is perfectly matched. The power loss of the 4 db. line is 4 db. plus .15 db. due to a standing wave ratio of 1.4 as indicated in Fig. 3 or 4.15 db. The attenuation of the 3 db. line is 3 plus 1.5 db. due to a standing wave ratio of over 4:1 or about 4.5 db. Obviously the 4 db. per 100 foot, 100 ohm line would be the best cable to use.

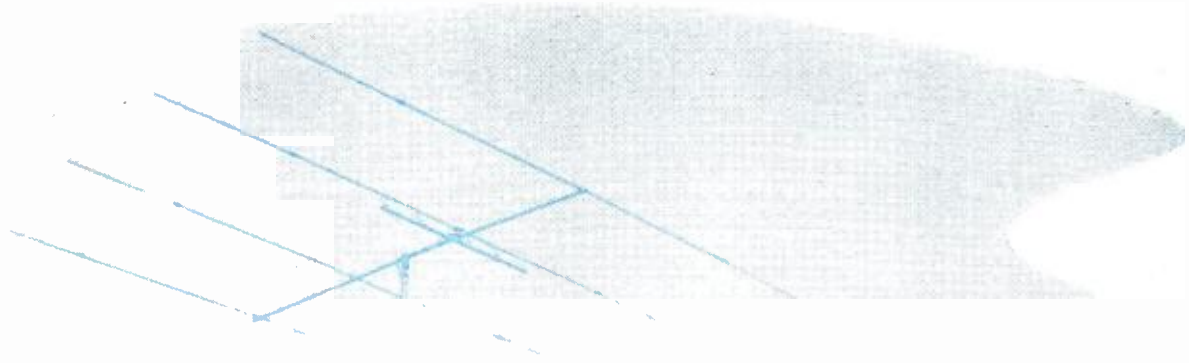
Quarter-Wave Matching Line

As previously indicated, an antenna mismatch can very possibly materially reduce the signal voltage picked up by the receiver to a point where it completely nullifies the other advantages that the antenna may have, such as, economy, availability, simplicity or power gain. Obviously, if a simple medium existed whereby the mismatch could be corrected, it would provide a far better solution to the problem than to use a different antenna.

(Continued on page 137)

Fig. 5. This chart may be used to obtain the surge impedance of a quarter-wave matching section used as an impedance transformer from one real impedance to another. In the example shown: $Z_r = 72$ ohms; $Z_s = 200$ ohms, indicating a quarter-wave matching section of 120 ohms is needed.





An Inexpensive

4-ELEMENT ARRAY

By VINCENT C. HALE

Construction details covering a high gain beam which may be built of readily available materials.

SINCE the original papers published by Yagi and Brown on the superior advantages of the multi-element array for transmitting and receiving, amateurs have probably evinced more interest in this type of antenna than any other, for the higher frequency bands. Particularly is this true of ten meter operation, since a well designed rig with modest power capabilities, used in conjunction with a beam of proper design and adjustment, can equal on most counts a relatively high power rig with a simple antenna system. The same holds true, with certain modifications, for the receiving situation.

Culling from the many articles available, and from a somewhat varied personal experience in the matter of beams, the author has evolved the array to be described, incorporating in its manufacture those features that would give a maximum of performance and a minimum of trouble and expense. It has been found desirable to eliminate all wood in the structure, since invariably warpage and aging will adversely affect the operation of a beam so constructed. Metal tubing, light but strong, has been used throughout, and the antenna proper, for ease of feed and adjustment, has alone been insulated from the supporting structure.

While a close-spaced, three-element array is satisfactory, the addition of another director, properly adjusted, results in superior performance and adds but little to the cost. Accordingly this antenna system uses two directors, the antenna proper, and one reflector, all spaced 1/10 wave, for compactness primarily, but also because the impedance so obtained makes a good match very easily attainable by several methods. There is little advantage to be gained in using any particular one of the matching methods . . . personal preference and ease of obtaining material will be the primary criteria of choice, rather than any especial benefits to be obtained. These optional feed methods have all been tried, and found to be

practically equal in performance. A description of each system is found in the *Handbook*, and the builder will find that any can be adapted to the particular needs and desires of the individual.

The particular beam shown in Fig. 1 was made from sections of 1 1/4", 1" and 3/4" thin wall tubing, known as steeltube. These sizes were used because of the relative ease with which this diameter tubing was available in this particular locality. Smaller sizes

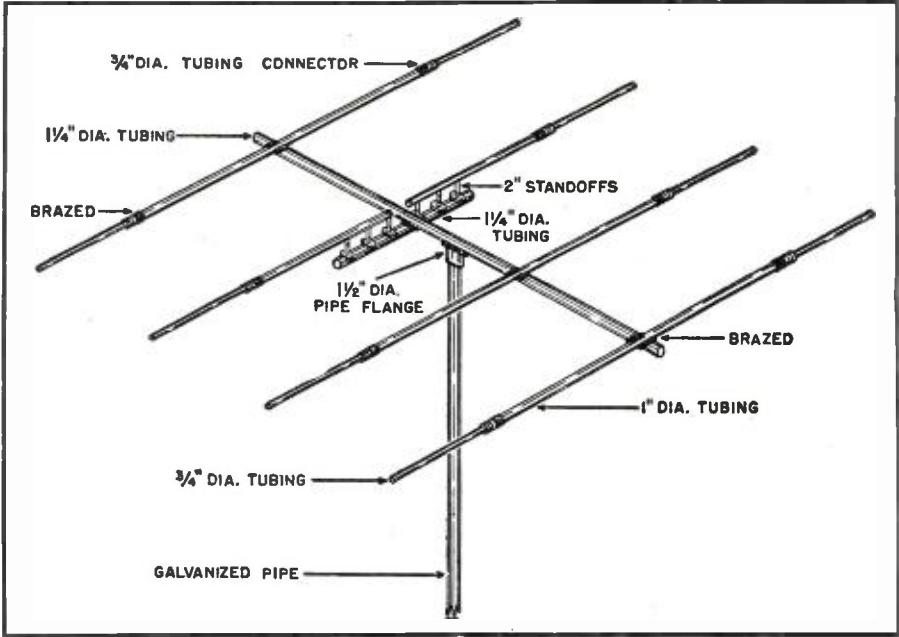
can, of course, be used, and will work equally as well. Aluminum, brass, dural, copper, etc., can be used as well as the steeltube, and performance will be practically the same.

The complete listing of material for the beam proper is as follows:

- 4 sections 10' long, 1" dia. tubing.
- 4 sections 10' long, 3/4" dia. tubing.
- 1 section 10' long, 1 1/4" dia. tubing.
- 1 1 1/2" pipe flange, threaded internally.

(Continued on page 78)

Fig. 1. Mechanical details for the construction of 4-element array.





Servicemen's associations get excellent cooperation from manufacturers and jobbers in keeping posted on radio developments. Bill Behr, president of the New Jersey Assn., Henry Johnson, ad manager for Sylvania and Rene Jacobs, V.P. of Dale Distributors, look over one of the door prizes.

Service Associations Can Be Successful

By **DAVE KRANTZ**

Pres., Philadelphia Radio Service Men's Assoc.

Servicemen's associations fill the urgent need of today's technician by supplying him with a clearing house for problems of his business.

TO MOST citizens, Philadelphia is known principally as the cradle of American liberty, repository of our beloved Liberty Bell and scene of many of the early struggles to secure the future of our

country. To those of us who live in this sprawling metropolis, it is the scene of a continuing battle to maintain our business existences and to wrench a livelihood from them.

This is especially true of those of

Members of the New Jersey servicemen's association listen attentively as Sylvania's Walter R. Jones discusses circuit analysis. Up-to-the-minute information, as supplied by service organizations to their members, is the pressing need of radio men.



us who elected to try to make a living out of the business of selling and servicing radio receivers. Within Philadelphia's borders, you will find areas which reflect every level of living condition to be found in any densely populated city. Rich man, poor man—they all have radio receivers and we make available the service equipment, the knowledge and the ability to keep those receivers in working order. Our ambition is to be able to do this work efficiently and profitably.

Radio service as a business came into being spontaneously. In most cases, radio manufacturers distributed their products indiscriminately without any regard for the availability of service in the areas where these receivers would be used. Further, many intricate and sometimes questionable circuits are employed without any supporting schematic or operating data to assist the radio serviceman to locate the reason for the failure when he is called on to repair the equipment. At no time, to the best of the writer's knowledge, has any manufacturer made a serious attempt to train independent field servicemen to handle the necessary service for his home receivers.

Since its growth stems from local needs for service, radio servicing as a business attracts a heterogeneous group of individuals, most of whom are interested in radio service primarily through an intense personal interest in the mysteries of this new science. For the most part these men are good technicians in that they comprehend the functional operation of a radio circuit. However, few of them are even well-grounded in radio theory. In other words, they know *why* a radio receiver works, but not *how*.

Running a business, to the average person, means merely opening a store

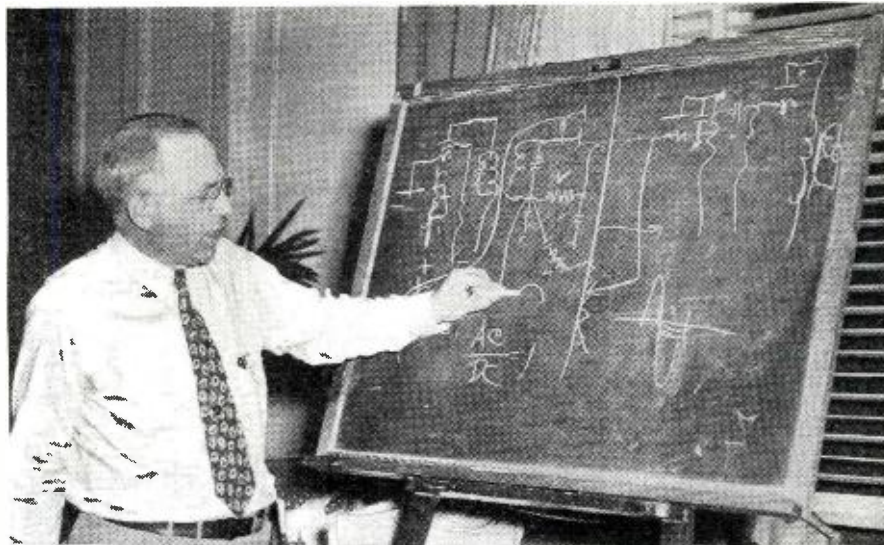
at some convenient location and making your services or goods available to the public. This, too, is the attitude of the average radio service business novice, who ingeniously assumes that his skill in repairing radios—usually perfected in his kitchen repairing neighbors' sets—will be wafted on the wings of happy customers' conversations to bring a stream of repair jobs beating a path to his door.

As the service dealer flounders about trying to induce people to bring their radio repair jobs to his shop, he usually tries every unprofitable scheme in the book in the hope of increasing his volume of business. Seldom does the individual, as a product of his own thinking, reach the conclusion that he is first of all a retailer and second a technician. He usually fails to realize that if he doesn't know how to merchandise his services in a profitable volume, all of the money-making artifices avail him nothing.

With the thought in mind that we could lift the level of radio servicing as a business and at the same time, the stature of the men engaged in it in the eyes of the public and of fellow businessmen, a group of us formed the Philadelphia Radio Service Men's Association a number of years ago. In the course of its fifteen years of existence, PRSMA has successfully weathered all of the storms of organizational and operational difficulty which usually beset voluntary associations. Through trial and error a type of organizational structure was evolved which insures against the common dangers which beset such associations and which in so many cases, result in eventual disintegration.

There has been so much interest expressed in the organization of PRSMA that I would like in this article to briefly outline the operation of the association and its various committees.

The organization is headed up by a Governing Board of eighteen members, each of whom is elected for a three-year term. One-third of this



Walter R. Jones, Chief Engineer, Radio Tube Division of Sylvania, highlights his discussion of circuit analysis with a chalk talk.

Board comes up for reelection or replacement each year. The Association's program is directed by its five officers who are elected by secret ballot each year.

The Association's programs are carried out by a group of eight committees, each of which is headed by a chairman, who, in turn, is a member of the Association's Advisory Board.

The following breakdown of the committee structure will give a general idea of the functioning of these various units.

Entertainment Committee—This group arranges all technical meetings. The primary purpose of these meetings is to permit local distributors to present engineers familiar with the lines the distributor carries. This provides the opportunity for members to acquire a better understanding of the technical details of various types of equipment and products, and promotes a better understanding between distributor and servicemen.

Membership Committee—The func-

tion of this committee is to pass on all applications for membership in the Association. Through examination and investigation, they determine the qualifications of each new applicant and recommend his acceptance or rejection for membership.

Employment and Veterans Committee—This group has the responsibility of ferreting out employment opportunities for members and veterans.

Education Committee—This committee was set up to carry out a program for courses in electronics, both basic and advanced, at local institutions and at closed meetings of the Association. It is charged with the responsibility of securing and distributing technical literature to members of the organization.

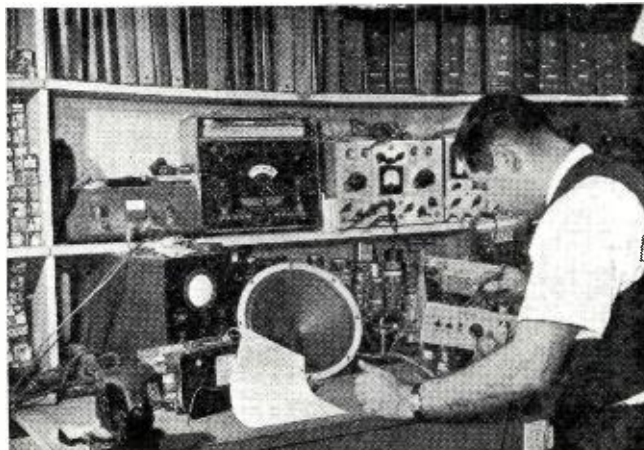
Magazine Committee—"P R S M A News" has been a financially successful monthly house organ for a dozen years. The preparation and distribution of this publication is the responsibility of the Magazine Committee.

Grievance Committee—Any and all complaints are diligently checked by
(Continued on page 122)

Many Eastern service organizations are already equipped to handle television and FM installations and repairs. Here Frank Krantz and Reginald Cherrill of Witte Radio and Television Company, Philadelphia, check a couple of television receivers.



Author at work in his shop in Philadelphia. A clean, uncluttered service bench, up-to-date test equipment, and complete reference data, in addition to ample electrical outlets, all combine to make for an efficient radio servicing operation.



Capacity Operated RELAYS

By
R. G. ROWE, W2FMF
Consulting Engineer

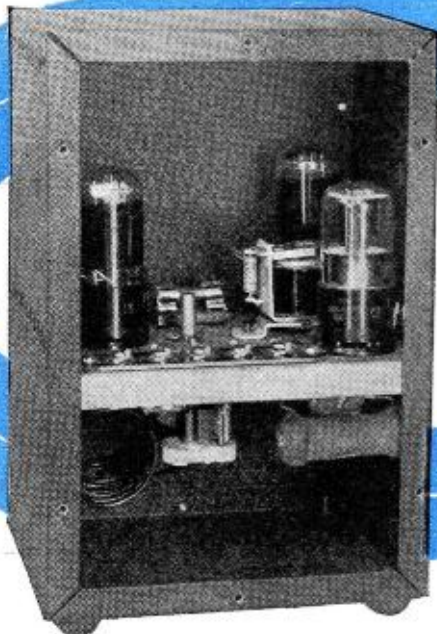


Fig. 1. Rear view of home built oscillator and negative impedance unit. Schematic is shown in Fig. 5.

Although adapted primarily to various industrial applications, this novel device will be of interest to the experimenter. Many intriguing setups can be operated simply by body-capacity effects.

A CAPACITY-OPERATED relay may be described as an instrument which responds to a change in capacitance, or in the character of the capacitance, in a capacity-sensing element by activating or deactivating a current responsive load. The load may be a relay for the operation of an indicating or alarm circuit, a motor for the actuation of a

valve or a multiplicity of other electrical devices. In general, the term "capacity-operated relay" implies an "on" or an "off" snap-action function as a result of a capacitance change, rather than a smooth, gradual function.

One general type of capacity-operated relay employs the beat principle, wherein a capacity sensing element

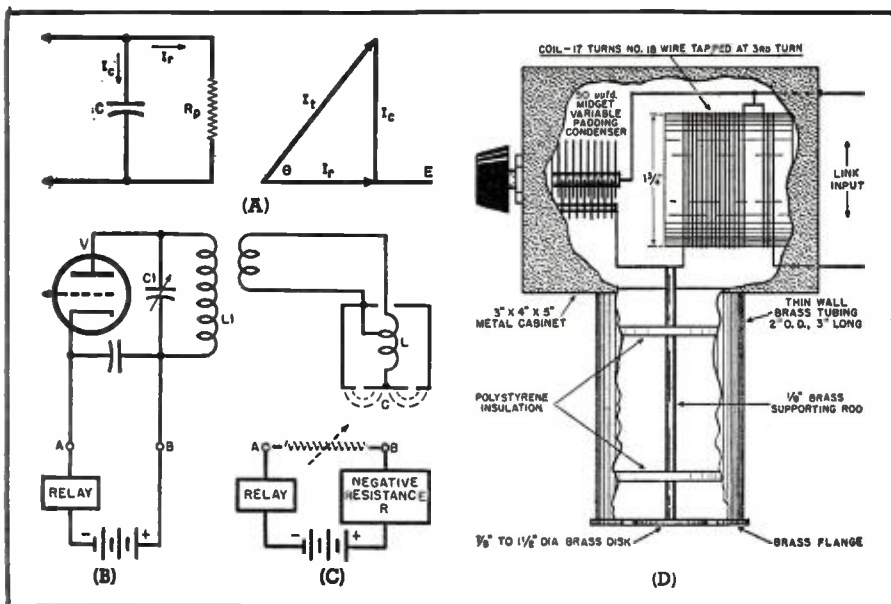
becomes part of the frequency determining network of a variable frequency oscillator, the output of which may be "zero beat" with a fixed oscillator in a mixer circuit. A change in the capacitance of the sensing element, in producing a frequency shift of the variable frequency oscillator, is reflected as a beat note in the mixer output which may be rectified or further altered to activate a relay or other load circuit.

A second general type of capacity-operated relay consists of two identical radio frequency oscillators, the tank inductances of which are link-coupled. A sensing capacitor is connected in shunt with the frequency determining network of one of the oscillators. When the two oscillators are in phase with one another, no current flows in the link circuit. When a capacitance change is delivered by the sensing element, the frequency of the corresponding oscillator attempts to change and currents flow in the intercoupling link in an effort to keep the two oscillators synchronized. These currents may be rectified or otherwise altered to operate the relay or load.¹

A third general type of capacity-operated relay consists in a crystal controlled radio frequency oscillator, in which the sensing capacitor shunts the tank circuit. The oscillator tank may be so designed as to operate on the tank capacitance-plate current curve at a point where reasonably small capacitance changes will produce sufficient plate current excursion to operate a relay in the anode supply circuit.²

A fourth general type of capacity-operated relay, and one enjoying wide popularity, consists of a radio frequency oscillator in which the sensing capacitor is so connected as to control the amplitude of oscillation by effectively modifying the phase or amplitude of the regenerative feedback voltage. The radio frequency output voltage, or some portion thereof, may

Fig. 2. (A), Vector analysis of sensing circuit. (B), A capacity-operated relay using a sensing capacitor and inductance, link coupled to an r.f. source. A greater change in control resistance across AB can be obtained by adding a negative resistance as shown in C. In our completed unit this negative resistance is in the form of vacuum tubes, V_1 and V_2 (Fig. 5). (D), Construction details of sensing element shown in schematic diagram, Fig. 5.



be rectified, amplified and employed to operate the relay or load device.^{3, 4, 5, 6, 7, 8, 9}

In all capacity-operated relay setups, the sensing capacitor, which is usually designed according to the dictates of the particular application, obviously must be located at the site of the function being sensed. In all of the aforementioned relay types, the remainder of the electronic apparatus should be located near the sensing capacitor to insure short coupling leads, if the maximum potential sensitivity is to be realized. It will be appreciated how the connecting leads shunt the sensing capacitor so that a small capacitance change of the sensing element itself represents only a small percentage change of the total "lumped" capacitance. By eliminating the lumped capacitance it is in general possible to employ smaller capacitance changes to trigger the relay and, hence, more compact sensing capacitors may be used. Further, in many applications it is undesirable or impossible to locate the relatively bulky, delicate capacity-operated circuit at the site of the function being sensed. One such possible approach to this problem is indicated wherein a secondary LC circuit shunts the primary LC circuit by virtue of a link coupling.¹⁰

A new method will be described wherein a conveniently small LC circuit, comprising a sensing capacitor and an inductance, may be located at the site of the function being sensed and link-coupled through a low impedance, low-loss line to a specially designed radio frequency source.¹¹

With reference to Fig. 2B, there is shown a sensing capacitor and inductance, LC, link-coupled to a radio fre-

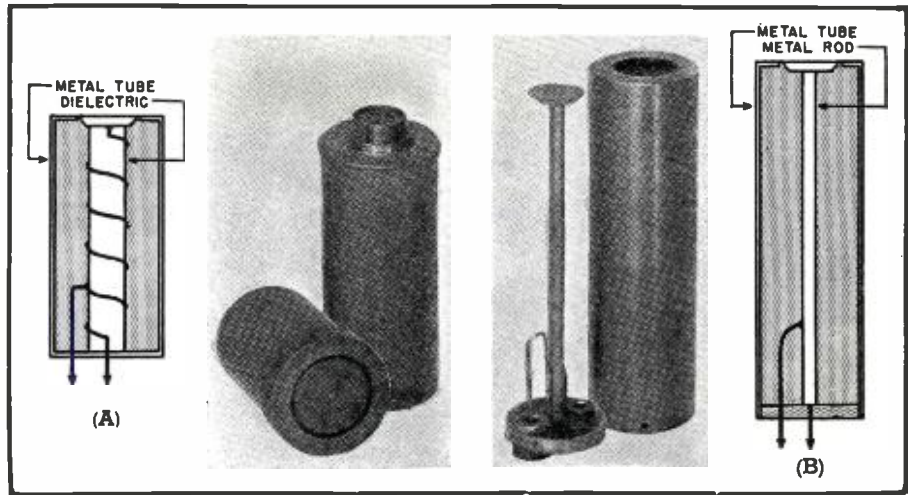


Fig. 3. Two different types of sensing elements that have been used successfully. (A) For the lower frequencies where appreciable inductance is required for resonance, and (B) For higher operating frequencies, this coaxial type is applicable.

quency source comprising tank circuit L_1C_1 and tube V, in which the grid circuit is deleted for convenience. It is known that when resonance is obtained between LC and L_1C_1 , LC will exhibit unity power factor and reflect a purely resistive load to L_1C_1 . The magnitude of this reflected resistance will be determined largely by the resistance of the inductance L and the resistance of the dielectric material in the capacitor field, provided that the link line losses are kept to a minimum. The exact nature of the effect of this load on the source, where the source may be a self-excited oscillator or a radio frequency amplifier, is rather complex and beyond the scope of the present article.

However, in the case in point, the introduction of reflected resistance in L_1C_1 effectively lowers this tank cir-

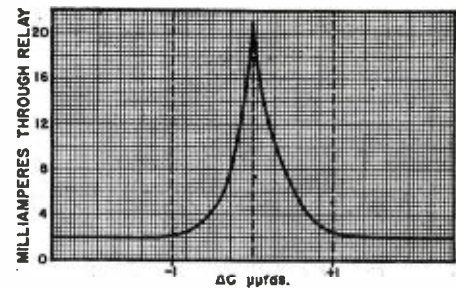
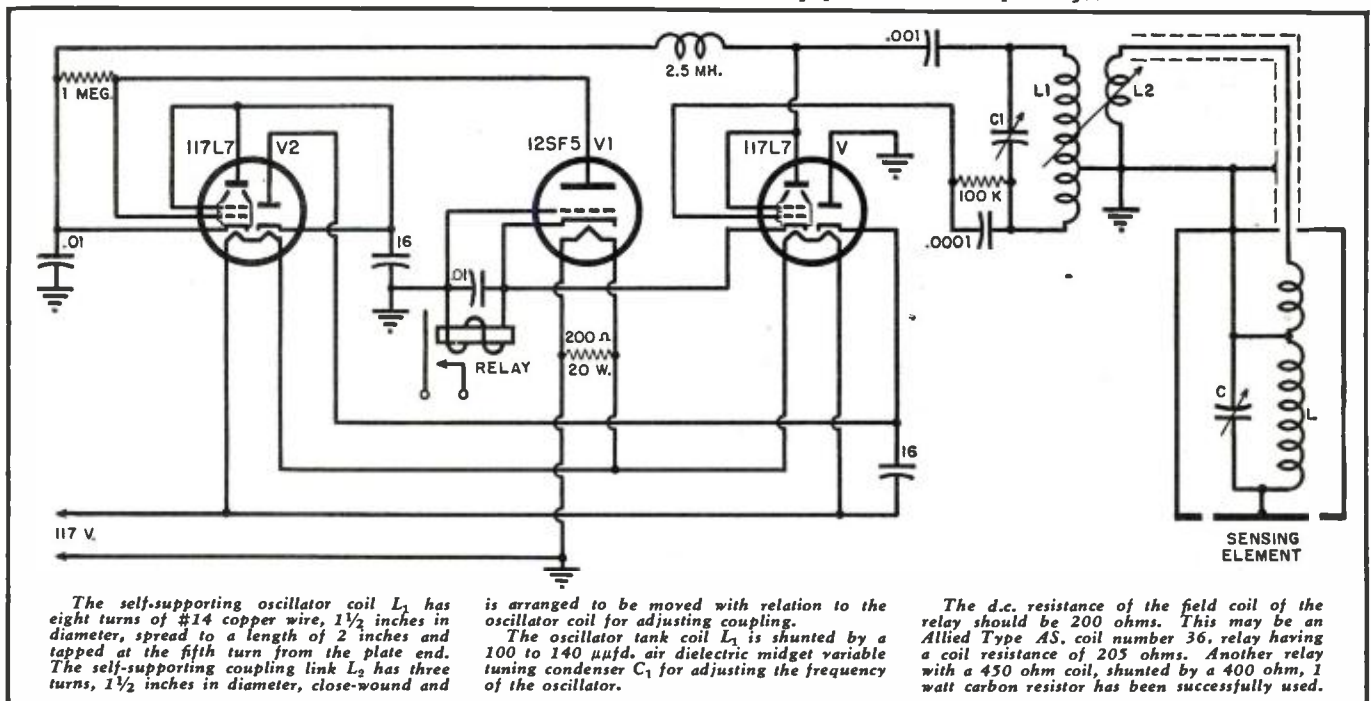


Fig. 4. Graph illustrates the current change that can be obtained through the relay shown in the schematic diagram, Fig. 5.

cuit impedance, resulting in a relatively high plate current flow through tube V. As C is detuned, the effective impedance of L_1C_1 increases, thus reducing plate current through tube V. While not meant to represent theoretical limits, plate current (Continued on page 135)

Fig. 5. Schematic diagram of home built capacity-operated relay. Although tube filaments are operating below rated voltage, performance of this equipment has been reported good.





The 1N34 crystal diode when mounted in housing shown makes a convenient test probe.

CRYSTAL DIODE Reduces Probe Size

By ALBERT BEIN
Radio Eng., National Radio Service.

This simple and compact crystal diode probe makes the signal tracing of small receivers practical.

APPPLICATION of the crystal diode has made signal tracing practical for the radio serviceman by reducing the size of the probe for application to compact receivers and eliminating tuned bands and channels and volt or ohm ranges requiring adjustment when a volt-ohm meter is used. In addition, signal tracing technique analyzes the audio component of the broadcast signal for the source of hum, noise, oscillation, microphonics and other operational faults instead of simply measuring the electrical characteristics of various components which may or may not be the cause of faulty operation.

Unlike the conventional type of signal tracer, which indicates the difference of carrier frequency, the crystal diode probe indicates difference in modulation or changes in the audio component of the signal. All frequencies between 90 kc. and 33 mc. are demodulated by the crystal diode and fed directly into an a.c. audio amplifier.

The crystal probe may be easily constructed by fitting a *Sylvania* Type 1N34 germanium crystal diode and a ¼ watt ceramic type carbon series resistor into a standard voltmeter probe or an *Amphenol* r.f. coaxial probe with capacitance removed. The coaxial probe is recommended. Space

allowed for the capacitance is ample for the *Sylvania* crystal and ¼ watt resistor. Shielded cable should be used with either type of probe and should be pushed in as far as possible to reduce capacity effects. Connecting the plus side of crystal to probe will result in greater output at broadcast frequencies.

Value of the ¼ watt series resistor depends on amplifier gain and signal generator output. With an average signal generator and hi-mu triode and pentode output amplifier the value will be about 100,000 ohms with a possible range from 50,000 ohms to ½ megohm. A .001 µfd. mica r.f. bypass condenser will prevent pickup of r.f. currents at frequencies below 1000 kc. To prevent crystal damage a .01 µfd. blocking condenser is recommended. These capacitances may be mounted in the input section of the amplifier as shown in Fig. 1A.

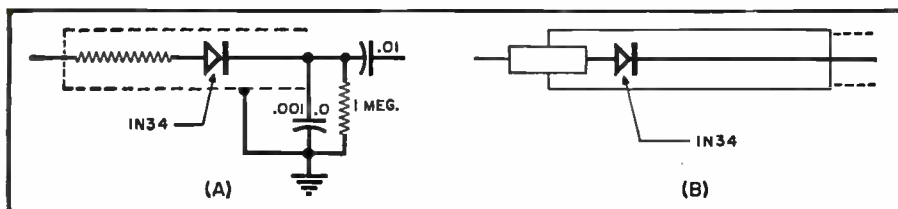
To reduce loading effects of the probe, which should contain a minimum of metal, the ¼ watt ceramic resistor may be used as the probe point by cutting off the external lead wire to within ¼" of the resistor body and using it as a probe point as shown in Fig. 1B. This arrangement will have negligible loading effect even at high frequencies.

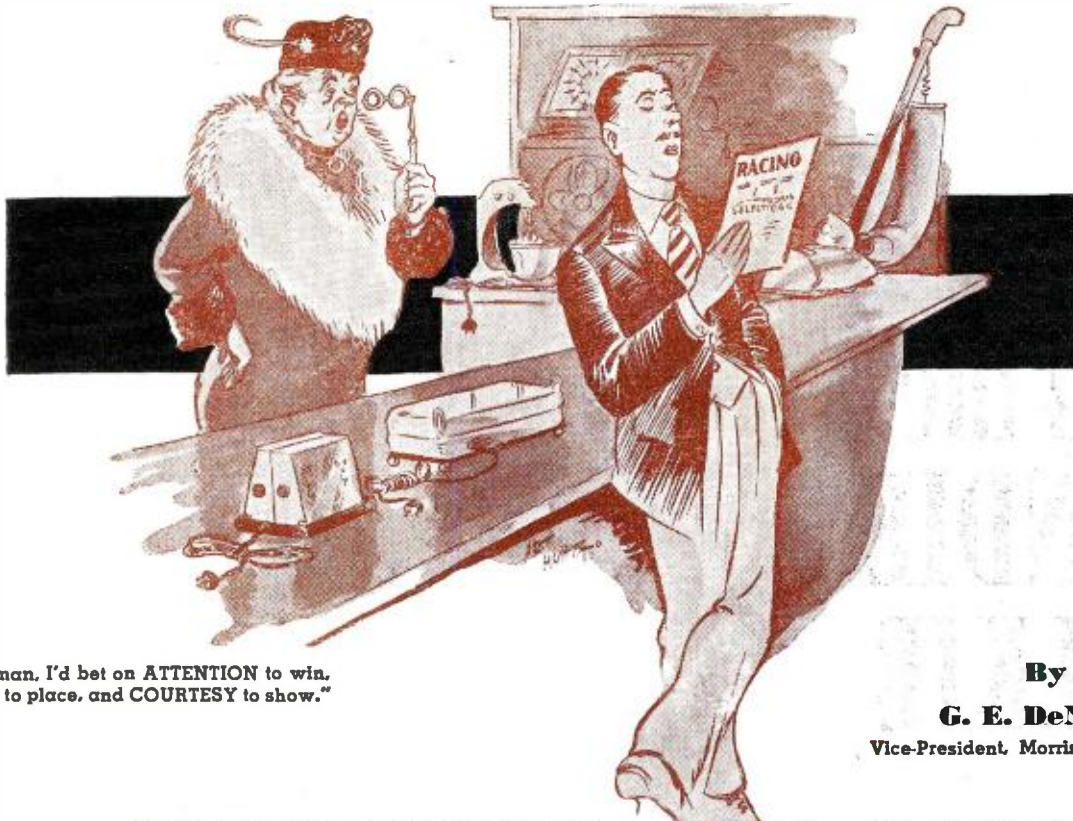
If the probe is made to plug into the wide band amplifier of a signal tracer containing a vacuum tube voltmeter and scope, waveform and sensitivity may be checked at service test frequencies. The crystal diode probe is connected to the signal generator which is operated through its entire range. The result will usually be a good waveform and good signal strength throughout a range of 90 kc. to 33 mc. Frequently signal strength is adequate to drive both the scope and the v.t.v.m. off scale.

Straight a.c. amplifiers should be used with the crystal diode probe.

(Continued on page 147)

Fig. 1 (A). Arrangement of resistor, blocking and bypass condensers in probe utilizing 1N34 crystal diode. Output of the probe is increased at broadcast frequencies when the positive terminal is connected to probe tip. At high frequencies increased output is obtained by connecting the negative terminal of the crystal to the probe tip. (B) Physical arrangement of crystal diode probe using ceramic type carbon resistor's pigtail lead, cut to ¼" length, as a probe point for high-frequency applications.





"Young man, I'd bet on ATTENTION to win, SERVICE to place, and COURTESY to show."

By

G. E. DeNIKE

Vice-President, Morris F. Taylor Co.

CONSUMERS ARE SORE

WHEN we heard the tale of the returned veteran who decided he and his buddies had better start rehabilitating civilians, we listened with a wry smile. The lad was undertaking a project which might well utilize his full time and talent. "War nerves" of the civilians is a disease induced in large measure by the treatment accorded them by the very persons who might be expected to exert a soothing influence, the merchants of America.

From having been the silver tongued persuaders of the prewar years, merchants and those in their employ did a turnabout which left the consumers with a mixed train of emotions. First shocked and incredulous, then mildly resentful but resigned and finally irate we find today's consumer in a vengeful mood.

How often have you heard "There'll come a day," or how often have you said it yourself when you've been ignored, insulted or intimidated by a storekeeper. That day the consumer has yearned for is dawning. Sooner than we think possible our gigantic production machinery will be spewing forth mountains of consumer goods. Certainly there will be a time lag before they reach every retail outlet, before shelves are filled and showrooms replete, but don't delude yourself that eager millions of consumers are going to storm retail outlets, cash in hand. Don't imagine that they are going to brook wartime insults characteristic of over-confident, under-supplied merchants of the painful

The first wave of buyers which hits your store will be people sorely in need of merchandise. You can make or break your reputation by the way you handle them now.

sales demotion era. As rapidly as supply loosens, sales resistance will stiffen. That day when the millions have dreamed of giving the merchant a piece of their mind and stalking proudly out to purchase elsewhere is at hand.

Be assured that the waiting queue which characterized the cigarette shortage will not form and patiently wait to buy radios and appliances. Consumers are sore and they're going to take some sailing before they lay down the cash for what you have to sell them.

The widespread advertising and publicity on new products is going to keep the prospective buyer in a wary mood. There are even signs of an incipient buyers' strike. Dolores Bigelow of Burton Bigelow Organization warns of this danger in an article in "Retailing" wherein she points out that in 1921, a

nationwide consumers' strike expressed a revolt against the retailers' failure to reduce inflated war prices and brought on one of the severest depressions in American history. We well remember how, eventually, prices tumbled all along the line, thousands of stores went bankrupt, factories closed, millions of men were out of work. All because merchandisers had been blind to the fomenting mood of the masses.

(Continued on page 148)

This type of sales demotion, so typical of the wartime period, will have to be corrected by all retailers now.



144 mc. HANDIE TALKIE

By
C. T. HAIST, Jr., W6TWL
General Electric Co.

Complete construction details of a home-built handie talkie featuring separate transmitter and receiver.

LOTS of interest and enthusiasm has been shown in the handie-talkie sets I designed, built and described in the June issue of *QST* for 1944 and the April issue in 1946. I have now combined my ideas for a third set. This is a handie-talkie to end all handie-talkies.

The first two sets being of the transceiver type had one disadvantage that had to be eliminated. Since the same tube was used for the oscillator for transmitting as well as a detector for receiving, the transmit and receive frequency was not quite the same. This is not objectionable when working a fixed station having a separate transmitter and receiver but does present a problem when two hand sets are used. The result is that on every transmission the receiving station has to retune to receive the other transmitter. This, in turn, changed the transmitting frequency so the other station had to retune when receiving. The different operating frequency of the oscillator

and detector is brought about by the different potential applied to the plate and the introduction of the quench voltage in the grid circuit.

The new set consists of a separate transmitter and receiver using three tubes. The circuit is so arranged that only two tubes are used in either "transmit" or "receive." Simple switching for "transmit" or "receive" is accomplished by switching the filaments of the tubes. Two tubes are connected in series for 3 volt operation and the selection of the oscillator or detector is had by switching either tube in series with the third tube which is the modulator or audio amplifier. Switching of grid and plate circuits are not necessary in this arrangement. This increases the efficiency of the circuit by keeping the leads short.

Antenna switching is accomplished with another section of the same switch. No loss occurs in this circuit even with a common fibre insulated switch, since the switch is at

a point of low r.f. voltage of the $\frac{1}{4}$ wavelength antenna. A third section of the switch closes the microphone circuit when transmitting.

With the 3 volt filament supply and the tubes connected as shown, the modulator amplifier tube is automatically provided with a 3 volt grid bias. If $67\frac{1}{2}$ or 90 volts of "B" supply is used, it will be necessary to insert additional bias (two pen-lite cells between secondary of T_1 and ground) to keep the plate current drain down. A 1S4 connected as a triode is used for the oscillator tube. A 957 tube is used for the detector. A 30 ohm resistor R_1 is connected across the filament connections since the filament drain is .05 amp. in the 957, and .1 in the other two tubes. A 958 could be used and the resistor eliminated, but the 957 makes the better detector and the radiation on receiving is less. The modulator or amplifier is another 1S4 tube. The rest of the circuit is conventional except that the earphone for receiving is used as a Heising modulation choke when transmitting. Since transceiver transformers are at a premium now, a midget 3 to 1 audio transformer with an additional winding for the mike was used. The midget transformer core is disassembled and the winding cover paper is removed. A single layer of #30 cotton covered wire is wound over the secondary winding of the transformer and the winding shellacked for holding it in place and for protection. The 3 volt filament circuit is also used to supply the mike current.

Switch S_2 , as shown in the circuit diagram, is used for turning the set "on" and "off." This switch was later modified so that the set turned on when the antenna was pulled out of the case. Two leaf springs taken from an old headphone jack were mounted along the side of the polystyrene antenna holder. By fastening a polystyrene block on the end of one spring (providing a cam action) the contact was made to close when the antenna was pulled out. The block riding on the antenna when the antenna is in the case keeps the filament circuit open.

The chassis is a $\frac{1}{2}$ "x $2\frac{1}{2}$ "x $4\frac{1}{2}$ " piece of polystyrene. The chassis is drilled as shown in Fig. 8. All parts are mounted and wiring is completed before the chassis is inserted in the case. This provides ease of wiring and service. Double tie points mounted on each end of the transformer provide soldering terminals for the microphone, earphone, and "B" battery leads. The A lead from the "on" and "off" switch is the only wire coming from the chassis to be connected. On the under side of the chassis small angles are mounted under the transformer mounting screws to provide a means of holding the chassis to the case. The front end of the chassis is held by the polystyrene antenna support going through the top of the case. Tube socket VS_1 is supported by soldering pins 2 and 6 to the stator plate supports of tuning conden-



Fig. 1. Over-all view of completed unit.

ser C_4 . Socket VS_3 is supported by a small brass angle. Tank coils L_1 and L_3 are self-supporting and their leads are soldered directly to the condenser stator and rotor connections. L_2 and L_4 antenna coupling coils are single turn loops supported by 4-40 screws. Assembly details are shown in Fig. 6. The knobs for the tuning condensers are made from a polystyrene rod as shown in Fig. 7C. The knobs extend through slots on both sides of the case. The condensers are turned by thumbing the edge of the knob. This method leaves the case free from large protruding knobs that would be bumped and turned in handling. A piece of hard finish white paper is glued to the back of the knobs and the condensers are then calibrated for the two meter band. Two small windows $\frac{1}{4} \times \frac{5}{16}$ are filed in the back of the case for viewing the figures. In filing the windows a small point should be left in the center of the slot for the index pointer.

Below the chassis is the battery compartment. A 67½ volt battery is supported off the rear of the case by a small channel made from a piece of aluminum. This provides clearance for the antenna when it is raised or lowered. Bias cells for the 1S4 modulator are placed on each side of the antenna under the "B" battery. Below the "B" battery is located the flash light cells for the filament circuit. The two batteries are connected in series and the connections may be soldered to the batteries or a bracket made so that the batteries may be plugged in.

The earphones and microphones are

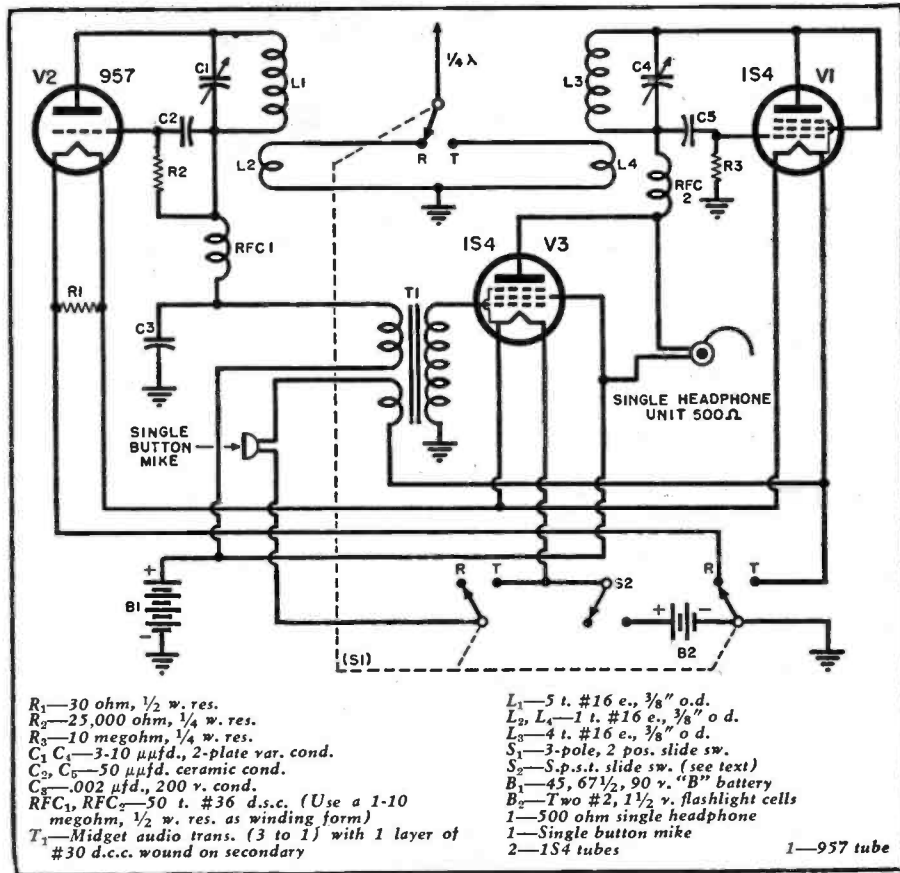


Fig. 2. Schematic diagram of three-tube, 144 mc. home-built handie-talkie.

fastened to the cover of the case with machine screws. Flexible leads are connected to the two units and brought down to their respective tie point terminals on the transformer.

The telescoping antenna is a modified auto radio antenna. With the auto antenna extended, the bottom section is cut off so that it is ap-

(Continued on page 131)

Fig. 3. Front view of unit with cover removed; internal assembly arrangement.

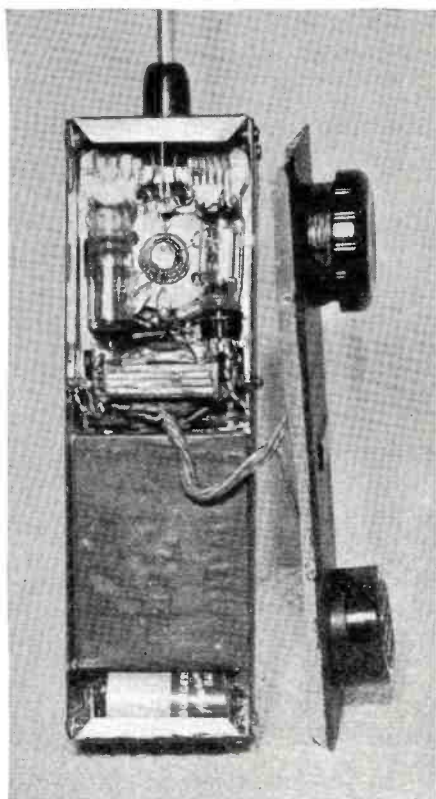


Fig. 4. Rear view of transmitter-receiver portion of 144 megacycle handie-talkie.

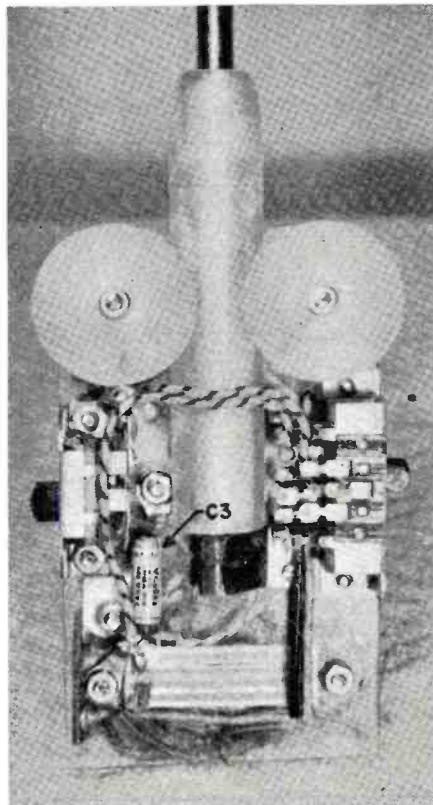
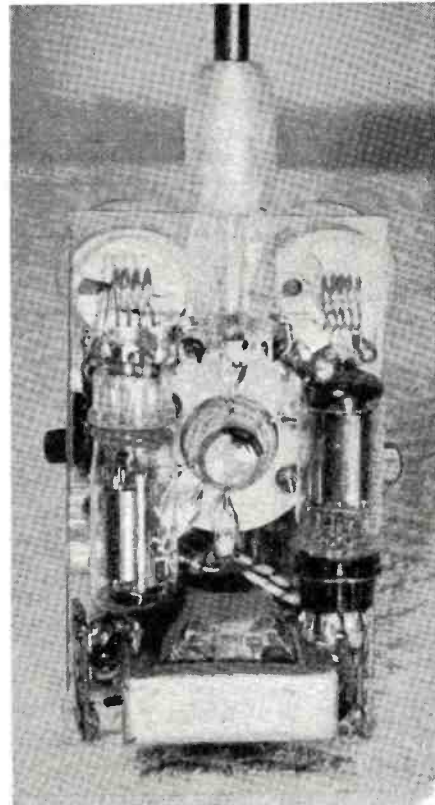


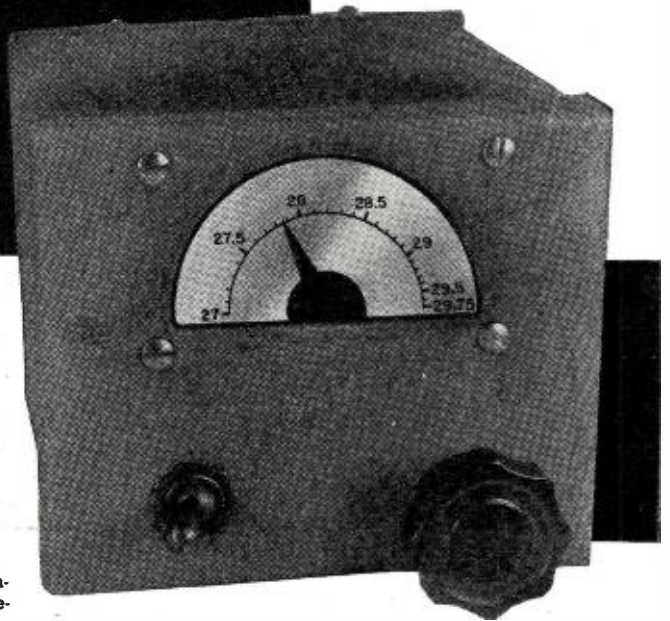
Fig. 5. Front view of transmitter-receiver shows placement of component parts.



SIMPLE 10-METER CONVERTER

By C. W. ROESCHKE, W9PFB/5

Construction details for a frequency converter that will extend the range of many war surplus communications receivers to the 10-meter band.



Front view of home-built converter. The unit covers a frequency range from 27 to 29.7 mc.

IN THE months since VJ-Day many thousands of surplus receivers of various types have been disposed of by the military at very attractive prices. These low prices, combined with the dearth of commercially manufactured units at the present time have resulted in the acquisition of these receivers by countless amateurs.

Unfortunately, the government services had little need for the frequencies above 18 megacycles in their regular communications, with the end result that the upper frequency limit of most of these receivers was 18 megacycles. The omission of the broadcast band, while annoying in some cases, is not at all serious.

In order to have the maximum amateur usefulness, it is essential that any receiver also cover the ten meter band. Then there is always the possibility of mobile operation on ten or the new QRM eleven meter band, if some simple converter can be devised to use

the inherent good sensitivity of the receiver.

In the past there have been many excellent converters of different types in various publications. Examination of the circuits, however, revealed that many of the parts required were not available at the present time. Experience with some of the designs in the past had shown inherent faults, such as bad frequency stability, poor mechanical construction, and too great a physical size for use in a car.

The first attempts to simplify a converter were along conventional lines, using standard tubes. Although good results were obtained in some cases, the large size of the tubes made the over-all size too great. Another design was then worked out using miniature tubes, with performance above

expectations. With such excellent performance, steps were taken to further simplify the design, and still maintain satisfactory results.

Experiments proved that the r.f. stage could be eliminated without noticeable loss. This stage, while it did contribute some gain, had its main function in the lessening of image response. With an i.f. frequency of from 1500 to 1600 kc. this was not a problem.

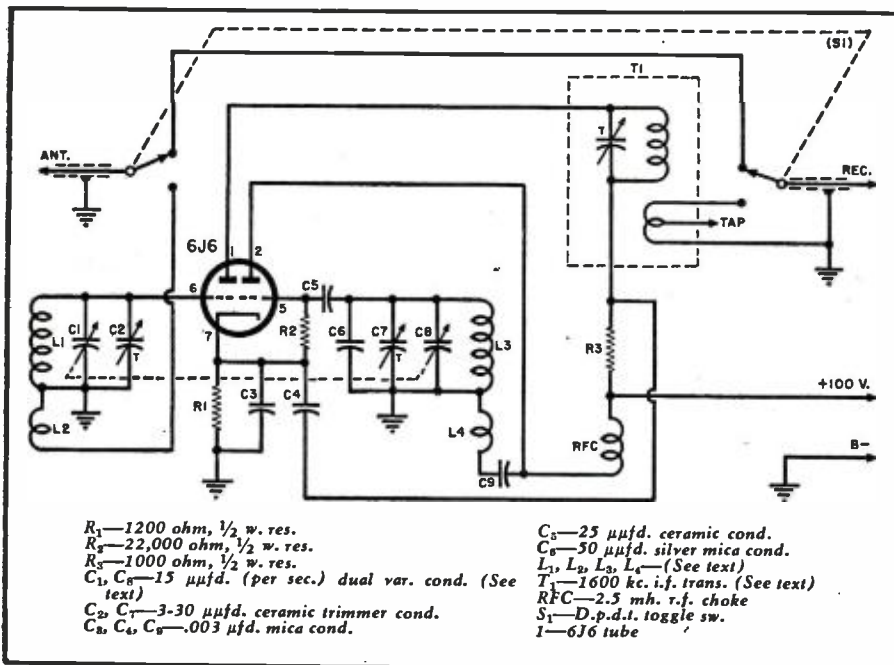
Of the various tubes listed which appeared to have possibilities as a one tube converter, the 6J6 seemed to be the logical choice. Its stability as an oscillator was excellent, while its high transconductance made it an excellent mixer.

In the construction of the converter described, every effort was made to hold down the physical size so that it could be used in a car as well as at home. If use only at a fixed station is desired, the dimensions may be increased to any reasonable size.

The entire converter is constructed on a chassis formed of scrap $\frac{1}{16}$ " aluminum and measures $3\frac{1}{2}$ " wide, 4" long and 1" deep. The tuning condenser, a Cardwell ER-15 AD with one rotor and one stator plate removed from the rear section, is mounted in the center of the chassis. The tube is mounted to the right of the condenser, with the oscillator coil just in front of it and the mixer coil located to the rear.

The output transformer T_1 , a home-made unit, is mounted in an i.f. can from a defunct "personal" portable. The primary of this transformer consists of a single pi from a $2\frac{1}{2}$ mh. r.f. choke, with 100 of the turns removed. The secondary of this transformer is simply a jumble winding of 50 turns, with a tap at the 25th turn, of the wire removed from the primary. The tuning condenser across the primary is a $75 \mu\text{fd.}$ mica with a $3\text{-}30 \mu\text{fd.}$ trimmer across it.

Schematic diagram of frequency converter. All coils are home constructed.



(Continued on page 96)

Television Takes to the Air



Fig. 1. Complete camera unit of the "Block" airborne television set.

By **JORDAN McQUAY**

Technical review of the warborn "Block" and "Ring" television systems which will be used for airborne on-the-spot video news coverage

THE rapid advance of television during the past half-decade has brought about the development of an important specialized phase; highly mobile, *completely airborne* television equipment.

Television pickup and transmitting equipment that once might have weighed tons and filled a large room now has been redesigned, modified, and built to "suitcase" compactness, while retaining a high degree of picture fidelity. Although useful in many other applications, the extreme portability of the equipment makes it particularly adaptable for use in aircraft.

And thus: Television takes to the air.

Using cameras equipped with super-sensitive Image Orthicons, the newest of airborne televisors incorporates all of the latest and most efficient video techniques, including use of improved automatic gain control, synchronizing, picture shading, and automatic frequency control circuits for scanning.

Ranking in technical importance with radar and the proximity fuse, airborne television was largely a wartime development.

Two principal types of gear provided electronic "eyes" for remote controlled aircraft, flying bombs, and other types of guided missiles. Airborne televisors were also used to observe naval and military actions, as well as general reconnaissance work and the transmission of maps, charts, and other tactical information.

But use of this type of equipment is not limited to warfare. Its greatest future lies ahead.

Many of the video and electronic circuit developments are even now being incorporated in new commercial television apparatus.

Laboratory work is now under way to convert and adapt this warborn equipment for practical peacetime employment.

What will airborne television do?

It will provide revolutionary news-

reel-type coverage of important events for rebroadcasting into the homes of television set owners. "On-the-spot" coverage of fires, floods, accidents, disasters, parades, and other events of public interest can be obtained over long or short distances, from moving vehicles, boats, airplanes, and helicopters. Such instantaneous transmission of eye-witness views of important events will bring a new meaning of realism to broadcast-television.

Other important uses of this portable television equipment include exploration of unknown terrain, and the transmission of such data to ships or planes, whose pilots may be unfamiliar with the region.

Small, fixed installations can be used as electronic "watchdogs," where peril from heat, chemical, or radioactive processes would render human observation impossible.

Because it is relatively small and light in weight, the equipment lends itself to either fixed or mobile installations and for *any* kind of visual supervision or investigation.

Besides being lightweight and diminutive, the equipment operates satisfactorily with the small transmitting antennas practicable for airplanes, on airplane power supply, and under unusual physical handicaps of noise and extreme vibration.

Two distinct types of airborne tele-

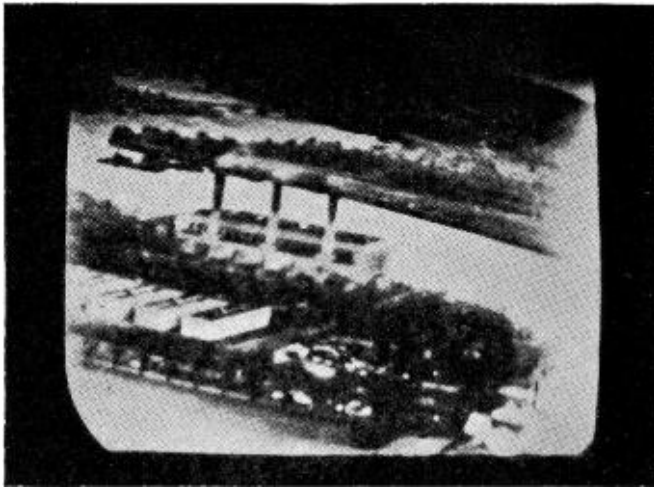


Fig. 2. Typical image televised by the "Block" airborne set. Picture shows a river-side power plant picked up at 3000 ft.

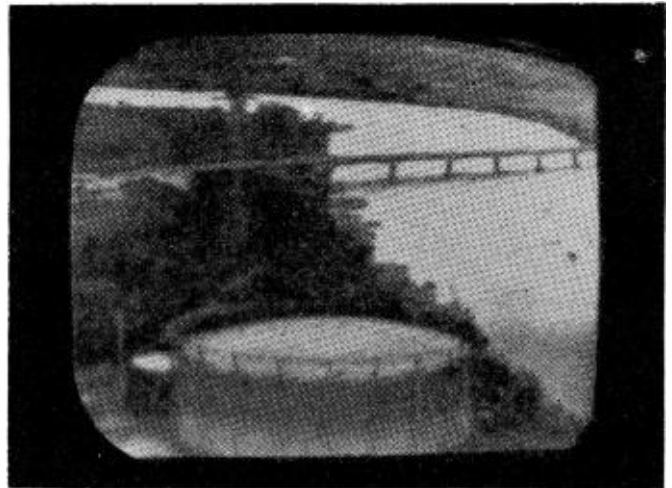


Fig. 5. Typical image televised by "Ring" airborne equipment. Scene is Sousa bridge and storage tank on the Potomac River.

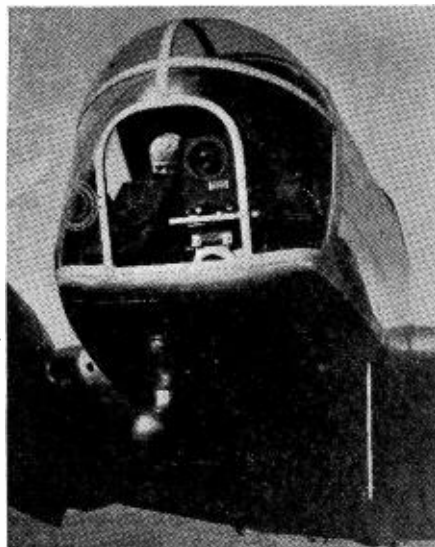


Fig. 3. "Block" television camera mounted in nose of plane and ready for action.

vision equipment were developed during the war by engineers and scientists of the *Radio Corporation of America*, the *National Broadcasting Company*, and the United States Navy. For security reasons, the two television systems were identified by special code names: "Block" and "Ring." But since the war these names have become permanent nomenclature.

The *Block* system is a small, compact televisor suitable for short-range pickup and transmission of pictures,

operating up to about 50 miles. The complete apparatus, including power supplies and a single camera, weighs only 100 pounds. It operates unattended, and provides good picture fidelity under most operating conditions.

The *Ring* system is much larger in size, using two or more cameras and a crew of four operating engineers. This equipment has a range of over 200 miles when transmitting at an altitude of 15,000 feet. And the complete apparatus weighs about 500 pounds.

The *Ring* system provides considerably greater picture fidelity than is possible with the smaller *Block* system, chiefly because components of the *Ring* system can be operated at all times under optimum operating conditions, while components of the *Block* system cannot be adjusted during flight and thus can be operated only under average operating conditions.

However, such a comparison of the two systems is not strictly fair, since each type of airborne equipment was designed for a particular tactical purpose. And the two systems were not intended to compete with each other.

Block Equipment

The *Block* airborne television system (Fig. 4) is a small but complete television broadcasting system, normally installed in high-speed reconnaissance aircraft.

The entire *Block* equipment is housed in a single demountable unit

(Fig. 1) containing all components necessary for televising and transmitting images. The power supply for the unit is self-contained and operates directly from the plane's generator.

Block equipment functions automatically and is unattended. The camera-unit is fixed, usually in the nose of the aircraft (Fig. 3). Any panning effect is accomplished by the plane's pilot, who moves the controls of the plane in such a manner that the television camera screens the desired object or target.

The camera uses an Image Orthicon, and the output of this tube is fed to a video amplifier whose gain is preset (Fig. 4). The video signal is then combined with appropriate sync and shading signals in the conventional manner, and this combined signal—sync plus video—is applied to the modulator stage. This amplified signal is then used to grid-modulate the power output stage of the transmitter. The output stage is also plate-modulated by a separate sync signal from the sync generator.

Thus the transmitter is decidedly unique in that it combines both grid and plate sync modulation.

The purpose of this modulation arrangement is to maintain the percentage of sync modulation constant, increasing the range, reliability, and electronic stability of the televised picture.

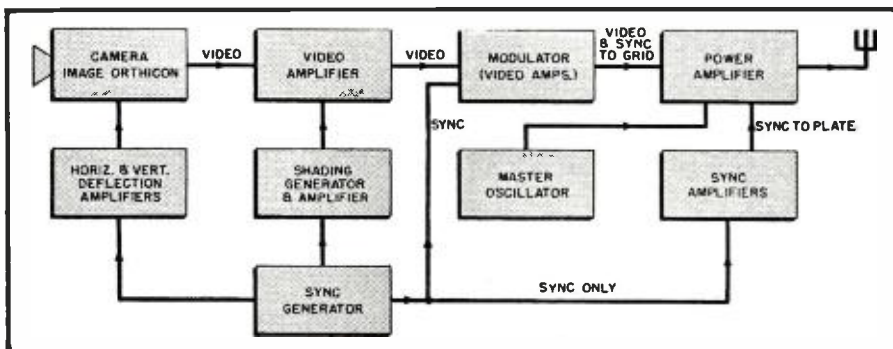
Operating frequency of the *Block* transmitter is between 264 and 372 megacycles, controlled by a master oscillator stage. The output of the transmitter delivers approximately 60 watts of power to special transmitting antennas used for each of ten workable channels.

Scanning standards for *Block* equipment require sequential scanning at 350 lines, 40 frames per second.

Sequential scanning is used for purposes of circuit simplicity. This method of scanning, however, provides considerably less resolution, primarily because of adjacent-line halation.

Since the *Block* equipment operates unattended, it must be properly adjusted by the technical ground crew

Fig. 4. Simplified functional diagram of "Block" television system.



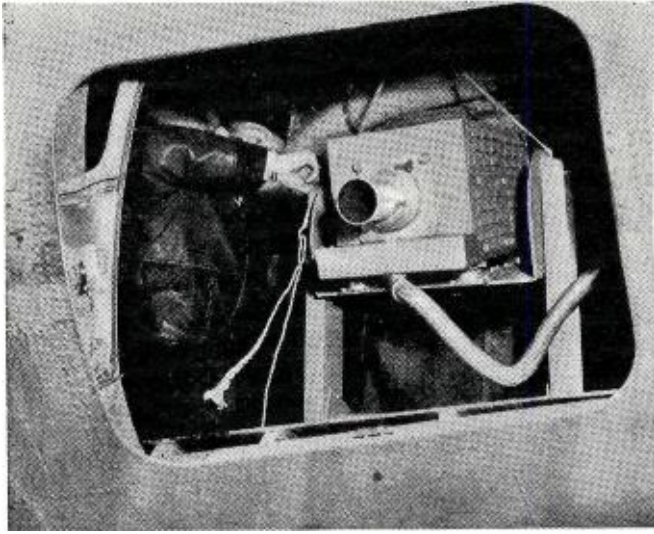


Fig. 6. "Ring" type camera mounted in the waist of aircraft. This camera was used principally for close-up observations.

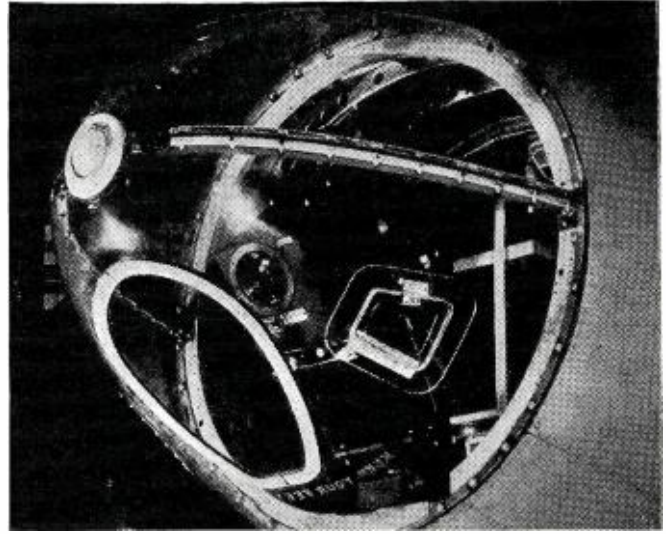


Fig. 7. "Ring" camera mounted in the nose of aircraft. This camera is usually used for shooting general over-all scenes.

before it becomes airborne. In operation the gear must have fixed focus, fixed lens aperture, fixed shading, and fixed camera positioning in the nose of the plane. For these reasons the equipment can never function with an efficiency comparable to the larger *Ring* system since the *Block* equipment must be adjusted for average (not optimum) operating conditions. Any variance from the average operating conditions will be detrimental to its operation thus impairing the picture quality.

In its early stage of development *Block* equipment was used by the Navy's Special Task Air Group One during attacks on Bougainville and Rabaul. The targets there were successfully relayed back over a distance of 15 miles.

In a slightly modified form *Block* equipment was also used extensively during the war for control of guided missiles, including glide bombs, "crash" boats, and other death-dealing devices in need of visual control or observation of final results.

A typical image televised by the *Block* equipment is shown in Fig. 2.

Ring Equipment

The *Ring* airborne television system (Fig. 8) is also a complete television broadcasting system, but it's normally installed in medium or large airplanes.

While the previous *Block* system was designed to be compact and expendable if necessary, the *Ring* equipment was built for television production along standards comparable to those expected from portable ground equipment now in use to cover boxing, football games, and other special events.

Two pickup cameras are generally used with *Ring* equipment, but three or more could be used if desired. Each is operated by a television cameraman. A transmitter engineer is required to supervise operation of the 1 kilowatt video transmitter. All technical operations within the plane are controlled and monitored by the video control engineer.

Thus in the more general installation, four television engineers are required to operate the *Ring* equipment, these in addition to the usual plane crew.

This television system is specifically designed for synchronized control of all technical operations under the direct supervision of the video control engineer.

The cameras are not fixed, but are free to move. They are each equipped with lenses of different angles to permit observation of an over-all area or, when desired, the observation of pinpoint targets within a given area. And when required, specific targets can be greatly enlarged.

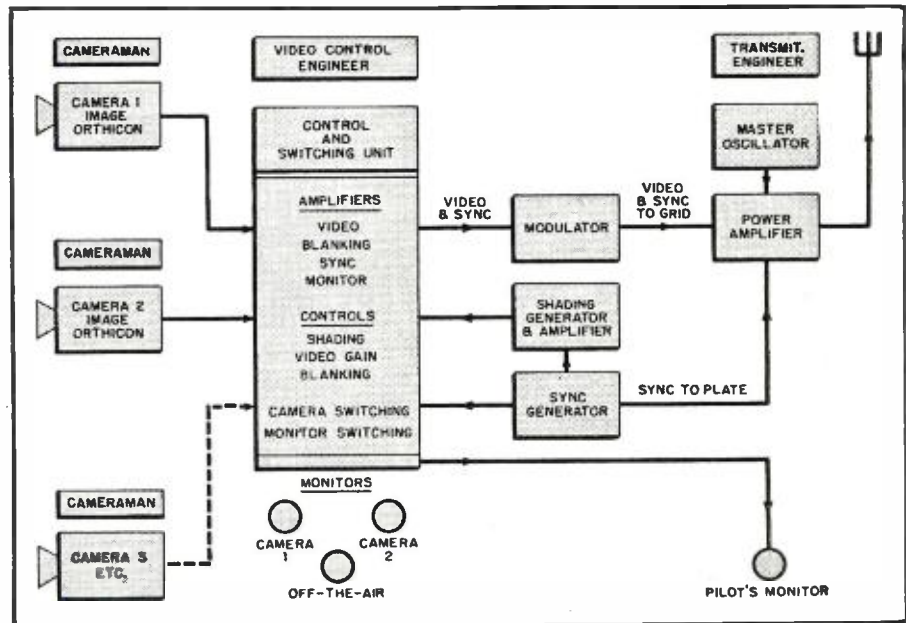
Picture monitoring is an important part of the *Ring* equipment. One monitoring scope is for the exclusive use of the plane's pilot, providing the pilot with a view of either output of the two cameras. Then, by means of closely integrated communication be-

tween the pilot, video control engineer, the cameramen, and ground base headquarters it's a simple matter to locate pinpoint targets.

This integrated control is only one of the many duties of the video control engineer. He's also responsible for shading of each camera, controlling the video output and blanking level for each camera, directing each cameraman (via the plane's intercom system) on matters of excessive brightness, lens apertures, panning, and focussing. This engineer is the focal point for all communications with the ground base headquarters and with any other planes involved in an operation.

Because all components of the *Ring* equipment are under the constant control, scrutiny, and supervision of a complete engineering staff, all of the many technical adjustments can be maintained continually at their optimum during the entire flight or
(Continued on page 100)

Fig. 8. Block diagram illustrates principle of operation of "Ring" television system.



Distortion Analyzer

Simplicity of construction and operation puts this test instrument within the reach of the average serviceman.

By J. T. GOODE

Asst. Chief Eng.
Packard-Bell Co.

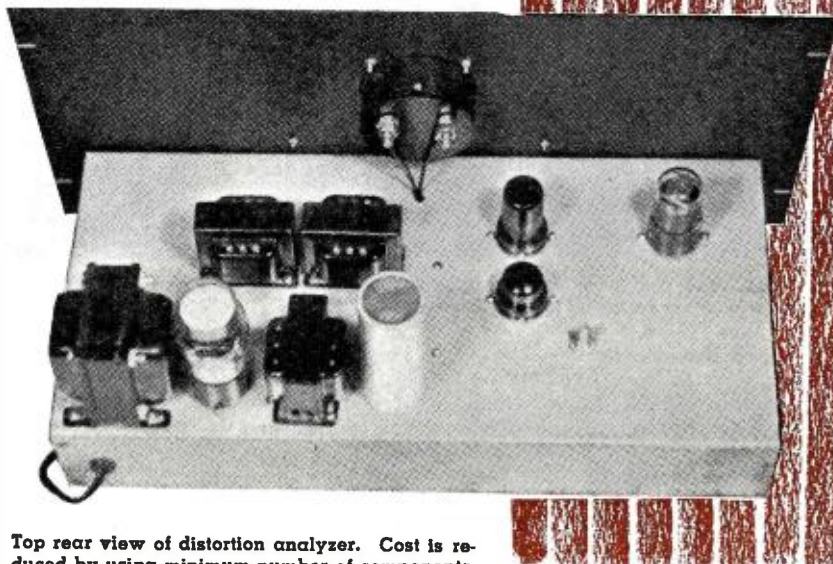
THE equipment to be discussed in this article when used in conjunction with the RC audio oscillator discussed in last month's issue gives the operator an opportunity to delve into some of the mysteries of audio amplifiers. An engineer who has constructed several audio amplifiers soon finds out that one amplifier operates differently from another. The difference may be in tone quality, power output, or both.

If distortion measuring equipment is not available, the engineer is not in a position to analyze properly what is causing the difference other than by checking voltages and observing patterns on an oscilloscope.

Under some conditions the voltages will be identical and continuity tests will indicate no change. By substitution of parts the difficulty is usually determined and corrected. A distortion analyzer makes it possible to check stage by stage and adjust each value of resistor, condenser, or transformer for optimum operating conditions. The use of common resistor and condenser values for resistance-coupled amplifiers is normal practice, but actually some definite value of resistor, condenser, or transformer will give optimum operating conditions if proper equipment is used to indicate slight changes when these values are varied.

A well designed amplifier will naturally have a minimum amount of distortion. It is extremely difficult for an engineer to simply listen to a loudspeaker and determine by substitution of parts when the amplifier is giving minimum distortion. The use of an oscilloscope aids the situation materially but still does not completely suit the purpose.

When determining the correct value of resistance for a particular circuit and selecting an optimum value, it is necessary to use something that will indicate small changes, such as a fraction of 1%, in that some changes of this value of resistance may cause only a slight improvement. For instance, the plate resistor in a resistance-coupled amplifier may be changed from 100,000 ohms to 150,000 ohms, decreasing the distortion by 1%. The screen resistor on this same stage is adjusted from 500,000 ohms to 750,000 ohms, reducing the distortion another 1%. By selecting these optimum values, we have reduced the distortion in



Top rear view of distortion analyzer. Cost is reduced by using minimum number of components.

this amplifier 2%, but with an oscilloscope this change would not be noticed and most certainly not by a listening test, yet 2% of distortion was removed from the circuit.

The same adjustment made on the following amplifier stage could result in another decrease of distortion in the order of 1% or 2%. The net result of the over-all amplifier distortion would be in the order of 4% or 5%, which is a worthwhile improvement. In transformer design, distortion becomes a very important factor. Selection of a transformer that gives maximum gain may result in an increase in distortion over another transformer that gives slightly less gain.

The difference in percentage of distortion can be less than that observed on an oscilloscope. In amplifier design, the addition of a tone control or negative feedback circuit is normal. Tone controls sometime result in an increase in distortion as well as high frequency attenuation. The percentage of distortion created under such conditions can be compensated for if the amount of distortion can be indicated. Negative feedback is normally used to reduce distortion. The use of a distortion analyzer makes it possible to determine what effect this feedback is causing and how much feedback is optimum.

The distortion analyzer becomes an important piece of equipment for servicing radios. Placing new tubes in a receiver may result in no particular improvement in the quality of the set. New tubes have a habit of being defective, and when such a condition exists, the technician may spend con-

siderable time determining the difficulty. A simple distortion test immediately indicates the difficulty.

The use of this distortion analyzer is extremely simple. By connecting the distortion analyzer to any part of the audio circuit, the distortion can be read in direct percentage. Going from stage to stage in a matter of seconds, the source of distortion can be located.

Understanding the operation of a distortion analyzer aids the operator in determining where a distortion measurement can be made to aid design or the repair of existing equipment. The distortion analyzer consists of four tubes: (1) 6SN7, amplifier stage; (2) 6SR7, vacuum tube voltmeter amplifier; (3) 6H6, vacuum tube voltmeter rectifier; (4) a type 80 tube used in the power supply. The 6SN7 amplifier stage amplifies low voltages, creating a sufficient voltage for the distortion filter. This amplifier is distortionless (.1% or less). The output of this amplifier is sent into the bridged-T filters.

Two filters may be selected by a switch on the front panel, one frequency at 400 cycles and the other at 1000 cycles. These filters cancel the fundamental frequency, leaving all harmonics. The vacuum tube voltmeter is simply switched from input to output of the bridged-T filters, and the difference in voltage determines the percentage of distortion. The 6SR7 amplifier amplifies the input or output of the filter, creating sufficient voltage for the 6H6 rectifier tube. The power supply voltage is adjusted so that 200 volts is applied to the plate

circuit of the 6SN7 and 6SR7 tubes.

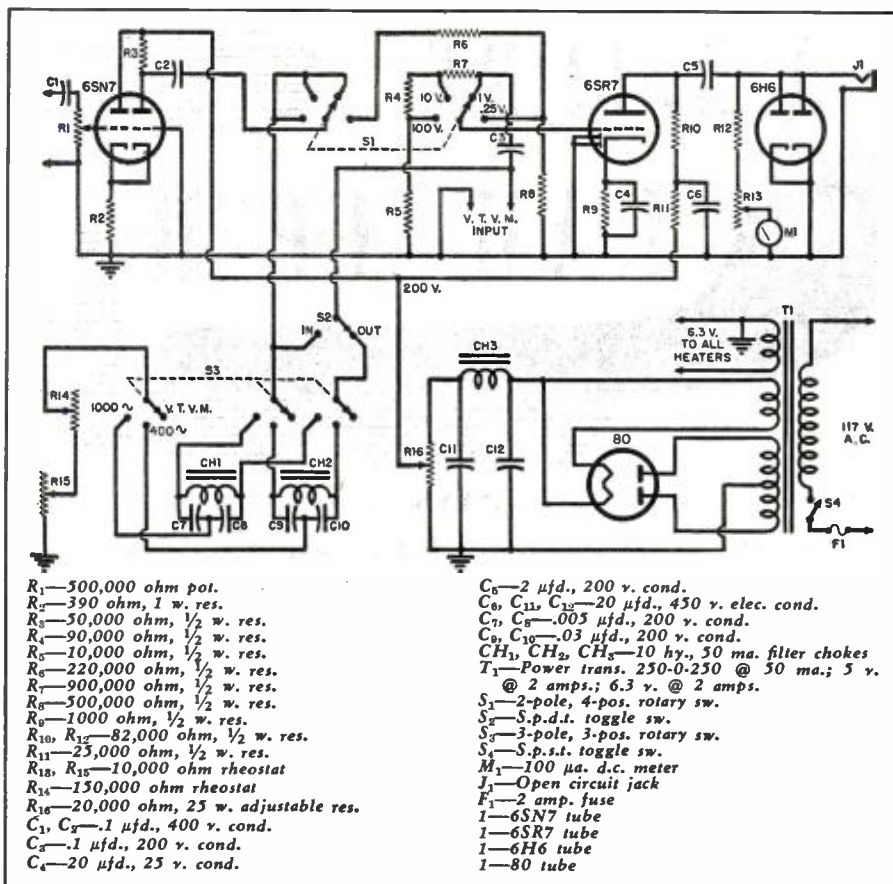
The 6SN7 amplifier is an extremely simple audio circuit. The first section of the amplifier operates as cathode follower, and the voltage created by the common cathode resistor is then impressed on the grid of the second stage of the amplifier, which creates an extremely low impedance grid circuit as well as negative feedback. The gain of this amplifier is approximately 5. The operation of the bridged-T filter circuit is to cancel the fundamental without materially affecting the harmonics. This filter does just that, effectively.

The filter consists of an iron core coil with two condensers in series shunting it. The center tap of these condensers is connected to two variable resistors. One variable resistor is 150,000 ohms and the other is 10,000 ohms. The 150,000 ohm resistor becomes the coarse adjustment, and the 10,000 ohm resistor becomes the fine adjustment. By means of a three-pole, three-position switch, the two filters may be selected, and the third position of the switch will allow the use of the vacuum tube voltmeter circuit for other purposes.

A single-pole, double-throw switch connects the vacuum tube voltmeter to the input or output circuit of the filters. At this point the voltage is fed into the vacuum tube voltmeter decade switch. This decade switch will select various voltage ranges. The output of the amplifier is then fed into the plate circuit of the 6H6 and the rectified current is indicated by a 100-microampere meter. A 10,000 ohm variable resistor is connected in series with the meter, which creates a calibration adjustment for the meter.

The operation of the vacuum tube voltmeter is as follows: 1 volt is fed into the vacuum tube voltmeter with the switch in the 1 volt position. The 10,000 ohm calibration resistor is then varied for full scale deflection of 100 microamperes. After this adjustment is made, the vacuum tube voltmeter will be in calibration on all voltage ranges with the exception of the .25 volt range, providing the decade resistors are of the correct value. By measuring several resistors of the same value, it is possible to select a set of three resistors that will give 1% or 2% accuracy. For instance, if the nearest value to 900,000 ohms turns out to be 950,000 ohms, then select a 95,000 ohm resistor in place of the 90,000 ohm resistor. Next, select a slightly higher value for the 10,000 ohm resistor. In other words, the total resistance of the three resistors is not critical, since the grid circuit offers no load, and it is simply a voltage divider. The resistance values selected added together will total 1 megohm. The total resistance could be two megohms, one and one-half megohms, or any other value in that region as long as the steps in the decade follow in steps of ten to one.

The author was able to bridge a quantity of 10% resistors and create a decade that was accurate within 1%



Schematic diagram of the completely a.c. operated, 4-tube distortion analyzer.

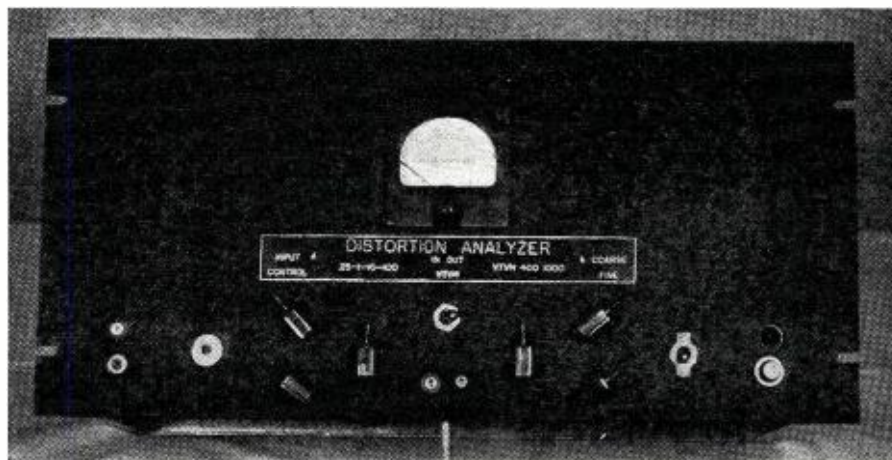
in a matter of minutes. The purchase of 1% resistors would, of course, eliminate the problem but would increase the cost of construction. When the voltage selector switch is moved to the .25 volt position, the gain of the 6SN7 amplifier stage is utilized. To calibrate this set of resistors, rotate the input control to maximum and apply .25 volt to the input terminal. Connect a 500,000 ohm variable resistor in place of the 220,000 ohm resistor which connects between the contacts of the selector switch. Adjust this resistor until full scale deflection is indicated by the 100 microampere meter. Remove the variable resistor from the

circuit and measure its resistance, substituting a fixed resistor for that particular value.

The 500,000 ohm resistor from the switch contact to ground is not critical if placed in the circuit prior to the adjustment just mentioned. By placing the filter selector switch in the vacuum tube voltmeter position and the "in or out" switch in the "out" position, it is then possible to use the vacuum tube voltmeter for purposes other than distortion measurements.

For voltages of 1 volt, 10 volts, or 100 volts, use the vacuum tube voltmeter binding posts. For voltages less
(Continued on page 140)

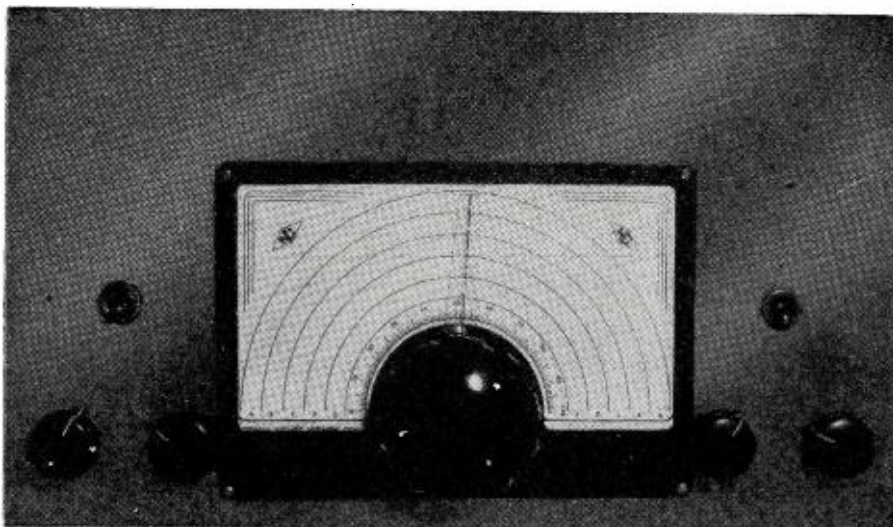
Front panel view shows proper location of various operating controls. In order to achieve a symmetrical panel layout, the control toward the left of the panel, below the "Input Control" is a dummy and not used. It may be omitted entirely.



A 5-TUBE HAM SUPER

By C. V. HAYS, W6RTP

Complete construction details for a short-wave receiver that can be built at reasonable cost.



Panel view of completed receiver. Controls from left to right are: volume control, R_{11} ; a.v.c. control, R_{12} ; tuning condenser C_{1a} , C_{1b} ; regeneration control, R_2 ; and standby switch, S_1 . Toggle switch S_2 is to the left and S_3 is to the right.

IN THE design of a suitable amateur communications-type receiver there are several approaches open to the builder. If the only consideration, or the primary one at least, is the matter of performance, then the problem simply becomes one of choosing the best circuits and components available. However, many hams do not have the requisite pocket-book to indulge in the deluxe type receivers commonly to be found, and the usually-to-be-seen simpler type of receiver is almost always frankly one which the designer admits will not hope to equal in performance the more elaborate jobs; i.e., it lacks sensitivity, has no selectivity, usually has no speaker output stage, no b.f.o., etc., etc. This article will give data on the construction of an inexpensive communications job which makes no apologies insofar as performance is concerned—the cheapness has been obtained by deleting heavy panels and chassis, cabinet, meter, pilot light, etc., and by using a simple type of dial

whose excellence of action is well known among hams, yet is not expensive. A simple type of power supply adds further to the economy, so that the builder's \$20-\$25 purchases pure performance without doo-dads.

The front end of the receiver employs a high gain 7V7 or 7G7 tube, fed conversion voltage from a simple 7A4 Hartley oscillator in a method which ensures quiet, high conversion gain detection in this critical spot. A single stage of 1600 kc. i.f., using a type 6SF7 tube may be used if the builder desires a.v.c.; if not, a conventional 6SJ7 tube in this spot is recommended, merely leaving out the a.v.c. circuit shown in the schematic. The i.f. stage has regeneration of a simple sort applied to it by inserting a variable series resistance between the chassis and the screen grid bypass condenser, giving a degree of selectivity, easily controllable, that can be adjusted to the familiar "ping" sound common to crystal filters for c.w. work, or used in broader positions as desired. Careful layout

and shielding, as well as good bypassing, etc., are necessary in the i.f. stage—we want the regeneration to be introduced *when* we want it, and as *much* as we want it, only! Build the stage exactly as shown, not forgetting a 1" x 1¼" shield (of tin or brass) which connects to pins 3 & 8 (ground), if a 6SF7 is used. If a tube of the 6SJ7 type is used, just make sure the shield solders to a good ground connection, and isolates plate and grid circuits.

Following the i.f. stage, we use a 6SN7, which tube has two complete triode units in one envelope, for a combined plate second detector and b.f.o., in which use it has proved an excellent performer. Lay out the socket so that pins 1, 2, and 3 point at the b.f.o. transformer, and the pins 4, 5, 6 come as close as possible to the last i.f. transformer; this will ensure neat, easy wiring, with all leads spaced sufficiently. No other precautions are necessary in the second detector circuit—follow the parts placement exactly for the b.f.o. section, and no trouble will be experienced with "birdies" when using b.f.o. for c.w. work, with the shielding as shown. A different layout might require that all component parts of the b.f.o. circuit be shielded separately, so that chassis layout given had best be followed in the interest of painless construction.

The audio stage is a conventional 6V6, which more than sufficiently excites a 5" PM speaker for those who wish speaker performance—if phones only are used or desired, the 6V6 stage can be deleted, the 6SN7 detector giving more than enough gain for such operation. In the interest of laziness, the output transformer was fastened directly to the chassis, instead of on the speaker itself, as is common practice. It has worked out better thus than on the speaker, since in carrying the little job from place to place, it is a simple matter to find a permanent magnet speaker of some sort lying around, and since the receiver has its own output transformer, it is a simple matter to fire up the 5-tuber for demonstration, etc., without the necessity of finding a suitable matching transformer.

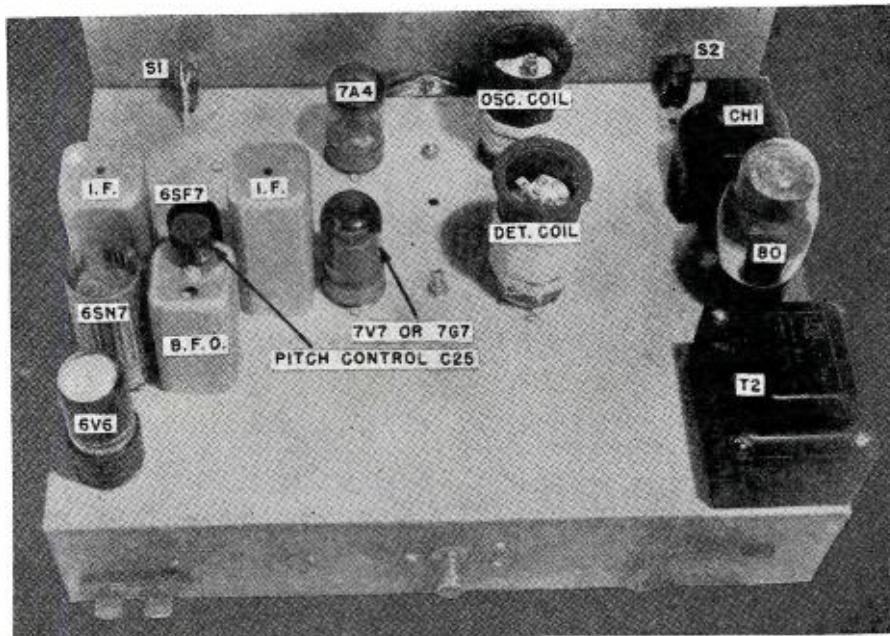
Alignment of the receiver is a simple matter. With a set of coils installed (80 meters is good) turn on S_3 , and, with audio gain open, r.f. gain open, and the tuning gang set half-mesh, turn the osc. trimmer (in coil form) slowly for signal indication (3750 kc.) from the signal generator—the lower signal is the one used in the model shown, but the oscillator can just as well work on the high side—then peak the detector trimmer for maximum signal, and the little super is ready to go. The matter of i.f. alignment is equally simple, and needs no word except one of caution perhaps—if your i.f.'s are new, it is a good idea *not* to change any trimmer screw adjustments until you are ready to adjust the i.f. stage—the transformers are usually set for frequency, and will need merely a bit of touching-up. I.f.

adjustments are made with regeneration full off.

The manner of obtaining bias is simple and positive, and affords a large degree of smooth control, as well as allowing the cathode of the i.f. stage to be grounded directly, an important point in quiet, high-gain stages. It is not recommended that this bias method be changed, but copied exactly as is, for best performance of the receiver.

In wiring the job, it is recommended that the constructor, particularly if not too experienced in receiver building, follow the parts placement exactly. It will be found convenient to wire all filaments first, keeping the filament lead spaced well away from grid and plate leads, and running it in chassis edges when possible, grounding one filament pin of each stage directly at the sockets. The author advocates, if at all possible, building the little job backwards, that is, wiring and testing the audio stage, then the second detector, i.f., converter and oscillator, then when all circuits "perk," wiring the b.f.o. stage. This avoids the common trouble of having possibly two or three wiring errors, etc., in a row to contend with. In following this method, wire cathode and grounds first, then plate, then grid circuits. (NB—This type of converter/oscillator must be tested with both converter and local oscillator wired and operating with proper coils installed, to insure bias for the first detector. Always turn off switch S_2 when changing coils.)

It is wise to build your i.f. stage first



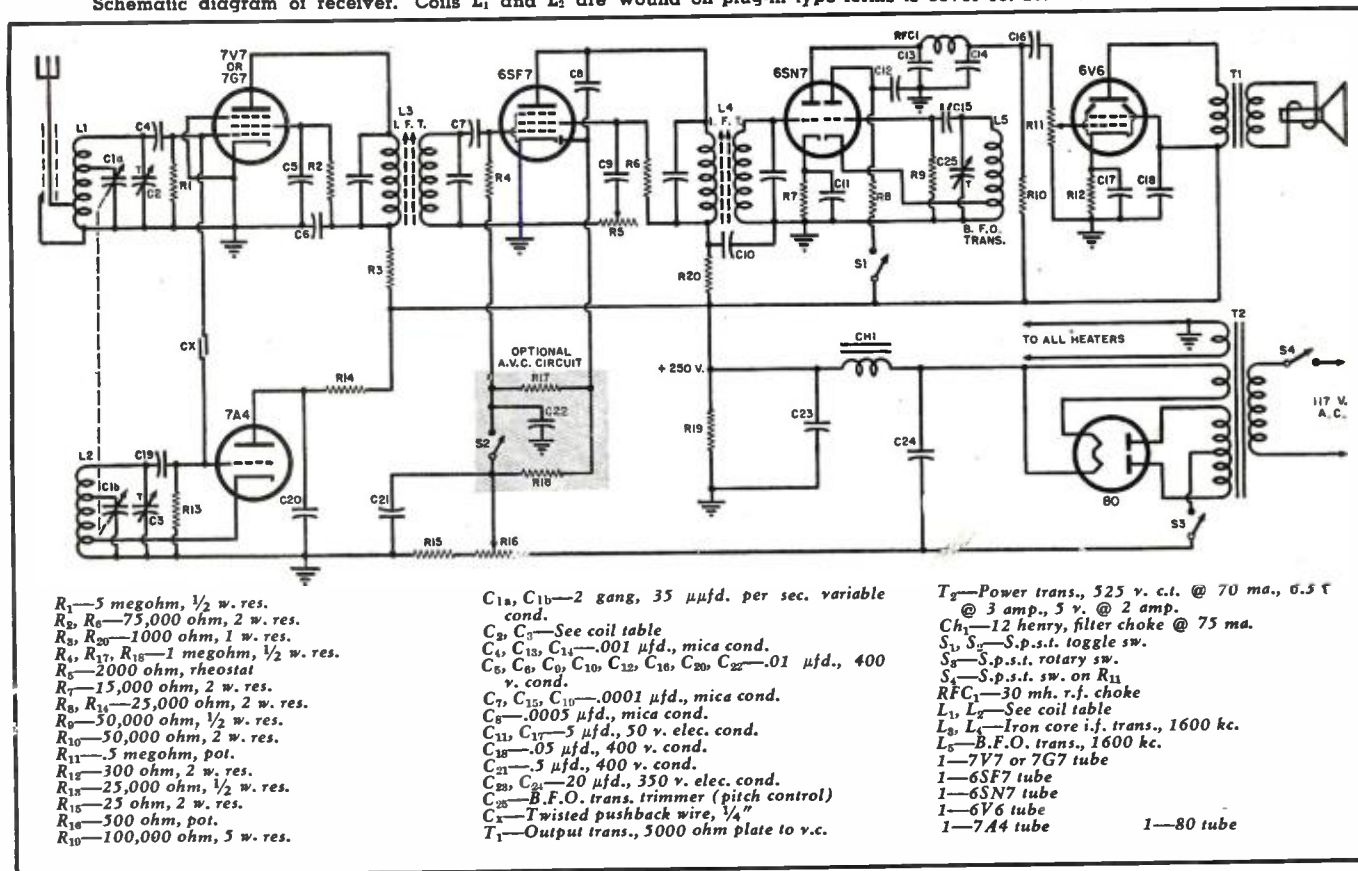
Top view of short-wave receiver shows placement of major component parts.


with the regeneration control (R_5) out of the circuit—simply ground the i.f. screen by-pass condenser (C_5) directly, until the i.f. stage is properly aligned and operating perfectly, which means that no hissing nor noise of any kind is audible in the output without signal being applied to the i.f. grid. This is important if you wish a dead-quiet receiver, a highly desirable condition for weak signal reception; once the stage is operating properly, unsolder the ground end of C_5 and connect it to

R_5 as shown in the schematic diagram—increasing the value of R_5 will then be found to give smooth selectivity.

The author highly recommends the inclusion of the type 6SF7 tube in the i.f. position, since it allows simple, good a.v.c. to be obtained. A careful study of the schematic will show the foolproof action of the a.v.c. circuit, and its inclusion is very desirable if phone operation is contemplated. The operation of the circuit (Continued on page 116)

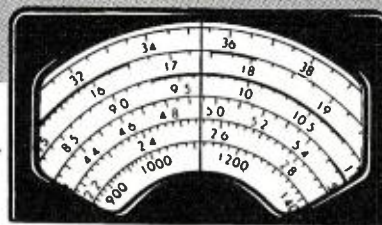
Schematic diagram of receiver. Coils L_1 and L_2 are wound on plug-in type forms to cover 10, 20, 40, and 80 meter bands.





International SHORT-WAVE

Compiled by **KENNETH R. BOORD**



IT IS with great pleasure that this month's ISW Department is dedicated to two widely-separated short-wave outlets—*Radio Saigon*, French Indo-China, and *Radio Central America*, Republic of Panama.

For the benefit of ISW readers, I am quoting portions of a letter just received from Mrs. R. G. (Margaret Morgan) Coughlin, formerly of Pennsylvania, who is now "*Speakerine Anglaise*" at *Radio Saigon*, French Indo-China:

"*Radio Saigon* received your grand letter about ten days ago and was delighted to hear that the signal comes through so clearly. We of the English Department were particularly pleased with your comments on the English programs and your pleasure at hearing English over a foreign station. I am the woman announcer you referred to as speaking 'fluent' English. That comes naturally to me, as I am an American. My husband is in the foreign service here and I, to keep myself occupied, have taken a job with *Radio Saigon* as 'afternoon' English announcer. The work is extremely interesting and we've received letters from radio listeners all over the world, reporting reception of our English programs.

"By the time you receive this, I will have stopped broadcasting regularly, as I've found it too heavy a schedule to swing along with my other duties. I will continue to help

with the programs, however, and will probably continue to give the Tuesday 'afternoon' broadcast and the French lesson.

"*Radio Saigon* had one of the strongest signals in the Far East before the war and, I am told, had the finest record collection. Practically everything was destroyed in the arsenal explosion which occurred last April, however, and the station has been forced to begin building 'from scratch' with very primitive equipment. We are gradually building up again; but it will be a difficult task with equipment from overseas so hard to procure.

"We give two *English* broadcasts a day—the first at 4:45-5:30 EST; * the second, 8:30-9:30 a.m. The 'afternoon' broadcast consists usually of 15 minutes of dance music, followed by 10 to 15 minutes of news. At 5:15 a.m. there is usually a 10-minute special feature; and the program is concluded with music. Features include an English lesson for French listeners on Mondays and Fridays; a French lesson for English listeners on Tuesdays (taught by myself); a short talk on subjects of general interest on Wednesdays; our Listener's Letter Box (replying to letters received from short-wave listeners) on Thursdays; and over the week-end, occasional special talks or sports lectures. The 'night' broadcasts follow the same pattern, except that there is always a

half-hour of music (popular, classical, or semi-classical), preceding the news (usually heard around 9 a.m.); the English lessons are also omitted in the 'evening' period and music is substituted.

"The shortage of personnel necessitates our programs being rather simple; however, we hope soon to be able to include occasional skits, plays, and other special features.

"Let me assure you that your reception of our station on August 7 on the 11.78 frequency was most accurate . . . I surely hope you will be tuning in this frequency Thursday afternoon when I answer your letter over the air." (*Your ISW Editor missed it!*)

Mrs. Coughlin concluded, "Thanks so much for your letter and also for the *RADIO NEWS* which is much appreciated; it is the first record I've seen of other Far East stations and their wavelengths. Please continue to write us; and if you have any suggestions or material that we could use on our English broadcasts, they would be much appreciated, as there is little of that sort of thing left in post-war Saigon."

(*Your ISW Editor is trying to arrange a special DX broadcast from Radio Saigon for some Sunday in March or April, dedicated to readers of RADIO NEWS, for around 5:15 a.m. (1015 GMT). Watch for it!*)

Technical data on *Radio Saigon*, furnished by Mrs. Coughlin, follows:

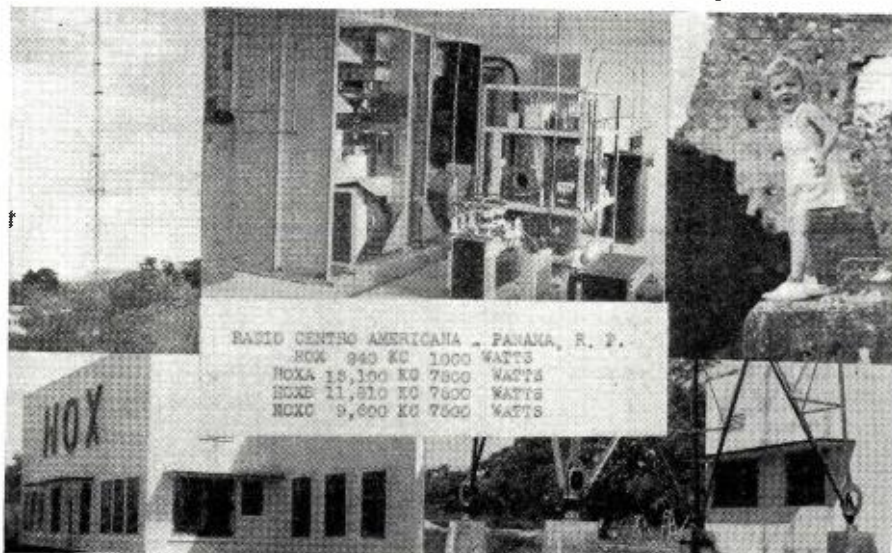
The station radiates on 11.780, 4.810, and 1050 kilocycles in the 25-, 62-, and 285-meter bands, respectively. Studio is located at 198 Rue Chasseloup Laubat, Saigon, French Indo-China. Transmitters are located at Phu T-no, 3 miles from Saigon. The station is owned and operated by the *Haut Commissariat de France pour le Pacifique*. Studio equipment is emergency equipment; former studios were destroyed in an ammunition depot explosion in April, 1946.

The s.w. transmitter on 11.780 operates on a non-directive, half-wave antenna; the 4.810 one with a non-directive, delta-matched. Output power is 12 kw., input power, 50 kw. Final stage tubes are (two) water-cooled 10 kws. anode voltage 8800 volts; modulation is Class A.

Full schedules of *Radio Saigon* are: Daily, 6-7:30 p.m.; 9:45-12 midnight;

* Unless otherwise indicated, all times herein are expressed in American Eastern Standard Time, 6 hours *BEHIND* GMT.

This photograph "verie" has been sent to all parts of the world by HOXA, Box 1335, Panama City, Republic of Panama, and features scenes around the station. A new series of verie cards is being prepared for distribution in the very near future.



Radio Serviceman:

here's a valuable tool for your shop!



**RADIO
MAINTENANCE**

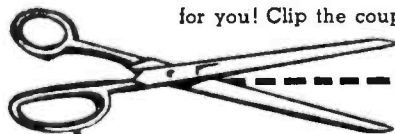
MAGAZINE serves the Radio Service man with original articles on servicing techniques, educational articles on how to use all kind of test equipment, and "know-how" that will speed your servicing.

For example, each month we carry a special feature entitled, "The Radio Service Bench." Prepared by **Radio Maintenance** staff and readers, this department completely discusses the various problems of a radio shop such as tools, work bench, hints and kinks, and so on. Here we tell you not only what is needed but how, through your own ingenuity, your service jobs will go faster with more profit for you.

Of course, we go beyond the service bench. Each month, **Radio Maintenance Magazine** focuses attention upon all services which come under your jurisdiction. Trouble-shooting Procedures in AM-FM-Television; Public Address Systems; Alignment Problems—all are dealt with by well known men in the radio industry.

Radio Maintenance Magazine is a trade publication. You can't buy it on the newsstands. A one year subscription—twelve full months—costs only \$2.50.* If you double up on two years, the cost is only \$4.00. Either way, you win in the long run.

Don't miss this valuable tool for your shop—this magazine that is published especially for you! Clip the coupon below and send it with your check to **Radio Maintenance**.



RADIO MAINTENANCE MAGAZINE
460 Bloomfield Avenue
Montclair, New Jersey

I enclose \$2.50 for 1 year \$4.00 for 2 years RN-2

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Gentlemen:
Please send me (one year's
(two years') subscription to
Radio Maintenance Magazine
as checked above.

NOT SOLD ON
NEWSSTANDS

RADIO

MAINTENANCE

460 BLOOMFIELD AVENUE • MONTCLAIR, N. J.

BOLAND AND BOYCE, INC. - PUBLISHERS

TOMORROW'S PRODUCTS TODAY...

STOCK DELIVERY



TEST INSTRUMENTS

Compact — Accurate — Priced Right!

- Jeweled Meter • Range Selector Switch
- All multipliers bridge tested for 1% accuracy
- Zero adjustment—built in batteries
- Molded bakelite case only 3-13/16" x 2-7/8" x 2"



MODEL 450A

Volt—Ohm—Milliammeter
A fine instrument having a sensitivity of 1000 ohms per volt.
Ranges: Volts DC, 0-5/10/50/500/1000;
Mills DC, 0-1;
Ohms full scale, 0-5000/50,000/500,000;
Ohms center scale, 30/300/3000.

NET complete with batteries **9.75**

MODEL 451A

AC-DC

Volt—Ohm—Milliammeter

A dependable instrument of wide utility—sensitivity 1000 ohms per volt.
Ranges: Volts AC, DC, and Output Ranges, 0-10/50/100/500/1000;
Ohms full scale, 500,000.
Ohms center scale, 7200.



NET complete with batteries..... **13.65**

MODEL 451B

Same instrument as above but has 2500 ohms per volt sensitivity.

NET complete with batteries..... **15.15**



MODEL 452A

Volt—Ohmmeter

A superb instrument—100 microampere meter gives 10000 ohms per volt sensitivity.
Ranges: Volts DC, 0-10/50/100/500/1000;
Ohms full scale, 0-2000/20,000/200,000/2 Meas;
Ohms center scale, 30/300/3000/30,000.

NET complete with batteries..... **13.65**



MODEL 312

Volt—Ohm—Milliammeter

An economy pocket meter featuring a 2" moving vane meter.
Reads: AC-DC volts, 0-25/50/125/250;
Mills AC-DC, 0-50;
Ohms, 100,000; mfd. .05-15.
Jacks provide range selection.

NET Complete with cord and plug..... **6.00**

CONDENSER SPECIALS

Guaranteed first quality.

"The best at the lowest price"

Mfd.	Voltage	Net			
10	25	27¢			
25	25	36¢			
100	25	52¢			
10	50	32¢			
8	150	32¢	30/20	150	88¢
16	150	42¢	100/30	150	94¢
20	150	44¢	20	250	59¢
30	150	47¢	8	450	44¢
20/20	150	70¢	16	450	64¢



Attention GI JOE!

Here's Your Opportunity to

Start Your Own RADIO SERVICE SHOP

Complete Starting-in-Business Package Stocks of

TEST EQUIPMENT TUBES, PARTS, TOOLS **\$350 up**

Act quickly! Meet the pent up demand for radio service. Turn your special service training into a profitable business of your own. No fuss. No worry. Here's everything you need—\$350 up. Details upon request. Write, wire or phone.

PHILCO BEAM OF LIGHT

Selenium cell only, no holder, postpaid..... **1.80**
(Puts new life in Philco Chargers.)



"One with every car radio service job"

Emergency trouble lite. 12' cord reaches anywhere on car. Insert plug in cigar lighter on any car. Gives light—where needed—when needed—a "natural" for installing and servicing car radios—use it—sell it to your customer—for added profit.

1 lighter lite in box **2.50**
1 dozen..... **1.88 ea.**
2 dozen..... **1.67 ea.**
4 dozen..... **1.50 ea.**

SHORT WAVE RECEIVERS



HALLICRAFTERS S-38..... **39.50**
S40 (REPLACES S20R)..... **79.50**
HAMMARLUND HQ129X..... **161.40**
SPEAKER IN MATCHING CABINET..... **11.85**

20% deposit required on all C.O.D. orders.
2% transportation allowance on orders of \$25.00 or more accompanied by payment in full.

RADIO SUPPLY & ENGINEERING CO., Inc.
129 SELDEN AVE. DETROIT 1, MICH.

SEND FOR FREE BARGAIN BULLETIN

and 3:30-9:45 a.m.; English periods begin at 5:45 and 8:30 a.m.

Radio Central America

We are indebted to the staff of *Radio Central America*, Box 1335, Panama City, Republic of Panama, for this interesting article prepared expressly for readers of RADIO NEWS:

"New equipment now being installed at Station HOX, Panama, will make *Radio Central America* the first radio outlet to give complete long-wave coverage of the Republic of Panama and other parts of Central America as well, although Panama now has nine stations in operation and seven others in various stages of construction.

"The new equipment consists of a one-kilowatt transmitter, beam antenna for short-wave transmissions which will increase the power of the station approximately six times; new recording facilities; and FM transmitters.

"*Radio Central America* first went on regular schedule on October 12, 1946, after three years of planning and painful accumulation of equipment and building materials.

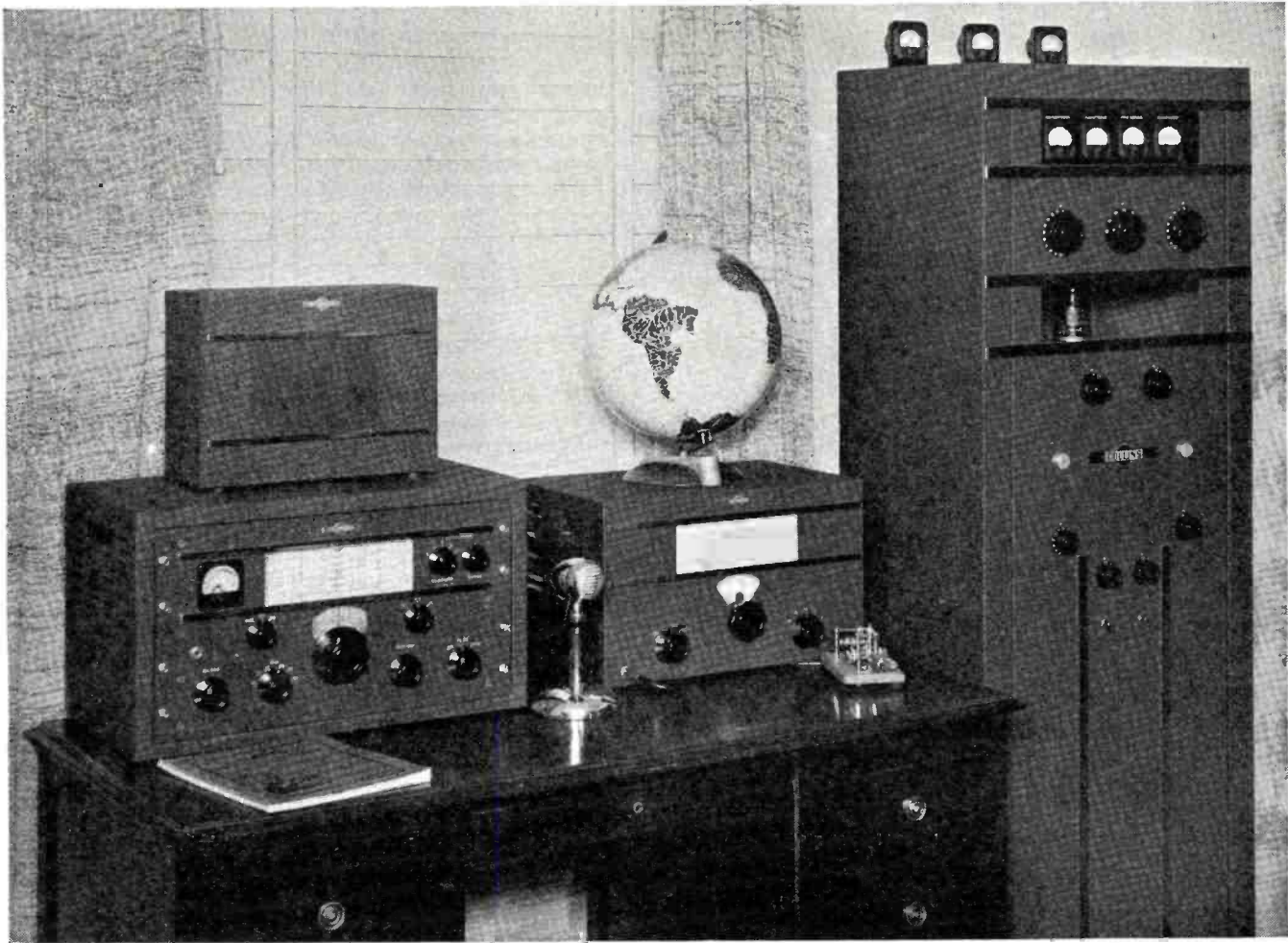
"Although the Republic of Panama has long had several commercial radio stations (due to local restrictions, there is but one amateur station on the Isthmus, although the amateur field is expected to be opened shortly), the promoters of *Radio Central America* were not satisfied with the local radio stations, and were determined to add a new station to the list.

"This group of Panama businessmen, therefore, placed orders for equipment through the Panama Radio Corporation and applied to the Government of Panama for a construction license. At that time—1943—it was a difficult question to answer—which was the harder to get, building materials or radio equipment. For some time, *Radio Central America* remained a 'paper company.'

"The end of the war brought not only equipment to *Radio Central America*, but also the services of two young Americans, James T. Cooper, Raleigh, North Carolina, and Wilbur T. Morrison, Lancaster, Pennsylvania. Cooper, now English Program Director of Station HOX, was formerly with WIP, Philadelphia, and both he and Morrison were in radio work with the Army Air Forces on the Isthmus during the war. Cooper was for a time director of USO stage and radio activities in Cristobal, Canal Zone.

"After two years of waiting, equipment and building materials for HOX began to arrive. In December, 1945, work began on the building which now houses the station's transmitting equipment and temporary studios. Workmen began setting up the transmitting equipment in February of 1946, and in April the all-steel *Blaw-Knox* tower which is HOX's BCB antenna, began to rise toward its present height of 261 feet, seven inches.

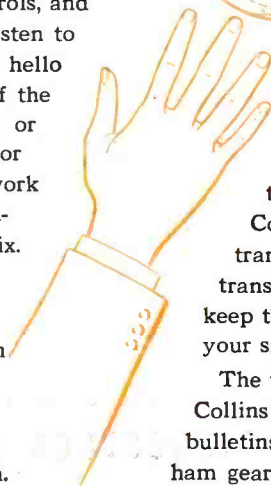
"Late in July, 1946, HOX began to make test broadcasts. Letters poured



The world is at your fingertips with Collins

Snap on the filaments, settle yourself at the controls, and enjoy a most satisfying world tour—by radio. Listen to the musical CQ from Latin America, the cheerful hello from Canada. Hear the eagerness in the voice of the American operating portable from Casablanca or Tinian. Maybe you're searching the DX bands for the G4—or was it an HB9—that you used to work every Saturday. Or perhaps your next door neighbor wants to send a message to his aunt in Phoenix.

Sharpen up the incoming signal you've selected on the Collins 75A receiver. You have a crystal filter that you can adjust with ease. The r-f gain control does not affect the pitch of a cw note. And the receiver is so stable that line voltage fluctuations—or the slam of a door—will not require frantic retuning to find the signal again.



Even under adverse conditions your reception will be better with the 75A.

Then switch the Collins 30K transmitter to the Operate position and you're on the air. Use either fone or cw. You can change frequency quickly if you desire. The permeability tuned oscillator (PTO) controlled exciter—the Collins 310A—sits right on the operating desk. Both transmitter and exciter are bandswitching. The 30K transmitter has a speech clipper in the audio circuit to keep the modulation at a high level. Notice how it helps your signal, particularly in QRM or QRN.

The world is truly at your fingertips when you're using Collins equipment. Write for illustrated bulletins describing Collins ham gear.

FOR BEST RESULTS IN AMATEUR RADIO, IT'S . . .



COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA

11 West 42nd Street, New York 18, N. Y.

458 South Spring Street, Los Angeles 13, California

in from all over the world reporting that the station was coming in fine—better than some local stations, the letters invariably said. With the exceptions of Bolivia, Uruguay, and Paraguay, HOX received confirmation of the strength of its signal from all countries of the Western Hemisphere and from every state in the United States. *Why Bolivia, Uruguay, and Paraguay have remained silent is still a mystery!* Responses have come in from Hawaii, Portugal, India, Liberia, Norway, Nigeria, Egypt, Germany, Newfoundland, The Netherlands East Indies, England, the Christmas Islands, Denmark, Australia, New Zealand, and a number of places in the Pacific, identified only by APO numbers. One letter from Germany—in a tight, careful script—covered several pages with a painstaking description of HOX reception; the writer, a radio technician, said that he had once had a transmitter of his own but that 'it burned down about three years ago.'

Reports from Sweden were especially notable. As reported in the November (1946) issue of RADIO NEWS, the Swedes are great radio listeners. Chief Engineer Morrison, of HOX, says that, judging solely by the mail received by *Radio Central America*, from Sweden, "one would think that all Swedes speak English, listen to the radio avidly, and are great stamp collectors!" Morrison lists the Swedes as *Radio Central America's* greatest for-

eign fans, and after them, Canadians and Cubans.

"Like most Panama radio enterprises, *Radio Central America* now transmits on more than one frequency. At present on the air are Stations HOX, 940 kcs., and HOXA, 15.100. Eventually, it is planned to radiate over Stations HOXB, 11.810; HOXC, 9.660; HOXD, 1310 kcs.; and HOXFM, 43.300. HOXFM will be Panama's first and only FM station; it will serve chiefly as a link between *Radio Central America's* downtown studios—now under construction—and the transmitter, which is located in Panama City's suburbs.

"At present, transmissions over HOX and HOXA are identical. From 11 a.m. until 9 p.m. each day, Spanish programs are transmitted over both frequencies, and from 9 p.m. until midnight, *English* language broadcasts are radiated.

"It is planned, however, when all the new equipment is ready for use, to expand the *English* language broadcasts to a full day and to broadcast them on a frequency different from the Spanish language outlet.

"When *Radio Central America* goes on the air with a full-time program in English, it will be broadcasting more English than any other station in Panama, and probably more than any other in Central America. Before HOX appeared on the scene, Panama radio stations broadcast almost entirely in Spanish with only a few pro-

grams—such as short newscasts—in English. Heretofore, the only all-English broadcast from the Isthmus was done by the *Armed Forces Radio Station* in the Canal Zone, which still broadcasts all day in *English*.

"Other Panama stations have protested the existence of the AFRS and its continuance after the end of the war. They charge that it offers unfair competition to Panama stations because the great majority of English-speaking residents on the Isthmus prefer to listen to programs in English rather than in Spanish. During the recent Inter-American Radio Congress in Mexico City, the Panama delegate—an employee of one of the local stations—put in an official protest against the AFRS which protest was adopted by the Congress. Even so, authorities of the Canal Zone have shown little disposition to remove the AFRS which they regard as a considerable morale factor among the men of the U.S. Army and Navy stationed on the Isthmus. The recent announcement concerning the Caribbean Area indicates that there will be more soldiers and sailors on the Isthmus in the future than there are now, and that probably, unless budget considerations force its removal, the AFRS will continue business at the same old stand.

"Despite the many protests by various Panama radio enterprises against the AFRS, *Radio Central America* was the first Panama station to offer ac-

(Continued on page 104)

Fahnestock Clips

RADIO'S GREATEST CONVENIENCE



FAHNESTOCK SPRING BINDING POST GRIPS THE WIRE BY THE ACTION OF A SPRING

No tools required to make the connection. Grips the wire with just the right pressure for good electrical contact. Simply press down, insert the wire and let go. Does not injure wire, hence connection can be made or opened as often as desired. Available in large variety of types and sizes to fit any radio purpose and any requirement as to position, space or method of attachment. You will find them in the better sets.

Positive contact; cannot jar loose. Brass or bronze—nonrusting.



FAHNESTOCK ELECTRIC COMPANY, Inc.

46-44 ELEVENTH STREET
LONG ISLAND CITY 1, N. Y.

Dept. 12

Please send us at once, Descriptive Literature, Prices and Delivery Schedule on

FAHNESTOCK CLIPS

For
Name
Address
City..... State.....

WHATEVER YOU NEED IN RADIO OR ELECTRONICS

PARTS...SETS...KITS
 TESTING EQUIPMENT...TOOLS
 PUBLIC ADDRESS EQUIPMENT
 TRANSMITTERS

YOU CAN GET IT AT NEWARK!



SERVICEMEN

Three big stores, each carrying tremendous stocks, are ready to serve you with tools, replacement parts, test equipment, sets or anything else you need. Wire, write or telephone if you can't visit one of our stores. If you can visit with us you'll find our trained staff of tremendous help to you.

SERVICE

Mail orders are shipped the same day they are received. You don't have to wait when you buy from Newark. On special inquiries, we give you full information, prices and delivery dates promptly. Newark will give you service that will help you serve your customers better.



PUBLIC ADDRESS SYSTEMS FOR EVERY NEED AND PURPOSE

No matter what your public address needs may be, Newark has the outfit that will do the job for you. All the well known, standard makes are carried in stock. Delivery is fast and dependable . . . in New York and Chicago we maintain our own delivery system . . . for out-of-town customers we ship orders the same day they are received.

All our stores are staffed by trained men who know public address needs and can help you select the outfit that will best serve your purpose. If your needs are unusual, they know how to make up special combinations to satisfy them efficiently.

If you can, visit one of our stores. If you can't come to see us, write, phone or telegraph and your inquiry will be answered promptly and fully. Newark has the stock, Newark has the 'know how', Newark can help you.



BUILD YOUR OWN RADIO AND ELECTRONICS DEVICES AT LOW COST

With Newark's kits and parts you can easily build radio receivers, transmitters, amplifiers, and other exciting radio and electronics devices.

• • •

Make a good radio receiver for yourself or a fine record player with automatic changer at tremendous savings. You can construct these and many other radio and electronics devices easily. Our men know how to make them and will gladly show you if you can visit one of our stores—or will explain clearly by mail.

FOR GOOD BUYS AND A GOOD TIME VISIT OUR BIG BARGAIN COUNTERS

These big bargain counters in all our stores, are loaded down with special items available in quantities too small to advertise. Marvelous war-time sets, new small gadgets you can have fun with . . . all sorts of new parts and special things you'll want to see. Come in, look around and ask all the questions you wish. Come in often you'll have a wonderful time.

WRITE FOR OUR BIG BARGAIN BULLETIN LISTING THE LATEST AVAILABLE EQUIPMENT

MAIL ORDERS FILLED FROM EITHER NEW YORK OR CHICAGO

Magazines are printed months before you read them, stocks change, new things are developed and made, so we give you the very latest news about the very newest things in radio and electronics in our Big Bargain Bulletin. Send for your copy today and know all about the latest equipment first. When writing address Dept. G4.



N.Y.C. Stores: 115 W. 45th St. & 212 Fulton St.—Offices & Warehouse: 242 W. 55th St., N.Y. 19

— LAKE — Amplifying Systems



Excellent-ly de- signed, compact amplifiers, ideal for students, professional entertainers, homes, factories, schools, etc. Perfect for voice, musical instruments, pickups and contact microphones; clear, rich tone; heavy plywood in luxurious leatherette cover. Streamlined portable cabinets.

As listed below:

No.	Watts	Inputs	List	Your Cost
A16	18	4	\$110.00	\$64.68
A15	15	3	97.50	52.86
A12	12	3	87.50	51.45
A 8	8	3	87.50	51.45
A 8	8	2	75.00	44.10
A 5	5	2	60.00	35.28
AC-DC	8	3	75.00	44.10

HAWAIIAN ELECTRIC GUITAR

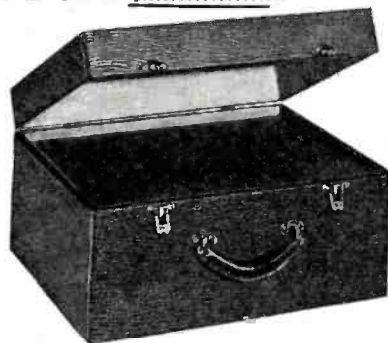
Beautiful black plastic, trimmed with chrome, 23" scale, 4 1/2 octaves of playing range. List \$50.00. Your Cost.....\$29.40



Deluxe PHONO CABINET

Covered in luxurious, genuine brown leatherette, has deluxe brass hardware throughout, made completely of plywood with brown plastic handle, has padded top and

bottom. Motor board 14" x 11 1/2". Overall dimensions 16" L. x 15" W. x 8" H. Your net price.....\$8.95



Portable Phonograph case, of sturdy, durable plywood, in handsome brown leatherette finish. Inside dimensions 16 1/2" long, 14" wide, 9 1/2" high. Has blank motor board. As illustrated above, specially priced at.....\$6.95

Also blank table cabinets of walnut veneer in the following sizes, with speaker opening on left front side: (*Note: *7 has center speaker grill.)
 # 1 — 8 1/4" L x 5 1/2" H x 4" D\$1.95
 # 2 — 10 1/4" L x 6 3/4" H x 5" D\$2.75
 # 3 — 13 1/2" L x 7 3/4" H x 6 1/4" D\$2.50
 # 7* — 10 3/4" L x 7" H x 5 1/2" D\$2.50
 *Speaker Opening in center of front side.

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

SERVICEMEN—RETAILERS
 Write for our new, illustrated 16-page catalog NR-116. It's free. Get on our mailing list!
 Write for our Special Catalog on Microphones, Amplifiers and Sound Equipment!

Order from Lake! You'll make no mistake!

Dept. A

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

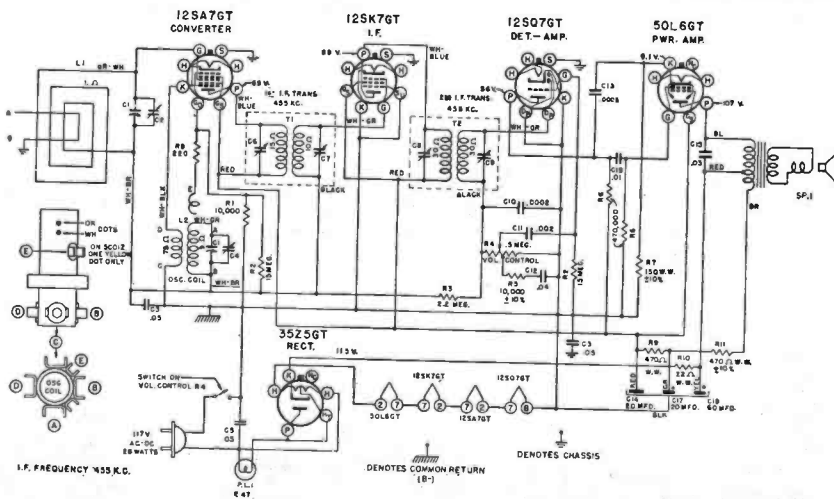


CIRCUIT PAGE

(FOR PARTS LISTS SEE PAGE 76)

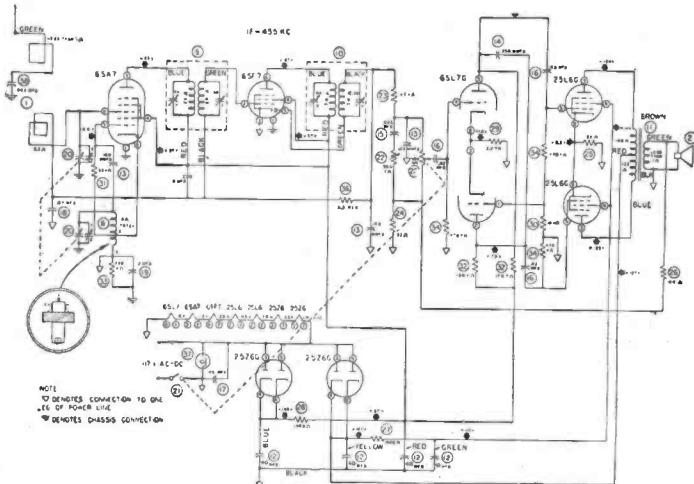
RADIO NEWS, FEBRUARY, 1947

ZENITH MODELS 5D011-5D027



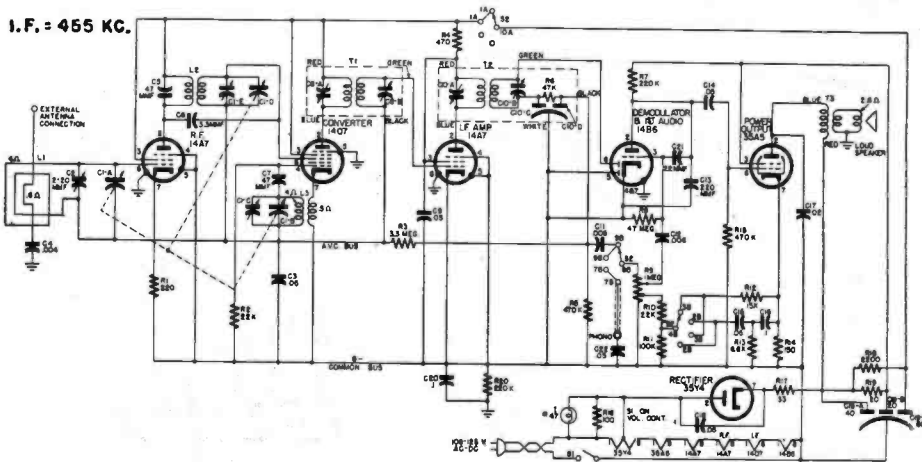
RADIO NEWS, FEBRUARY, 1947

ECA MODEL 108



RADIO NEWS, FEBRUARY, 1947

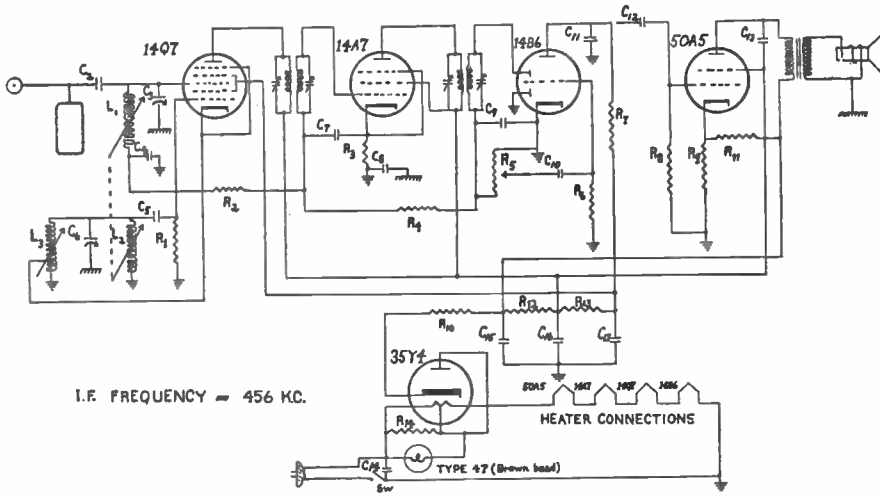
BENDIX MODELS 636A, C, D



Here, and on following pages, are circuit diagrams and parts lists of many new postwar radio receivers. Radio News will bring to you other circuits as quickly as possible after we receive them from manufacturers.

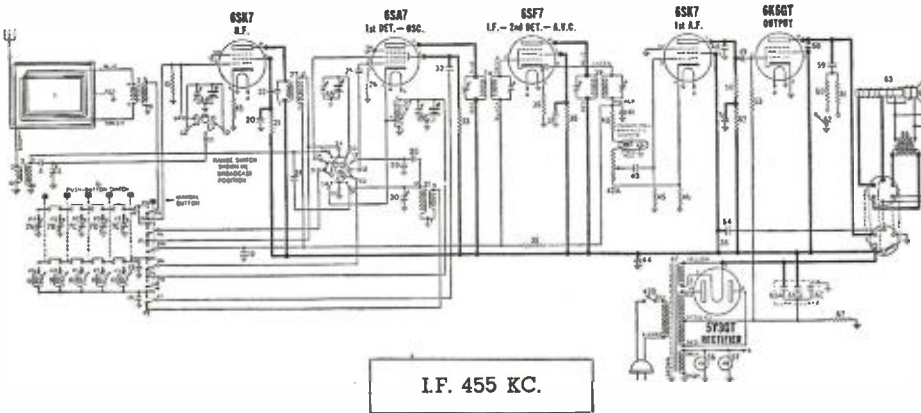
RADIO NEWS, FEBRUARY, 1947

CORONET MODEL C-2



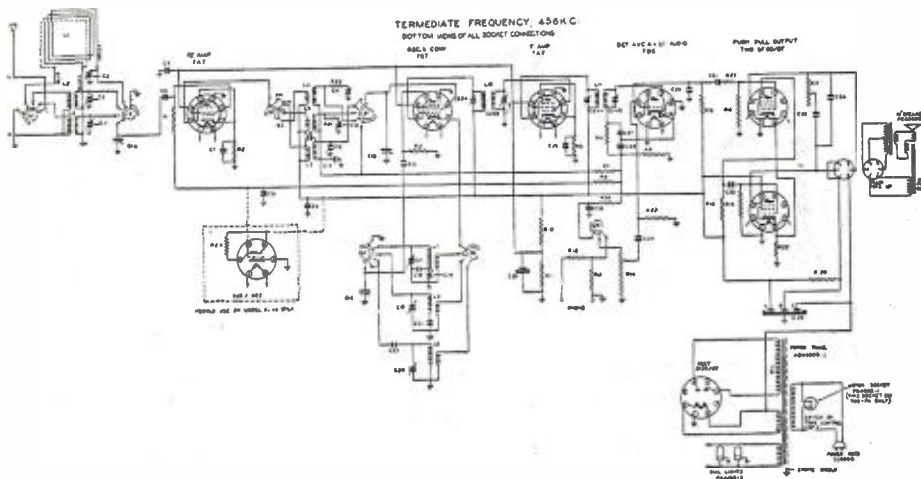
RADIO NEWS, FEBRUARY, 1947

STEWART-WARNER MODELS 9001-C, D, E, F

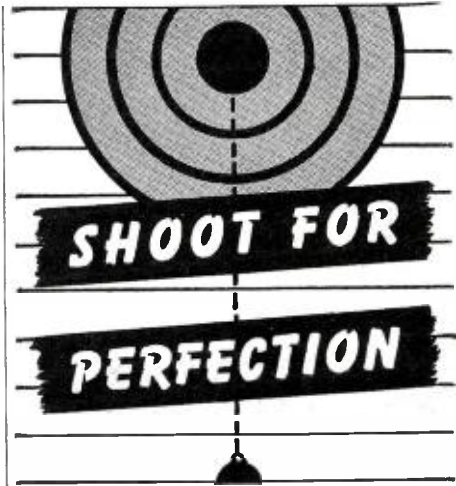


RADIO NEWS, FEBRUARY, 1947

SPARTON MODELS, 7-46, 7-46PA, 8-46, 8-46-PA



February, 1947



In amateur radio today perfection is an absolute necessity. The old days of hit-or-miss operation are gone forever. A good example of the need for perfection is the ever-present menace of the PINK TICKET Today with frequency multipliers in practically all transmitters, it is easy to hit the wrong Harmonic. The positive way to tell which band you are on, is by using the BUD WM-78 wavemeter. Shown on front cover.

The BUD WM-78 covers all amateur bands from 160 to 5 meters . . . accomplishing this by bandswitching. Due to its sensitivity the BUD WM-78 can also be used as a neutralizing indicator.



\$8.25 your cost at your radio parts dealer.

LET BUD SUPPLY ALL YOUR NEEDS

with the latest types of radio equipment including variable condensers, coils, chokes, dials, switches and a complete line of sheet-metalware.



BUD RADIO, INC.
CLEVELAND 3, OHIO

What's New in Radio

ALLIED
Sound for '47!
New 30 WATT DeLuxe
PORTABLE P. A. SYSTEM

Here's a preview of ALLIED Sound for 1947 in this smoothly-styled, brilliantly engineered 30 Watt De Luxe Portable System. New stabilized inverse feedback circuit delivers high output, usable right up to its peak. Flexible operation is provided by two microphone and one phono channels, each with separate control. Has bass-treble tone control. Amplifier and speakers are safety-fused. Amplifier gain on microphone is 128 db; on phono, 80 db. Frequency response: 50-10,000 CPS. System covers up to 4,000 persons, or up to 20,000 square feet.

Complete 30 Watt System includes: 30-Watt De Luxe Amplifier with tubes; 2-12" Safused Dynamic Speakers, with 30-ft. cables and plugs; 1-Cardax Unidirectional Microphone with floor stand and 20-ft. cord and plug. Complete in handsome luggage-type split portable carrying case, 22"x20"x15". Carrying wt., 60 lbs. For 110 volts, 60 cycles A.C. (Less phono top and volume level meter which are optional.)

Complete System (approximate price) Only **\$99.50**

ALLIED
For Everything
in Radio and
Sound

See your ALLIED Catalog No. 111 for the world's largest and most complete stocks of quality radio and sound equipment—at today's lowest prices! Count on ALLIED for fast service, expert help. If you haven't a copy of Catalog No. 111—send for it now—it's FREE for the asking.

ALLIED RADIO

ALLIED RADIO CORP.

833 W. Jackson Blvd., Dept. 1-B-7, Chicago 7, Ill.

Ship 30-Watt Portable System described above. \$..... enclosed.

Send full details on ALLIED Sound.

Send FREE Radio Catalog No. 111.

Name.....

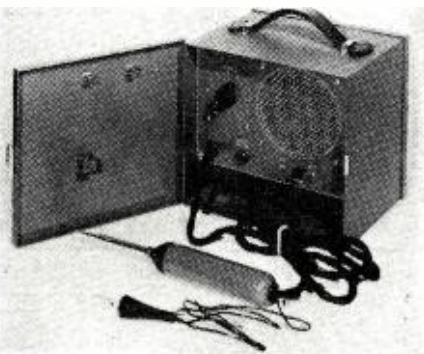
Address.....

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

PORTABLE SIGNAL TRACER

A new portable, battery-operated signal tracer for the radio serviceman is now being distributed by radio parts jobbers for *Special Products Company* of Silver Spring, Maryland.

The new SPECO instrument is housed in a gray crackle finish steel



case which is equipped with a carrying handle. The unit weighs 4 pounds, 10 ounces, and the over-all size is 5 1/4" x 6 1/4" x 6 1/8".

Low drain tubes have been used in the construction of this unit in order to assure longer battery life. A safety feature has been incorporated which prevents the closing of the cover when the power switch is on. An extra long probe and long test leads make this unit suitable for all types of radio servicing including auto radios.

Special Products Company, Silver Spring, Maryland is the manufacturer.

SERVICING TOOL

Angelus Tool Manufacturing Co. of Los Angeles, California has announced a servicing tool which should be of interest to the radio man.

Known as the "Flex-o-claw," this tool which is made of all steel wire, is particularly adapted for installing or removing small parts, nuts, screws, etc. from otherwise inaccessible places on the radio chassis.

This unit is 1/4" in diameter and is available in lengths of 12, 15, 18 and 22 inches. A simple plunger arrangement at the end of the flexible tubing oper-



ates the jaws of the unit to permit firm gripping of parts.

Angelus Tool Manufacturing Co., 3060 W. Pico Blvd., Los Angeles 6, California will supply prices and de-

livery dates on this item to those requesting this information.

WIRE RECORDER

Peirce Wire Recorder Corporation of Evanston, Illinois has recently announced production on two postwar model wire recorders, one for heavy duty office work and the other a portable model for field work.

The heavy duty business unit features remote controls which permit dictation to the recorder from 50 to 100 feet distant in addition to a button control for the use of the typist in transcribing. The light weight reel which carries the thin stainless steel "thread" weighs only a few ounces and is capable of recording from 66 minutes to over two hours. Messages may be played back as many as 100,000 times without loss of volume or tone quality.

Recordings may be erased automatically in the process of dictating a correction or using the wire for new recording.

Full details on either the heavy



duty or portable model wire recorder will be furnished by *Peirce Wire Recorder Corporation*, 1328 Sherman Avenue, Evanston, Illinois.

SYNCHROSCOPE

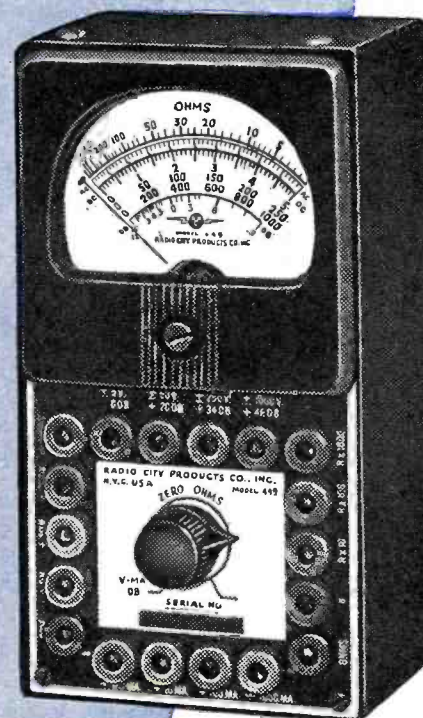
The *Electronics Division of Sylvania Electric Products Inc.* has recently announced the availability of a new synchroscope specially designed for the visual examination of the fine structure of periodic waveforms in television, pulse time modulation, sonic depthfinders, geophysical exploration and loran equipment.

The instrument includes a five inch cathode ray oscilloscope; trigger generator for synchronization; space for the addition of a video amplifier and r.f. envelope viewer; adjustable time delay phasing circuits; and seven input connectors and a selector switch for rapid viewing of separate external circuits.

Television applications include study of the shape, amplitude and duration of video pulses ranging from a fraction to several hundred microseconds. Used with the video amplifier and an r.f. envelope viewer it provides a

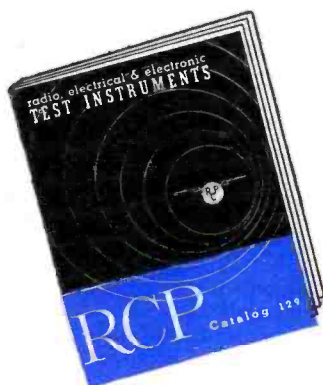
NO OTHER INSTRUMENT OFFERS SO MUCH FOR SO LITTLE

Ruggedness of a pocket portable . . . high sensitivity of a bench model . . . RCP's Model 449 gives you both . . . at a price way down among the lowest. When you take this fine instrument along on your service calls you're taking a *complete* testing unit in your coat pocket. With its 5000-ohms-per-volt DC sensitivity you can check voltage of high-resistance circuits . . . and its wide resistance range will measure up to two megohms with *self-contained* batteries. There's hardly a service problem that can't be solved with the Model 449 Multitester. Call your jobber now . . . tell him to send one out TODAY. Complete with self-contained battery—**PRICE \$24.50.**



IMMEDIATE DELIVERY

**RCP's 5000-ohms-per-volt
POCKET MULTITESTER
MODEL 449**



Write today for your copy of RCP's new Catalog No. 129. In addition to all the RCP instruments it contains the famous Reiner line. Complete descriptions and handsome illustrations of America's leading high-quality testing instruments.

FEATURES:

- Germanium-crystal-diode rectifier eliminates temperature and frequency errors.
- The 3" square, high-visibility meter is accurate to 2% and has a sensitivity of 200 microamperes.
- Six instruments in one pocket-size unit.
- A-C voltmeter frequency response is flat from 30 cps to 50 kc.
- Spring-clip-mounted batteries are readily accessible.
- Metalized, matched voltage multipliers have a tolerance of one per cent. This is far closer match than in most instruments of this type.
- All-metal case offers complete shielding of instrument.
- All ratings are based on standard A.I.E.E. and R.M.A. specifications at full-scale deflection.
- Size only 3"W x 2 1/4"D x 6"H. Weight: 2 lbs.

RANGES:

D-C VOLTmeter:	0/5/50/250/1000 volts. First scale division—0.1 volt. (5,000 ohms per volt)
A-C VOLTmeter:	0/5/50/250/1,000 volts. First scale division—0.1 volt. (1,000 ohms per volt)
D-C MILLIAMMETER:	0/.5/10/100/1,000 ma. First scale division—.01 ma.
OHMMETER:	0/2,000/20,000 ohms; 0/0.2/2 megohms.
DECIBEL METER:	—6 to +10, +14 to +26, +28 to +40, +40 to +52. The db-scale calibration is based on a line impedance of 500 ohms, 6 milliwatts reference level. For other impedances correction charts are supplied.
OUTPUT VOLTmeter:	0/5/50/250/1,000 volts. First scale division—0.1 volt.

RCP INSTRUMENTS—BEST FOR EVERY TEST

RADIO CITY PRODUCTS COMPANY, INC.

127 West 26th Street,



New York 1, N. Y.

Unbelievable STAMINA



IS THE HERITAGE OF OXFORD SPEAKERS

1 OXFORD SPEAKERS, with their remarkable stamina assure that when used as replacements that they will not break down in normal or extended usage. The over a million units now in use as original installations are the very best guarantee of that statement.

2 OXFORD SPEAKERS have the new pressure-thread device, which holds the pole-piece against the magnet, increases sensitivity and prevents pole-piece decentering. This new development is but one of many improvements which assure the jobber of long and trouble-free installations meeting the most exacting type specification.

3 OXFORD SPEAKERS are designed for handling the maximum power input in relationship to their size, and further embody response curves which permit the speaker to be used in radio receivers of quality.

Until the war, the loudspeaker was comparatively undeveloped from the first ineffectual unit which made its appearance in the middle 1920's. By consistent research in this highly complicated field, OXFORD engineers have improved almost every part until there is little resemblance, except in exterior appearance, between the OXFORD SPEAKER of today and the pre-1942 unit.

It will be found that the OXFORD SPEAKER can withstand greater overloads for longer periods, and provide cleaner, better reproduction than was believed possible just a short five years ago.



OXFORD RADIO CORPORATION
3911 SOUTH MICHIGAN AVE., CHICAGO

CAREERS in RADIO

INTENSIVE COURSES—Thorough, technical education for progressive men and women.

1. **RADIO TECHNICIAN**—The MRI General Course. Includes F.M. & Television. Prepares for FCC Broadcast Licenses.
2. **RADIO & TELEVISION SERVICING**—Prepares for employment as Repairman on Standard Broadcast, F.M. & Television Receivers.
3. **RADIO COMMUNICATIONS**—Prepares for FCC Operators' License. Leads to position as Merchant Marine or Flight Radio Officer, Commercial Operator.
4. **FUNDAMENTAL RADIO MATHEMATICS**—The MRI Preparatory Course. Required pre-training for students lacking a basic mathematical background.

MELVILLE RADIO INSTITUTE
45 W. 45th St., N. Y. 19, BR 9-5080
"The Radio School Managed By Radio Men"

Licensed by the State of New York

MELVILLE RADIO INSTITUTE
45 West 45th St., New York 19, N. Y.

GENTLEMEN:

Send me FREE Information about your school. RN

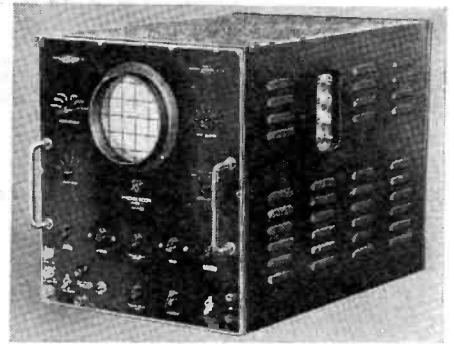
Name.....

Address.....

MAIL THIS COUPON NOW

means of visual examination of r.f. pulse envelopes or waveforms up to and including the microwave region.

Additional data on the Synchroscope



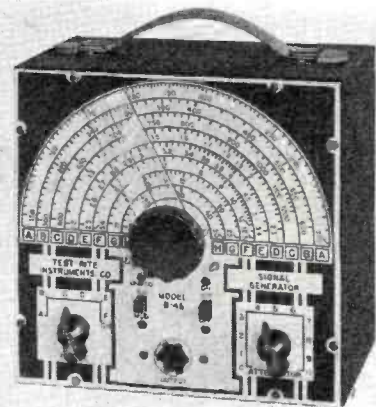
will be supplied by the *Electronics Division, Sylvania Electric Products Inc.*, 500 Fifth Avenue, New York, 18, N. Y.

SIGNAL GENERATOR

Metropolitan Electronic & Instrument Co. of New York are currently offering their Model B-45 Signal Generator for all types of radio servicing.

This model is a one-tube, self modulated unit which covers the range from 150 kc. to 50 mc. The range from 150 kc. to 12.5 mc. is covered on fundamentals and from 11 mc. to 50 mc. on harmonics. Pure r.f. is obtainable or can be modulated by a.f.

The Model B-45 may be used in servicing television and FM receivers as



well as all types of AM equipment. Modulation is accomplished by grid blocking action.

This signal generator is completely portable and self contained, requiring no external power supply.

Full details, including price, will be furnished by *Metropolitan Electronic & Instrument Co.*, 6 Murray Street, New York 7, New York.

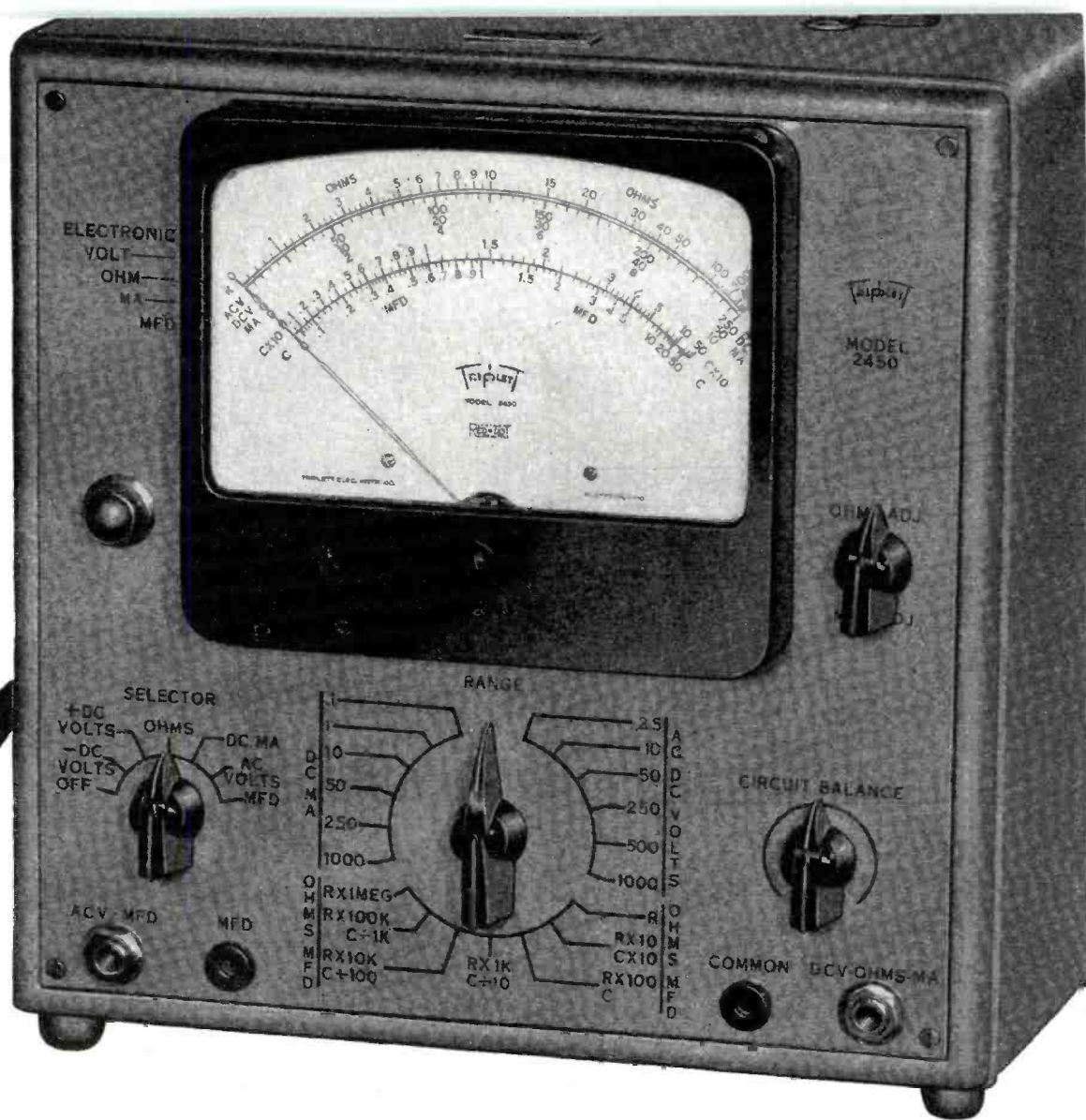
TUBE TESTER

The Triplett Electrical Instrument Co. of Bluffton, Ohio have recently placed on the market their new Model 2425 Transconductance Reading Tube Tester which features several innovations in the field.

Micromho readings and simplified testing are featured in this new unit. Transconductance readings are made possible through a simple measure-

(Continued on page 92)

Model 2450 ELECTRONIC TESTER



There's never been a tester like this!

Here's a tester with dual voltage regulation of the power supply DC output (positive and negative), with line variation from 90 to 130 volts. That means calibration that stays "on the nose"! That means *broader service* from a tester that looks as good as the vastly improved service it provides. And, together with its many other new features—including our Hi-Precision Resistor which outmodes older types—it means higher performance levels wherever a tester is needed. Detailed catalog sheets on request.

Highlights:

- 42 RANGES: DC and AC. Volts: 0-2.5-10-50-250-500-1000. DC MILLIAMPS: 0-0.1-1.0-10-50-250-1000. OHMS: 0-1000-10,000-100,000. MEGOHMS: 0-1-10-100-1000. CAPACITY IN MFD: 0-.005-.05-5-5-50.
- LOAD IMPEDANCE: 51 megohms on DC Volts.
- CIRCUIT LOADING: Low frequencies. Circuit loading equal to 8 megohms shunted by 35 mmfd. High frequency circuit loading equal to 8 megohms shunted by 5 mmfd.



Triplet



ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO

MONTHLY SPECIALS
LEOTONE SURPLUS BARGAINS

SMALL MOTORS: G.E. 27V, DC, 145 RPM, .65 amp, 14 oz/lin; 1 1/4" x 1 1/4", Shpg. wt. 1 lb \$1.49

Dual 50 watt-200 ohm rheostat, 27V DC, 3800 RPM, 1.4 amps, continuous duty, 3" x 4 3/4" shaft, 1/2" long, Black crackle finish, 3.45

POWER RHEOSTATS, Heavy duty, Popular brands, 25 watt-8, 75, 130, 175, 277, 500, or 1800 ohms, 2 1/2" x 4" x 40', 350', 300', SE, 7500 or 10K ohms, 1.29

SPECIAL 50 watt-15 ohm rheostat, 1.98

SHUNTS-MULTIPLIERS, 1% precision, wire-wound, Ohmmages: 2.35, 11, 24.5, 305, 840, 1740, 3500, 3300, 5290, 7500, 30K, 50K or 400K, .35

ALNICO MAGNETS

#1 Bar, 3 1/2" x 1/4" x 1/4" .50-.39

#2 Bar in shorter lengths, per inch .12

#3 Heavy duty bar, 2 1/2" x 1 1/4" x 5/16" .98

#4 Face 5/8" x 5/8" x 1/4" high .39

#5 Polished, face 1/2" x 5/8" x 1/4" high .35

#6 Polished bar, 9/16" x 1/4" x 1/4", 30 for 1.00

#7 Face 1/2" x 1/2" x 1/4" high .10

#8 ALNICO V h-shoes, poles 3/8" sq.; 1 1/2" high, shoes, poles 9/16" sq.; 1 1/2" high .98

#9 ALNICO V h-shoes, poles 1 1/2" x 1/2" x 1/4" high .59

#10 ALNICO V h-shoes, poles 1 1/2" x 1/2" x 1/4" high .129

#11 Horseshoe, ea. pole 1 1/16" O.D., 2 1/4" high .38

#12 (Similar to #5) 3/4" x 3/4" x 1/16" high .38

SPECIAL SIZES IN QUANTITY, CUT TO ORDER

TUBES: Perfect condition, but not in sealed cartons. Guaranteed for 30 days, 26, 27, or 56-29c; #24, 42, 77, 89, 6D6, 6H6, or 6K7-39c; #50, 75, 78, or 8A3, .30-.59

Brand new R.C.A. UX-200 tubes in sealed cartons. Ideal detector, 8 for 1.00

HEADPHONES-Signal Corps HS-33, 2000 ohms. Leather covered, ear cups, with PL-54 plug. With sponge sponge rubber phone cushions, 1.45

Headbands only (as above), with PL-54 & cord, PL-54 plug and 1/4" cord double phone sockets, .19

4 TUBE AMPLIFIER (2-7C5, 7F7, 7V4). Used as electronic supercharger control, 110V, 400 cycle. Contains power trans, 7 condensers (mica and oil), 7 resistors, 4 local sockets plus other components worth several times the price. Black crackle finish; fitted slide-in chassis, 8 3/4" x 4 1/2" x 3 3/4". Less tubes .49

Frequency Meter Tech. Manual (Nav.) Theory & Operation, 50 illustrations, diagrams, 58 pp. .15

EXPERIMENTAL TUBES. An assortment of 20, diamond sealed, including 12 sizes & base types 1.00

RADIOMAN'S HARDWARE TREASURE. Over 1000 nuts, screws, pins, washers, etc. PLUS Handy 36 compartment cardboard kit box .59

16 N.B.C. RECORDINGS. Each contains 2 complete 15 minute "Voice of the Army" dramatic programs with music. Over 60 different titles, such as: Whistling Willie, Case History, Philippine Return, etc. 33 1/2 R.F.M. 5 asstd records 1.49

32mf/450WV tubular electrolytics, 2 1/2" x 4", 20mf/200WV tubular electrolytics, 5 for 1.00

5 TUBE AMPLIFIER (Bendix), 2-6N6, 3-6SN7. Orig. used with remote indicator, 27V, DC-110V, 400 cycle. Black crackle, shock-mount, case & fitted chassis, 7 3/4" x 5 1/2" x 4 1/2". Shpg. wt. 7 lb. Less tubes .249

Victor Power Transformer for models R-32, 45, 52 or 75. Unshielded, 5.95

BAKELITE PANELS: 1/8" glossy brown, 7 1/2" x 10", 2" Meter Case & Housing (round). Complete with glass & adjust screw, 1" deep .39

SERVICEMEN'S KITS

#1-R.F. Antenna & Osc. coils, 10 asstd, \$0.98

#2-Speaker Cones; 12 asstd, 4" to 12" moulded & free-edge (magnetic incl.), Less poles coil 2.00

#3-BAKELITE MICA CONDENSERS; 50 asstd, .00005 to .2 mfd, 200-600WV. Clearly marked 2.95

#4-TUBULAR BY-PASS CONDENSERS; 50 asstd, .0005 to .25 mfd, 200 to 600WV. Standard brands 2.49

#5-Dial Scales; 25 asstd, airplane & slide rule (acetate & glass included) 2.98

#7-Escutcheon Plates; 25 airplane, slide-rule & full-vision types 2.95

#8-Knobs; 25 asstd wood & bakelite, including setcrew & push-on types, 1.00

#9-Wafer Sockets; 12 asstd, 4 to 7 prongs .25

#10-Voltage Dividers; 10 asstd, standard multi-tapped, high wattages included .98

#11-Shield Cans; 15 asstd, for coils, tubes, transformers, etc. 1.00

#12-Mica Padders & Trimmers; 15 asstd, incl. multiple & ceramic base types .89

#14-Potentiometers & Controls; 10 asstd, wire-wound & composition, Less switches 1.49

#15-Wire-Wound Resistors, 15 asstd, ohmmages, 5 to 20 watts .98

PROMPT SERVICE ON ALL SPEAKER & PHONO PICK-UP REPAIRS. Minimum order \$2.00-20% deposit required on all orders. Please add sufficient postage. WRITE DEPT. RR-2.



MAKERS OF CONES AND FIELD COILS
65-67 DEY STREET, NEW YORK 7, N.Y.
WORTH 2-0284-5
12,000 SQ. FT. OF RADIO PARTS

Parts Lists

(FOR CIRCUIT DIAGRAMS APPEARING ON PAGES 70 AND 71)

STEWART-WARNER MODELS 9001-C, D, E, F

Part No.	Code and Description
502468	15-4.7 megohm, 1/4 w. res.
502127	18-560 ohm, 1/4 w. res.
502132	21-100,000 ohm, 1/4 w. res.
502130	26-22,000 ohm, 1/4 w. res.
502466	33-33,000 ohm, 1 w. res.
502135	35-2.2 megohm, 1/4 w. res.
502264	36-47 ohm, 1/4 w. res.
502467	38-68,000 ohm, 1/2 w. res.
502131	40-47,000 ohm, 1/4 w. res.
502148	42A, 42B-500,000 ohm vol. control & sw.
502468	45-4.7 megohm, 1/4 w. res.
502128	46-2200 ohm, 1/4 w. res.
502133	50-220,000 ohm, 1/4 w. res.
502132	52-100,000 ohm, 1/4 w. res.
502134	53-470,000 ohm, 1/4 w. res.
502135	55-2.2 megohm, 1/4 w. res.
502291	60-4700 ohm, 1/4 w. res.
502127	61-560 ohm, 1/4 w. res.
502137	67-330 ohm, 2 w. w. res.
502202	4-150 ufd., 500 v. cond.
502172	5-25-100 ufd. trimmer
502910	7A to E-Trimmer assembly for P-B tuner
502161	13-270 ufd., 500 v. cond.
502165	14-1000 ufd., 500 v. cond.
502122	16A, 16B, 16C-Variable gang
502155	19-.1 ufd., 200 v. cond.
502157	20-.05 ufd., 400 v. cond.
502295	22-10 ufd., 500 v. cond.
502411	24-2 ufd., 500 v. cond.
502159	25-50 ufd., 500 v. cond.
502201	28-130 ufd., 500 v. cond.
502182	29-39 ufd., 500 v. cond.
502171	30-3-35 ufd., trimmer
502151	32-.01 ufd., 400 v. cond.
502157	37, 44-.05 ufd., 400 v. cond.
502271	41-260 ufd., 500 v. cond.
502150	43-.004 ufd., 600 v. cond.
502160	48-110 ufd., 500 v. cond.
502152	49-.02 ufd., 400 v. cond.
502410	51-.1 ufd., 400 v. cond.
502405	54-.25 ufd., 400 v. cond.
502150	58-.004 ufd., 600 v. cond.
502154	59-.05 ufd., 600 v. cond.
502207	66A, 66B, 66C-20/10/20 ufd., 400/400/25 v. elec. cond.

ZENITH MODELS 5D011, 5D027

Part No.	Code and Description
63-589	R ₁ -10,000 ohm, 1/4 w. res.
63-976	R ₂ -15 megohm, 1/4 w. res.
63-600	R ₃ -2.2 megohm, 1/4 w. res.
63-1337	R ₄ -5 megohm vol. control
63-641	R ₅ -10,000 ohm, 1/4 w. res.
63-597	R ₆ -470,000 ohm, 1/4 w. res.
63-686	R ₇ -150 ohm, 1/2 w. wire wound res.
63-579	R ₈ -220 ohm, 1/4 w. res.
63-1449	R ₉ -470 ohm, 1 w. wire wound res.
63-1450	R ₁₀ -22 ohm, 1 w. wire wound res.
63-1222	R ₁₁ -470 ohm, 1 w. wire wound res.

22-1356	C ₁ -2-gang var. cond.
22-829	C ₂ -Broadcast ant. trimmer (part of C ₁)
22-1017	C ₃ -.05 ufd., 200 v. cond.
22-953	C ₄ -Broadcast osc. trimmer (part of C ₁)
22-492	C ₅ -.05 ufd., 200 v. cond.
22-1202	C ₆ -First i.f. trans. pri. trimmer (on T ₁)
22-854	C ₇ -First i.f. trans. sec. trimmer (on T ₁)
22-243	C ₈ -Second i.f. trans. pri. trimmer (on T ₂)
22-1049	C ₉ -Second i.f. trans. sec. trimmer (on T ₂)
22-1519 or 22-1551	C ₁₀ -.0002 ufd., 600 v. cond.
22-196	C ₁₁ -.002 ufd., 600 v. cond.
S-11099	C ₁₂ -.04 ufd., 200 v. cond.
S-11136	C ₁₃ -.0005 ufd., 600 v. cond.
95-905	C ₁₄ -.01 ufd., 400 v. cond.
95-906	C ₁₅ -.03 ufd., 400 v. cond.
	C _{16, C₁₇, C₁₈-20/20/40 ufd., 150/150/150 v. elec. cond.}
	C ₁₉ -.01 ufd., 600 v. cond.
	L ₁ -Wavemagnet assembly
	L ₂ -Osc. coil
	T ₁ -First i.f. trans.
	T ₂ -Second i.f. trans.

BENDIX MODELS 636A, 636C, 636D

Part No.	Code and Description
RC1H16	R ₁ -220 ohm, 1/4 w. res.
RC1H40	R _{2, R₃} -22,000 ohm, 1/4 w. res.
RC1H68	R ₄ -3.3 megohm, 1/4 w. res.
RC1H20	R ₅ -470 ohm, 1/4 w. res.
RC1H58	R _{6, R₁₅} -470,000 ohm, 1/4 w. res.

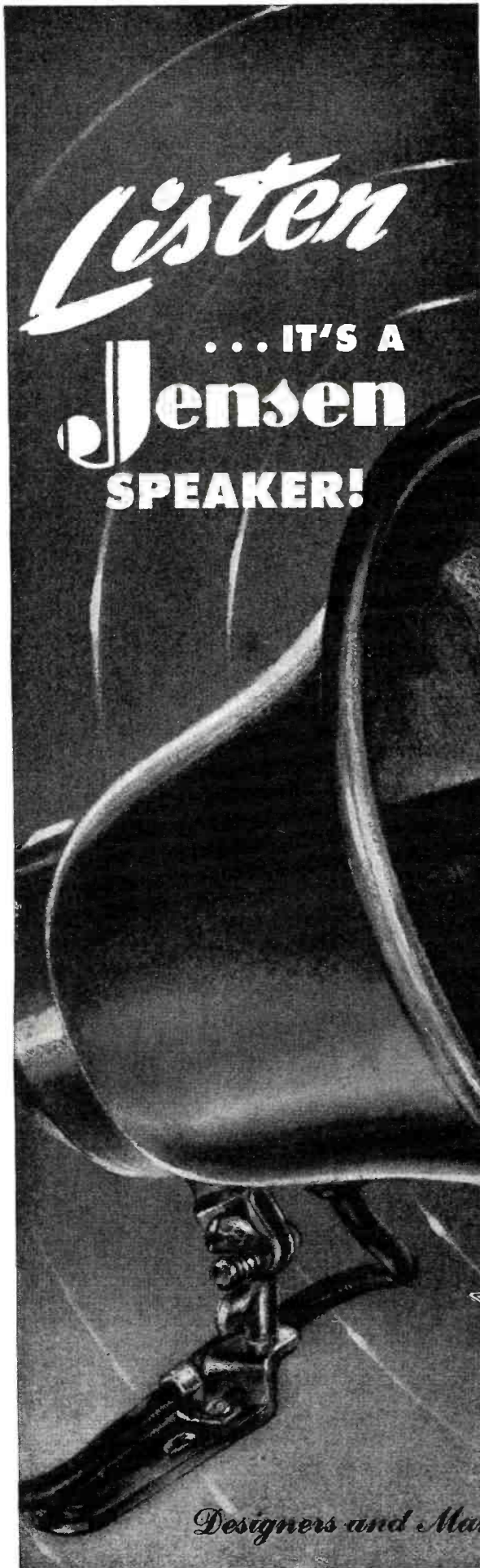
RC1H54	R ₆ -47,000 ohm, 1/4 w. res.
RC1H70	R _{7, R₂₀} -220,000 ohm, 1/4 w. res.
RV4500	R ₈ -4.7 megohm, 1/4 w. res.
RC1H51	R _{9, S₁} -1 megohm pot.
RC1H38	R ₁₁ -100,000 ohm, 1/4 w. res.
RC1H34	R ₁₂ -15,000 ohm, 1/4 w. res.
RW1B14	R ₁₃ -6800 ohm, 1/4 w. res.
RW1A06	R ₁₄ -150 ohm, 1 w. wire wound res.
RC4G28	R ₁₅ -100 ohm, 1 w. wire wound res.
RC1H32	R ₁₆ -2200 ohm, 2 w. res.
CV0C00	R ₁₇ -4700 ohm, 1/4 w. res.
CP6T16	C _{1A, C_{1B}, C_{1C}, C_{1D}, C_{1E}} -Var. cond.
CM5A14	C ₂ -2.20 ufd. trimmer
CC9A16	C _{3, C₉, C₁₀, C₁₆, C₁₈, C₂₂} -.05 ufd., 400 v. cond.
CP4T20	C ₄ -.004 ufd., 600 v. cond.
CM5A05	C _{5, C₈} -47 ufd. mica cond.
CP2T51	C ₆ -3.3 ufd. cond.
CP4T34	C _{8A, C_{8B}} -Part of T ₁ assembly
CE3A00	C _{10A, C_{10B}} -Part of T ₂ assembly
CP4T51	C _{11, C₁₂} -.006 ufd., 400 v. cond.
TI0C01	C ₁₃ -220 ufd. mica cond.
TI0D01	C ₁₅ -.1 ufd., 200 v. cond.
TA0001	C ₁₇ -.02 ufd., 400 v. cond.
TR6L00	C _{10A, C_{10B}, C₁₆} -20/40/30 ufd., 150/150/150 v. elec. cond.
LO6B00	C ₂₀ -1 ufd., 440 v. cond.

CORONET MODEL C-2

Part No.	Code and Description
R ₁	20,000 ohm, 1/4 w. res.
R _{2, R₇, R₈}	470,000 ohm, 1/4 w. res.
R ₃	33 ohm, 1/4 w. res.
R ₄	3.3 megohm, 1/4 w. res.
R ₅	500,000 ohm, 1/4 w. res.
R _{6, R₁₄}	170 ohm, 1/2 w. res.
R ₁₀	22 ohm, 1/2 w. res.
R ₁₁	18,000 ohm, 1 w. res.
R ₁₂	670 ohm, 1/2 w. res.
R ₁₃	1000 ohm, 1/2 w. res.
C _{1, C₂, C₃}	50 ufd. cond.
C _{4, C₇, C₁₁}	.05 ufd. cond.
C ₅	370 ufd. cond.
C ₆	.25 ufd. cond.
C _{8, C₁₁}	250 ufd. cond.
C ₉	.004 ufd. cond.
C _{12, C₁₃}	.02 ufd. cond.
C _{15, C₁₆}	20 ufd. cond.
C ₁₇	.30 ufd. cond.
L ₁	Tuning coil
L ₂	Osc. coil
L ₃	Padder coil

SPARTON MODELS 7-46, 7-46PA, 8-46, 8-46PA

Part No.	Code and Description
BR12S-105	R ₁ -1 megohm, 1/2 w. res.
BR12S-921	R ₂ -820 ohm, 1/2 w. res.
BR12S-203	R ₃ -20,000 ohm, 1/2 w. res.
BR12S-561	R ₄ -560 ohm, 1/2 w. res.
BR12S-335	R ₅ -18,000 ohm, 1/2 w. res.
BR12S-335	R _{7, R₉} -3.3 megohm, 1/2 w. res.
BR12S-184	R ₈ -180,000 ohm, 1/2 w. res.
DR12G-163	R ₁₀ -16,000 ohm, 2 w. res.
CR12G-223	R ₁₁ -22,000 ohm, 1 w. res.
BR12S-274	R _{12, R₁₃, R₁₅} -270,000 ohm, 1/2 w. res.
PA4401-2	R ₁₄ -2 megohm vol. control
BR12S-474	R _{16, R₁₈} -470,000 ohm, 1/2 w. res.
PA4404-1	R ₁₇ -.25 megohm tone control & sw.
BR12G-202	R ₁₉ -2000 ohm, 1/2 w. res.
DR12S-102	R ₂₀ -1000 ohm, 1/2 w. res.
BR12S-151	R ₂₁ -150 ohm, 1/2 w. res.
DR12G-241	R ₂₂ -240 ohm, 2 w. res.
BR12S-106	R ₂₃ -10 megohm, 1/2 w. res.
BR12S-105	R ₂₄ -1 megohm, 1/2 w. res. (For Model 8-46 only)
BR12S-331	R ₂₅ -330 ohm, 1/2 w. res.
PB40400-1	R ₂₆ -18,000 ohm, 1/2 w. res.
PA4356-1	R ₂₇ -1000 ohm, 1/2 w. res.
PA4356-1	C _{1A, C_{1B}, C_{1C}} -Variable cond.
MC60G-241	C ₂ -Broadcast antenna trimmer
PC40HL-503	C ₃ -Police antenna trimmer
PC40HK-503	C ₄ -Short-wave antenna trimmer
MC60G-050	C _{5, C₁₀} -240 ufd. mica cond.
PA4356-2	C _{6, C₇} -.05 ufd., 400 v. cond.
	C _{7, C₈, C₁₄, C₂₆} -.05 ufd., 200 v. cond.
	C ₁₁ -5 ufd. mica cond.
	C ₁₂ -Broadcast det. trimmer



Listen
... IT'S A
Jensen
SPEAKER!

MODEL VH-91 *Hypex** PROJECTOR

This latest addition to the famous JENSEN Hypex line meets a real need for paging and intercommunication applications. Particularly efficient in the voice frequency range, it delivers clear, intelligible speech with maximum "punch" to override high noise levels.

By reason of an extremely clever mounting bracket, this projector can be pointed in any direction and securely locked into position with a single wing nut. Two holes in the bracket are provided for mounting on table, wall, ceiling or a post.

The diaphragm is cloth base, phenolic impregnated. Nominal voice coil impedance, 8 ohms; power handling capacity, 15 watts maximum speech signal input. Two-wire RC cable is provided for connections. Mounting facilities are also provided on the bracket for a $\frac{5}{8}$ " x $\frac{3}{4}$ " core or smaller transformer. Because of the Hypex flare formula, useful output is attained for a 100° total angle.

This new Hypex projector is now in production; deliveries are expected early in 1947 and literature will be available shortly.

JENSEN MANUFACTURING COMPANY

6617 S. LARAMIE AVE., CHICAGO 38, U.S.A.

In Canada: Copper Wire Products Ltd., 11 King St. W., Toronto, Ont.

*Trade Mark Registered



Jensen
SPEAKERS WITH *ALNICO 5*

Designers and Manufacturers of Fine Acoustic Equipment

famous for
GREAT VALUES

RADIO KITS

Five Tube Superheterodyne Kit

Small Bakelite cabinet, size 9" x 5" x 6", complete parts (except wire and solder) for the construction of a standard superheterodyne receiver using 50L6, 35Z5, 12SA7, 12SQ7, and 12SK7. All parts properly matched to chassis base. Price not including tubes..... **\$10.75**

Five Tube Superheterodyne Kit

In a Walnut Veneer Wood Cabinet (size 12" x 8" x 6") contains complete parts for a 5 Tube superhet kit (less wire and solder) but including tubes (6SK7, 6SQ7, 6SA7, 12SN7, 25L6). Price, each..... **\$13.95**

Six Tube Two Band Superheterodyne Kit

In a solid color wood cabinet (green, red), contains all parts (except wire and solder) to construct a high grade 2 band superheterodyne receiver covering regular broadcast and short wave bands. Tubes consisting of 2-6SK7, 1-6SQ7, 1-12SN7, and 25L6 included. Price..... **\$17.75**

3 Tube Phono Amplifier

Complete with tone and volume control. Price..... **\$2.95**

All prices are F.O.B. New York City.

Write for our new catalogue showing new test equipment, tubes and a large variety of new replacement parts. We ship anywhere promptly.

Six Tube Superheterodyne Receiver

House in an exceptionally artistic designed walnut cabinet. The engineering on this receiver is such as to provide good reception in the most critical locations. Built-in loop antenna of special design. Broadcast band 540 to 1620 KC. 30 Watts input. Price..... **\$23.65**

Intercommunication System

A low priced two-way system for executives, professionals and home use. Consists of a master and one remote. Your Price..... **\$17.25**

Phono Oscillator

Wireless phono oscillator transmits recordings for crystal pickup or voice from carbon mike to radio without wires. Price..... **\$3.45**

Mallory Line Filter—useful in eliminating noises from offending electric appliances by installing the filter at source. Compares favorably with filters listing at \$10.00. Your cost.. **\$3.45**

Speaker Repair Kit (Coldpatch). Eliminates the use of messy cements. Price, ea. **75c**

**RADIO DEALERS
SUPPLY COMPANY**

135 LIBERTY ST., NEW YORK 6, N.Y.

PA4356-2
PA4356-2
MC60F-510
AB3503-36
AB3503-36
PA4357-1
PA4357-1
PA4354-2
PA4354-2
AB43500-44
AB43500-55
PA4303-1
MC60F-101

PC40GK-203
PC40GL-503
PC40GM-203
PC50GM-202
PA4300-1

C₁₂—Police det. trimmer
C₁₃—Short-wave det. trimmer
C₁₅—51 μ fd. mica cond.
C₁₇—Broadcast osc. trimmer
C₁₈—Broadcast osc. padder
C₁₉—Police osc. trimmer
C₂₀—Short-wave osc. trimmer
C₂₁—1680 μ fd. mica cond.
C₂₂—3320 μ fd. mica cond.
C_{23A}, C_{23B}—First i.f. trimmer
C_{24A}, C_{24B}—Second i.f. trimmer
C₂₅—4 μ fd., 400 v. elec. cond.
C₂₇, C₂₈, C₂₉, C₃₀—100 μ fd. mica cond.
C₂₀—02 μ fd., 200 v. cond.
C₃₁, C₃₂—05 μ fd., 400 v. cond.
C₃₃—02 μ fd., 600 v. cond.
C₃₄—002 μ fd., 600 v. cond.
C_{35A}, C_{35B}, C_{35C}—15/10/15 μ fd., 450/450/450 v. elec. cond.

ECA MODEL 108
Code and Description
1 — Loop antenna
2 — Speaker
8 — Osc. coil
9 — Input i.f. trans.
10 — Output i.f. trans.
11 — Output trans.
12 — Elec. cond.
13 — 100 μ fd. mica cond.
14 — 250 μ fd. mica cond.
15 — 002 μ fd., 400 v. cond.
16 — 05 μ fd., paper cond.
17 — 05 μ fd., paper cond.
18 — 05 μ fd., 200 v. cond.
19 — 2 μ fd., 200 v. cond.
20 — Variable capacitor and drum
21 — Sw.
22 — 500,000 ohm vol. control
23 — 47,000 ohm, 1/4 w. res.
24 — 33 ohm, 1/4 w. res.
25 — 82 ohm, 1 w. res.
26 — 100 ohm, 1/4 w. res.
27 — 1500 ohm, 1/2 w. res.
28 — 1500 ohm, 2 w. res.
29 — 2200 ohm, 1/4 w. res.
30 — 18,000 ohm, 1/4 w. res.
31 — 22,000 ohm, 1/4 w. res.
32 — 100,000 ohm, 1/4 w. res.
33 — 220,000 ohm, 1/4 w. res.
34 — 470,000 ohm, 1/4 w. res.
36 — 2.2 megohm, res.
37 — Pilot light
38 — .005 μ fd., 200 v. cond.

—30—

4-Element Array

(Continued from page 47)

6 2" beehive metal-base standoff insulators.

8 3/4" thinwall conduit connectors.

1 section 5' long, 1 1/4" dia. thinwall conduit.

The 10 foot section of 1 1/4" tubing is laid out on a flat surface, and marked at intervals of 3' 4". Two of the 1" dia. ten foot sections are placed, respectively, at the first and second marks from one end of the boom and carefully brazed, making sure they are at exact center and at 90 degree angles with the boom itself. Next, the five foot section of 1 1/4" tubing is similarly affixed to the boom at the next mark, but on the opposite side from the previous sections. A study of the diagram will show the method of assembly at this point. After this joint has cooled sufficiently, braze another of the ten foot sections of 1" tubing, on the same side of the boom as the other ten foot lengths and in exactly the same manner, at the final mark, making sure that all angles are 90 degrees, and that the tubing element lengths are brazed at the exact center. Failure to observe this will entail trouble in tuning the beam later, and will give power loss and a distorted pattern.

The remaining length of 1" tubing is then cut at its exact center; this is the dipole proper (when the tuning stubs in each end are added). These two 5' sections are then mounted with a two-

**GET YOUR
FCC Commercial Radio Operators' LICENSE**

Now...

How To Pass
FCC
LICENSE
EXAMINATIONS

CLEVELAND INSTITUTE
OF
RADIO ELECTRONICS
Terminal Tower Cleveland, Ohio

Don't Delay—
Write Today!

IT'S EASY IF YOU FOLLOW OUR PLAN!
Thousands of new jobs are opening up—FM, TELEVISION, MOBILE COMMUNICATION SYSTEMS, are only a few of the new radio fields which require licensed operators.

FREE BOOKLET

Tells you the Government Requirements for all classes of commercial licenses. Saves you many hours of random, undirected study. Assures a minimum of time in getting your ticket! Approved for Veteran Training Under G-1 Bill of Rights

CLEVELAND INSTITUTE OF RADIO ELECTRONICS

Successors to Nilson Radio School, founded 1939

Smith Practical Radio Institute, founded 1934

RN-2 TERMINAL TOWER

CLEVELAND 13, OHIO

MAIL THIS COUPON

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
RN-2 Terminal Tower, Cleveland 13, Ohio

Gentlemen: Please send your FREE Booklet, "How to Pass FCC License Examinations."
(NOTE: This booklet does not cover examinations for Amateur Licenses.)

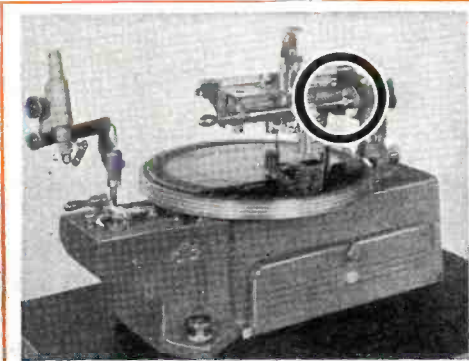
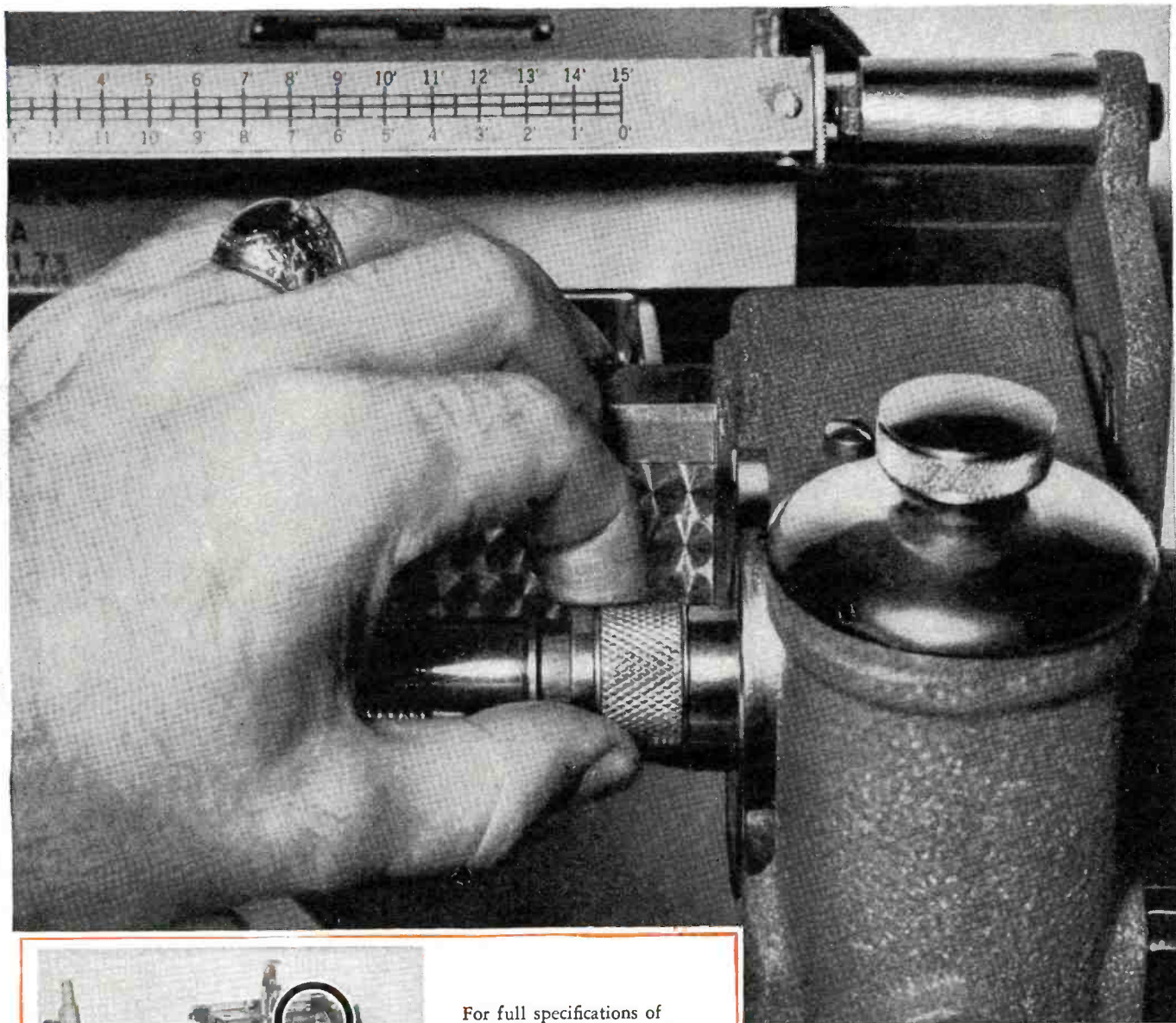
Name _____
Address _____
City _____ Zone _____ State _____

If a Veteran check here

change pitch and direction almost
instantaneously with the improved
Presto 8-D Recorder

The Improved Presto 8-D Recorder is equipped with a reversing device for the feed screw. Result: Six feed pitches, inside-out *and* outside-in, using only one feed screw. This feed screw need never be removed from the recorder. Thus, changes in pitch and direction are accomplished within a matter of seconds.

The Presto 8-D Recorder is the easiest and most convenient machine to operate because of the arrangement of its controls and the cantilever overhead which saves lost motion in operation. Its unusually heavy construction assures high fidelity masters and instantaneous recordings.



For full specifications of the Presto 8-D please write Presto Recording Corporation, 242 West 55th Street, New York 19, N. Y. To insure future delivery within a reasonable time, we suggest you place your order now for immediate listing.

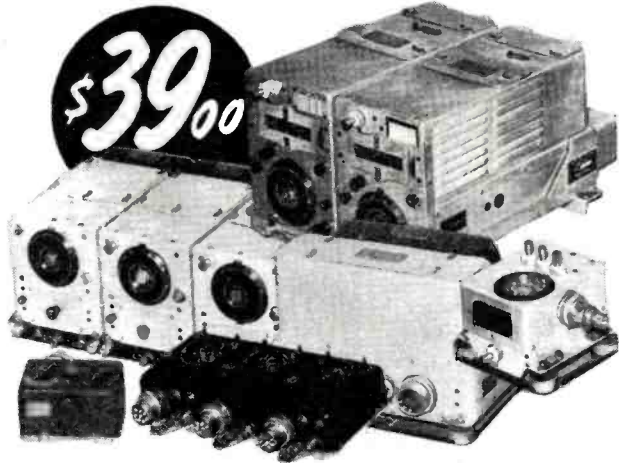
**PRESTO**

RECORDING CORPORATION
242 West 55th Street, New York 19, N. Y.
Walter P. Downs, Ltd., in Canada

World's Largest Manufacturer of Instantaneous Sound Recording Equipment

REAL SATISFACTION *is yours for years...*
with these superlative values in permanently usable gear brought you at amazing savings by the **RADIO SHACK!**

★★★ **SCR-274-N COMMAND SET**



\$39.00

consisting of

- 3 **RECEIVERS** — covering frequencies of 190-550 kc; 3 — 6 mc; and 6 — 9.1 mc; tubes included are: 12SK7 — RF amp; 12K8 — mixer; 12SK7 — 1st IF; 12SK7 — 2nd IF; 12SR7 — diode det & CW osc; 12A6 output or AF.
- 2 **XMTRS** — covering frequencies of 3 — 4 mc and 4 — 5.3 mc; tubes included are 1626 master oscillator driving two parallel 1625's; a 1629 magic eye tube and a calibrating crystal are also furnished

4 **DYNAMOTORS** — for 12-volt d-c service; each receiver has its own dynamotor and another dynamotor powers the transmitters and modulator.

1 **MODULATOR** — with carbon mike input to 1625 screen-grid modulator with 12J5GT side-tone oscillator and VR150-30 regulator.

29 **TUBES** — a complete set for each unit.

2 **TUNING CONTROL BOXES** — 1 **ANTENNA COUPLING BOX** with RF ammeter, antenna relay, and 5000 volt, 50 mmfd. W.E. vacuum condenser.

You'll find a myriad of uses for this stack of gear, the parts of which are in themselves worth many times the price at which the Radio Shack brings you the entire assembly. The receivers are great for stand-by use — effective on 40 and 80 meters — with ample bandspread — usable on phone or CW — output at 8000 or 600 ohms. The amazingly low price is possible because the equipment is slightly used — but it's in first class shape ready to give you many years service. **DON'T MISS THIS TREMENDOUS BARGAIN!**

AAF HAND MIKE and PHONES

Type T-17 mike with push-to-talk switch, cord, and plug. This is a carbon mike. Only **\$1.29.**

Type HS-33 phones with head-band, rubber cushions, cord, and plug. Only **\$1.95.** Used, but in A-1 condition.

★★★ **BC-221 FREQUENCY STANDARD**

Now it's easy to meet FCC Regulations par. 12.135 for regular measurement of your frequency. This extremely stable, heterodyne frequency meter readily checks up to 5th harmonic on most receivers and up to 125th harmonic on the better receivers.

Fundamental ranges 125-250 & 2000-4000 KC.

Stability better than .005%.

Works on 110 v. a-c, vibrapack, or batteries. Can be used as a signal generator — and you'll be seeing articles telling how to make it into a VFO that can't be duplicated in today's market.

Furnished complete with tubes, original crystal and calibration charts. First quality — can hardly be told from new. Immediate express shipment.



\$39.50

★★★ **BC-348 RECEIVER**



\$49.50

"The best military receiver for amateur use" is what many wise hams say about this sensitive, smooth-operating, heavily-built, 6-band receiver. Check these features and you'll see why!

6-band switching—200-500 kc; 1.5 — 3.5 — 6 — 9.5 — 13.5 — 18 mc.

Automatic noise compensator.

Constant sensitivity on all bands.

Temperature-compensated oscillator.

Crystal filter - AVC - MVC - BFO.

Output at 300 or 4000 ohms.

Smooth vernier tuning; 90 turns of tuning knob for each band.

Furnished complete with built-in dynamotor for 28-volt d-c use and detailed instructions for change-over to 110-volt a-c supply. **ORDER NOW** for immediate express shipment. Conversion kit available.

- TUBE LINE-UP**
- 1st RF — 6K7
 - 2nd RF — 6K7
 - RF Osc. — 6C5
 - 1st Det. — 6J7
 - 1st IF — 6K7
 - 2nd IF — 6F7
 - CW Osc. — 6F7
 - 3rd IF — 6B8
 - 2nd Det. — 6B8
 - Aud. Out — 41
 - V.R. — 991



\$39.95

★★★ **SCR-522 VHF XMTR-RCVR**
The ALL-PURPOSE RIG for your work in the 100-156 MC SPECTRUM

4-CHANNEL PUSH-BUTTON OPERATION CRYSTAL-CONTROLLED AM PHONE MOBILE or FIXED STATION SERVICE. Ideal for AMATEUR, EXPERIMENTAL, AIRCRAFT, MARINE, RAILROAD, POLICE, and EXPERIMENTAL WORK.

Here's the set that is so good it was made standard equipment in all American or British planes — and now you can have it at only a few percent of its original cost.

THIS VERSATILE SET GIVES YOU

A 10-tube superheterodyne receiver that includes a squelch circuit with sensitive relay to kill background noise when no signal is being received; 3 microvolts sensitivity at 10 milliwatts output.

A 7-tube, temperature-stabilized Xmtr delivering 15 watts.

A remote control box giving push-button selection of four sending and receiving channels.

A 28-volt d-c dynamotor to power the entire outfit in mobile service.

Furnished with full set of tubes, connecting plugs, and detailed instructions, as published in Radio News, for converting to a-c powered amateur service. Condition like new; total weight — about 100 pounds. (Incidentally, there's no extra charge if you find eight crystals in your shipment).

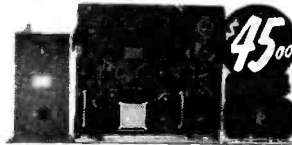
TUBE LINE-UP

- RECEIVER**
- 9003 RF amp
 - 9003 Mixer
 - 9002 Harm. Gen.
 - 9003 Harm. Amp.
 - 12SC7 1st IF
 - 12SG7 2nd IF
 - 12SG7 3rd IF
 - 12C8 Det. 1st IF and AVC
 - 12J5GT 2nd AF
 - 12AH7CT Osc and AF squelch

TRANSMITTER

- 6G6G Osc
- 12A6 1st harm. amp
- 832 2nd harm. amp
- 832 Pwr. amp
- 6SG7 Speech amp
- 2 — 12A6 PP mod

★★★ **AAF XMTR BC-375-E**



\$45.00

We're back again with more of these exceptional values in transmitting gear. Complete outfit includes seven of the tuning units, covering 200 kc to 12,000 kc (except broadcast band), plus antenna tuning unit BC-306-A with variometer and tap switch, plus dynamotor unit PE-73-C with relay, fuses, and filter. Power output is 30 to 75 watts, depending on frequency; RF meter reads antenna current; plate meter range is 0-500 milli-amperes.

This brand new gear is furnished complete with five tubes — 211 master oscillator, 211 RF power amplifier, 10 speech amplifier or tone oscillator, 2 — 211's PP modulators. 100-page AAF Manual covers every detail of use and maintenance. **ORDER NOW!!**

The whole rig weighs over 400 pounds so it's shipped by freight.

Price, complete — only **\$45.00.** Remit in full — No C.O.D.'s.

The **RADIO SHACK**
★ 167 A WASHINGTON ST. ★
BOSTON, MASS., U.S.A. ★

inch spacing between the split ends, by means of the standoffs, to the respective ends of the five foot section of 1 1/4" tubing, giving an insulated but rigid and light antenna, and thus making possible either split feed methods, or, by joining the dipole sections with a jumper, delta-match, T-match, etc.

Next, the 1 1/2" pipe flange is brazed at the exact center of the boom, and on the same side as the single five-foot length of 1 1/4" tubing which supports the antenna. This flange is to enable the whole assembly to be mounted on top of a jointed length of galvanized pipe at the desired height which been determined to be optimum for your particular locality.

The eight 3/4" conduit couplers are then filed out so that 3/4" tubing will slide freely through them, and with one nut and lock ring removed from each coupler, it will be found they will fit snugly inside the 1" pipe, where they are brazed securely as shown in the diagram. This makes a highly satisfactory, efficient and simple means of adjusting and locking the tunable end-lengths of the elements. These tunable sections are obtained by cutting, exactly in the center, each of the four ten-foot sections of 3/4" thinwall tubing. The remaining nut and lock ring of the brazed couplers allow the elements to be quickly and securely locked at any length for the ten-meter band.

The method of mounting used by the author involves the use of the familiar eave-bearing and thrust-bearing base and suitable lengths of galvanized iron pipe to attain the desired height, but individual preference and facilities vary so widely, no particular information will be given, other than to recommend the abovementioned method of mount for simplicity and low cost.

The preferred feed method tried at W6RTP consisted of a feed line of 70 ohm coax, in conjunction with a stub made of four lengths of 70 ohm coax paralleled, and cut to the length given by the formula for coaxial stubs. With this arrangement, and a reversible motor drive, rotation is a simple and fool-proof matter. However, any feed method involving open lines and conventional stub match, delta, T, or other similar systems, with slip-ring feed, is applicable to the particular way in which the antenna is designed, and allows plenty of room for individual preference and experimentation.

The highly important matter of tuning and adjusting is covered thoroughly in the *Handbook*, and rigid and careful adherence to this method is recommended. Remember, a beam is not a beam until tuning has made it such, and no general rules will hold true for all locations, so careful and detailed attention to this matter is highly advisable, following the rules laid down in the chapter on rotatable arrays in the *Handbook*.

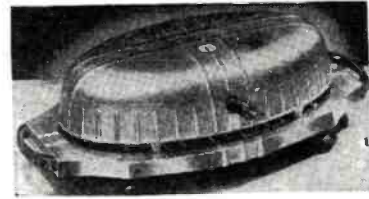
With the tuning, as such, accomplished to the erector's satisfaction, next comes the matter of determining one of the most important, if not the most important, details of getting a

February, 1947

The Nationally Known **HOLLYWOOD BROILER**

Here's the finest broiler made. It has an easy to handle cover, an attractive finish, comes complete with rack and cord. It has two heats and is roomy enough for the largest roast.

12.95 each. **12.50** in lots of 6



HOT PLATE

3 heat, two element, mounted on attractive metal stand. Three Switches Control all Heats. Complete with cord.

Net price **6.50** each. Lots of ten **5.95** each.

FOR ROOMS . . .
FOR STORES . . .
FOR GARAGE . . .

RADIATION TYPE HEATER

This cone shaped heater has replaceable element, and is 100% safe. Comes complete with guard.

4.95 each. . . In lots of six **4.45**

2 SPECIAL VALUES

Representative Values From Our Complete Radio Parts Stock.

• 5" P.M. speaker. Alnico slug . . . 3 to 5 ohms . . . voice coil.

1.59 each. 10 for **14.90**

• Output Transformer. Clinch or Screw Type. Can be used with 50L6 . . . 35L6 . . . 25L6.

49c each. 10 for **4.50**

Write us about your needs in Radio Parts, Testing and Sound Equipment, and Electrical Appliances.

Send for Our Latest Catalog

RADIO PARTS COMPANY

612 W. Randolph, Dept. "N", Chicago, 6, Illinois

SILVER

NEW

"SPARX"

DYNAMIC SIGNAL TRACER



New post-war design and construction, but low pre-war price, explains why wise service technicians buy it by the thousands. Matching "VOMAX", 904 Laboratory C-R Bridge, 906 AM FM Signal Generator in size and style, "SPARX" is the same outstanding "buy". At only \$39.90 it will earn you, too, more profits than any other instrument you've ever bought.

Touch "SPARX" prod to grid, to plate, of every receiver circuit. You'll localize trouble in 30 seconds per tube—trouble in a five-tube receiver located in 2 1/2 minutes! True dynamic signal tracing at r.f., i.f., a.f. — plus indication of presence or absence of a.c. and d.c. operating voltages, hum or distortion. Tests phono pickups, microphones, amplifiers, speakers—"SPARX" is your shop test speaker, too—all with visual and audible signal tracing. "SPARX", radio's complete signal tracer-tester, will earn its low cost for you in no time flat.

OVER 35 YEARS OF RADIO ENGINEERING ACHIEVEMENT

McMurdo Silver Co., Inc.

1240 MAJN ST. HARTFORD 3, CONNECTICUT

Send postcard for catalog of new measuring equipment, communication receivers, transmitters, kits and parts. See them at your favorite jobber.



Dial Belt Kits • Chemical Laboratory Phono Turntable Stand • Hell Box

New G-C Phono Turntable Stand



Steel stand on which you can place any phono turntables, ideal for repairmen, easily adjusted, sturdy, steel construction.

No. 5205—List..\$6.65

G-C Servicemen's Dial Belt Kits



Fine woven replacements for all sets. Easy to install. Supplied in kits of various quantities, with steel box.

No. G-25—Kit of 25 belts.
List.....\$6.70

Available at all leading distributors.
Write for catalog today!



G-C Hell Box



Grand assortment of screws, nuts, lugs, clips, washers, clamps, caps, all types of radio parts that you use every day. Thousands of pieces in a box.

No. 6500—Hell Box
asst'd in Metal Box.
List.....\$4.00

G-C Electronic Chemical Laboratory

Ideal for all servicemen. 19 different bottles and chemicals in hvy. steel rack which is FREE. Perfect chemical set-up for servicing.

No. 998—List...\$11.12

RADIO DIVISION DEPT. H

GENERAL CEMENT Mfg. Co., Rockford, Ill., U. S. A.

Manufacturers of over 3,000 products • Sales offices in principal cities

NEW SOLDERING GUN with adjustable tip FOR TOUGH JOBS

HEATS IN
5 SECONDS

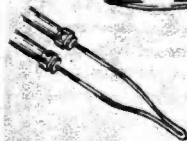


TIP ADVANTAGES

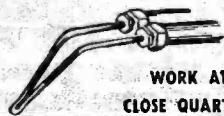
STAYS TINNED—
NO BURNING



SEE WHERE
YOU SOLDER



WORK AT
CLOSE QUARTERS



High heat produced in loop type tip by induction principle gives speed and flexibility to soldering with the new gun type Speed Iron. Ideal for intermittent operation on maintenance and radio service work.

Available at your radio parts distributor or write direct for descriptive bulletin.

- ★ 115 Volt 60 Cycle 100 Watts
- ★ Built-In Light Weight Transformer
- ★ Intermittent Operation With Trigger Switch
- ★ Can't Overheat or Burn Out
- ★ Tip Heats And Cools Fast
- ★ Impact Resisting Case
- ★ Soldering Heat In 5 Seconds

810 PACKER STREET

WELLER MFG. CO. • Easton, Pa.

Export Dept.—25 Warren Street, New York 7, N. Y.
In Canada—Atlas Radio Corp., Ltd., 560 King Street N. W., Toronto, Ont.

beam to work satisfactorily other than by sheer luck. As is well known, the gain achieved by a beam is primarily due to the lowered angle of radiation in a vertical plane. At ten meters, it is apparently optimum to secure an angle of approximately 10 degrees from the horizon, and height is highly important in achieving this. Accordingly, it is highly recommended that the system, completely tuned and adjusted, be fed power and raised in two-foot steps, through the range from thirty to forty feet above ground level. The ingenuity of the individual comes in here, depending on the mounting structure involved, but if the pipe support system is used, as shown in the photos, two or three huskies can do it quite nicely, by raising and lowering the supporting pipe up from a hole (dug directly under the structure by garden-hose hydraulic pressure.) This convenient three or four inch diameter vertical shaft in the ground also is a great aid in the erection of the affair itself, and is easily done. With a small amount of power fed to the system, and a receiver 'S' meter some distance away used as a reference, it will be found that the emitted signal will take a decided hop upward at some point in the aforementioned thirty to forty foot range, and at this point the array should be secured and left.

If this performance is not desired, and the builder is satisfied with a less efficient arrangement, heights of sixteen or twenty-two feet will be found to be quite satisfactory. The array was used for a time at W6RTP (a flat, coastal location) at sixteen feet elevation, and marked directivity characteristics were evident. The signal got to the Philippines, Guam, Australia, Hawaiian Islands, Tinian, Saipan, Peru, Guatemala, the Galapagos Islands, etc., as well as the usual continental contacts, with "S" reading that compared equally favorably with other W6's at the time, using an 829B with 60 watts input, and during the definite early summer slump of the band. It can be seen accordingly that results are quite gratifying, even if one cannot achieve the optimum height for the system. However, it is highly recommended, if at all possible, that the proper height be determined and used with the beam, since the results to be obtained, used thus, will leave nothing to be desired.

In receiving, the array has shown very good characteristics, depending, as usual, on power, direction, distance, and the all important conditions. Generally speaking, there is about four to six "S" points front-to-back gain, with almost infinite attenuation off the sides, both receiving and transmitting. If a conscientious and thorough job is done by the builder, and the array is tuned and adjusted properly with the optimum height determined and used, results will more than gratify the ham who wants to "get out, and get heard," as well as hear the choice stuff that the returning ten meter season is sure to bring.

**WELLS FAMOUS
RADIO COMPONENTS
NOW AVAILABLE
AT YOUR JOBBERS!**



See for yourself the truly remarkable values in the finest of Government inspected radio-electrical equipment that can now be obtained right in your own area. You will find a wide selection of condensers, resistors, relays, volume controls,

switches, transformers, transmitting tubes, etc.—all priced at a fraction of their original cost. This new Wells service is being established to help you choose your exact requirements from local stock.

THESE LEADING PARTS DISTRIBUTORS ARE NOW FEATURING WELLS DISPLAYS

David White Radio Supply Co.
1222 Main St.
Little Rock, Arkansas

Lurtz Electric Company
210 N. Illinois St.
Belleville, Illinois

James W. Clary Company
2024 4th Ave. N.
Birmingham, Alabama

Chambers Radio Supply Co.
1104 Broadway
Cincinnati, Ohio

All-State Distributing Co.
2407 Ross Ave.
Dallas, Texas

Pioneer Radio Supply Corp.
2115 Prospect Ave.
Cleveland 15, Ohio

Southeastern Radio Parts Co.
442 W. Peachtree St. N.W.
Atlanta, Georgia

Denison Radio Supply
Denison, Texas

Marsh Radio Supply
526 W. State St.
Milwaukee, Wisconsin

Radio & Television Equip. Co.
207 Oak St.
Santa Ana, California

Jobber franchises arranged exclusively by Hutchins Industries, 325 W. Huron Street, Chicago 10, Illinois

**WELLS
SALES, INC.**

If your jobber does not yet have his Wells display, write direct for catalog of the components in which you are interested.

4717 W. MADISON ST., DEPT. R-2, CHICAGO 44, ILL.

We Insist on Keeping PRICES DOWN!

- Our policy has been value for high-quality merchandise . . . and, despite high prices, we adhere to our principles.



ALL-STEEL CABINETS

- No. 11—Standard AIRCRAFT MOBILE cabinet 13"x10"x9" black crackle finish with 3" Lord mount. Shpg. wt. 15 lbs., only **\$1.00**
- No. 22—5" SPEAKER Cabinet with black crackle finish with rear cover and posts for mounting. Shpg. wt. 5 lbs. only..... **75c**



No. 33 P.M. SPEAKERS

- 4" P.M. Alnico 5. Lots of 5..... **\$1.44** ea.
- 5" P.M. Alnico 5. Lots of 5..... **1.66** ea.
- 6" P.M. Alnico 5. Lots of 5..... **1.99** ea.



No. 44 WIRE

- 20 ft. lengths (approx.) of 72 ohm coaxea. **44c**
- 10 ft. lengths (approx.) of 7 conductor vinylite shielded cable.....ea. **55c**
- 20 ft. lengths (approx.) of 7 conductor vinylite shielded cable.....ea. **88c**
- 125 ft. lengths (approx.) of 3 conductor # 18 outdoor phone wire..... **75c**



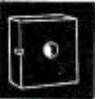
No. 55 TRANSMITTING TUBES

- We did it before and we are doing it again!
- No. 866A **75c** No. 1625 **50c**
- No. UH50 **\$1.50** No. 5BP4 **\$5.95**
- No. 250TH..... **\$7.95**



No. 66 SELENIUM RECTIFIER

- 100 MA—for use in AC-DC sets replacing rectifiers etc. Packed 12 to a box. Minimum sale 12.....ea. **90c**



No. 77 BENDIX 28 VOLT INTERCOM

- Complete with 6SJ7 and 6V6 tubes—easy conversion to a good power supply **\$4.95**

TEST EQUIPMENT

- | | |
|--|-----------------|
| RCA # 195A Volt Ohmyst | \$ 69.50 |
| RCA # 182C Chanalyst | 162.50 |
| RCA # 167B Test Oscillator..... | 63.75 |
| WESTON # 697 V.O.M. | 26.52 |
| WESTON # 779 Analyzer | 76.46 |
| WESTON # 785 Circuit Tester..... | 87.02 |
| WESTON # 798 Mutual Conductance Tube Checker | 187.09 |
| HICKOK # 125 V.T.V.O.M..... | 94.95 |
| HICKOK # 191X Microvolt Generator..... | 145.92 |
| HICKOK # 203 Electronic V.T.V.M..... | 79.80 |
| HICKOK # 288X Signal Generator.... | 144.60 |
| HICKOK # 534 Tube & Set Tester.... | 138.30 |

25% deposit, balance C. O. D.

Please include sufficient payment for transportation. Over payment will be refunded

Write to Dept. R-2

Standard Parts Corp.

235 MAIN ST. HEMPSTEAD, N. Y.

A New Synchronous Motor

By H. H. EVERETT

Eng., Fairchild Camera & Instrument Corp.

This smooth starting, low cost synchronous type phono motor reduces "flutter" and "wow."

WHEN the average customer considers a radio-phonograph combination, he usually looks for one that has a "good tone" and a handsome cabinet matching his living room furniture. Seldom does he ask what kind of a drive it has, whether it uses a crystal or a dynamic pickup, what features its inner mechanism, in general, offers. Usually he cares less about such purely technical factors.

But his ear is almost always keen enough to know one machine's "good tone" as against another's, even though he may not know the reason. Distracting hum, wobbling tone, turntable rumble, surface noise do not escape his attention. He tries to buy a machine that does not have, nor is likely to develop, such distractions.

Aside from this average consumer, there is a still small, but ever widening, section of the consumer public, able to afford the purchase of good equipment and fine record albums. These people love their music, and demand good playback equipment for it, even requiring standards of machine performance approaching professional quality. They are making it their business to learn more about the "insides" of their machines. They want to know the causes for the extraneous noises—"background hum,"

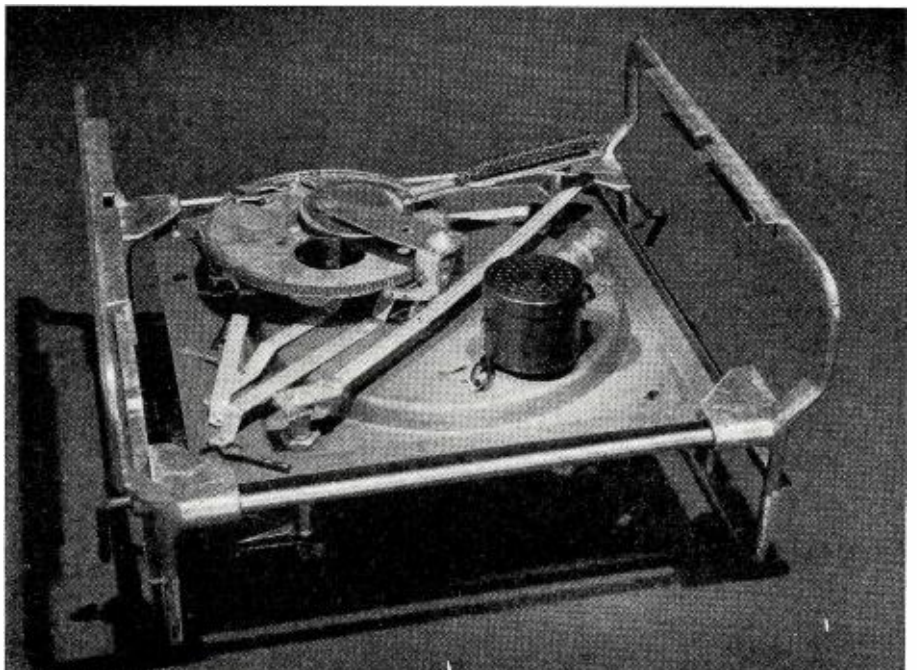
"wows," and the rest—that mar their listening enjoyment.

It may be argued that the layman should not be expected to be familiar with the mechanical workings of his playback machine. That is really the province of the manufacturer who builds it and of the dealer who markets it. They are the ones who should point out to customers its fine points, the reasons, why this may be good and that may be bad, and guide the customer's purchase accordingly.

Manufacturers and dealers have begun to do this. An education on some specific features has been increased through merchandising effort, the whole subject of quality basis is being more consciously impressed on all consumers. Thus, both manufacturers and consumers in turn are naturally becoming thoughtful about other quality features and so new components are beginning to come under wide general scrutiny.

With this growing spirit of criticism and inquiry, and the constant search for something better, manufacturers of high quality radio-phonograph equipment for the home are striving to satisfy the demand for better playback components. They know that consistent improvements in records

This new motor is designed for use in conventional record changers.



SPRAGUE TRADING POST

SITUATION WANTED by married radio serviceman, 15 yrs. experience, 40, graduate B.S. physics, math and radio. Now taking course through F-M and Television. Desire position where training and knowledge count. J. C. Wunderlich, YMCA, Galesburg, Illinois.

SALE OR TRADE—Port. single-play phonograph with 3-tube amplifier, brown bakeloid case; vol. and tone controls and 6" speaker; lightweight pickup. \$30 or equal value in multimeter. Barry Windsor, 212 W. Jamieson St., Flint 5, Mich.

WANTED—Hytron HY30Z plate transformer, Thordarson T19P56 or equivalent. Will swap new 1" band reamer for a 1" taper reamer. I. D. Smith, 39 Prospect St., Milford, Mass.

FOR SALE—No. 288x Hickok sig. generator crystal controlled, new, in original carton, \$140. 4" a-c voltmeter, \$15. 200 new tubes—what do you need? Testing machine to test tensile strength of wire. S. L. Malone, 2531 Sharon Ave., Dallas 11, Texas.

WANTED—Any schematic diagrams of phono-amplifiers or just plain amplifier circuits. Will trade. Stanley Schneider, 1041 Findlay Ave., Bronx 56, New York, N. Y.

WILL TRADE 2-meter RCUR and built-in code osc. plus speaker; surplus 814's, RK20, 937, 807's, 808, 5R4GY's. Want HK257B's, 866A's, 811's, 2A3's or 200-watt mod. xformer or beam indicator. Cash or what have you? Louis Gerbert, 815 Richmond St., Grand Rapids, Mich.

WANTED—RCA 8500 receiver in A-1 condition with coils for 5500-8900 kc. State price. Will trade or sell SX16 speaker. R. G. Summers, 104 Herman St., Buffalo 12, N. Y.

WANTED—Good sig. generator and tube checker. Cash or what do you need? F. A. Thompson, 1316 West Division, Grand Island Nebr.

FOR SALE OR TRADE—100-watt phone-cw transmitter complete ready to use on 10 meters. In 5 ft. rack. One Electro-Voice hi-impedance velocity mike and one hi-impedance dynamic mike. Both like new. Can use good camera. Bill L. Godden, 504 Norton St., Kansas City 1, Mo.

FOR SALE—Transmitter, receiver 3.5-7 bands. VFO. Phone/rw. 25 watts. 235 mc. Transceiver in same unit. 12 v. dynamotor. 15 tubes, phones, mikes, key, antenna, tuner spare parts. Mordecai Katz, 1399 Carroll St., Brooklyn, N. Y.

FOR SALE—Model C-E Solar Exam-eter. Like new. Has AC-DC vac. tube voltmeter tests resistance to 10,000 meg., capacity to 2000 mf. \$45. John J. Marsh, 4624 No. 19th St., Milwaukee 9, Wis.

WANTED—U.S. Signal Corps "Sound Powered" telephone headset and microphone assembly consisting of 2 earphones on head-strap microphone with switch, wire harness. Rider Channelyst, Cash. Chas. S. Brotzman, 173 Main St., Mexico, Maine.

FOR SALE—New 10-tube National 100 ASD receiver, perfect condition with real S-meter and 8" speaker. 200-400 and 1300 to 30,000 kc. in 5 bands. Includes kit and instructions for converting to broadcast band. \$100. Howard E. Moore, 13 So Dubuque St., Iowa City Iowa

SWAP — BUY — SELL

FOR SALE—Masco 35-watt amplifier like new, \$65. Astatic T-3 mike with floor stand, \$28.50. Two new phono motors, \$5 ea., also many new and used tubes. What do you need? We want 25B8 tubes. Ben's Radio, North Tonawanda, N. Y.

WANTED—Bass reflex cabinet, D.B. 20, preselector, also good communication receiver. C. Horn, 325 E. 163 St., New York 56, N. Y.

FOR SALE OR TRADE—Westinghouse 6 mfd. 1000 v. oil-filled condensers, \$1.50 plus postage. Will trade for speech amplifier parts or Class B stage. Don Morris, 303 Home St., Fairmont, W. Va.

FOR SALE—117N7, 35Z5, 25Z5, 9002, 807 and many other tubes. What do you need? C. Gutman, 4415 Explanade Ave., Montreal, Que., Canada.

FOR SALE—30-watt phone and cw transmitter complete. 80-10 meters. Plug-in coils furnished for 10 meters. Also 1 crystal. New, std. size cabinet. \$85. M. J. Hill, 105 E. 46th St., Austin, Texas.

WANTED—All kinds of war surplus radio eqpt. Will pay cash or swap hard-to-get tubes, both receiving and transmitting types. W3QEM, 2036 Chalfant St., Wilkinsburg, Pa.

FOR SALE—Hallicrafter SX-28A receiver complete with matching speaker. Excellent condition. \$185. Clair A. Rupert, R.D. No. 1, Sandy Lake, Pa.

FOR SALE OR TRADE—Triplet model 3212 tube tester, counter type. Will trade for any portable model and \$20 cash. Will sell for \$50 cash. This is new. Edward C. Punt, 397 Melrose St., Brooklyn 6, N. Y.

FOR SALE—New 6AC7 tubes, \$1 ea. in lots of 10 or more. Also Hallicrafters S-20-R absolutely new, \$50. Emanuel Wincor, 708 So. Homan Ave., Chicago 24, Ill.

FOR SALE—HRO receiver with power, \$150. Extra coils, \$9.95. BC 375E transmitter, \$40. Dynamic mikes and earphones, \$5 ea. B19 Mark II transmitter, \$59. Want transmitter and E.C.O. A. Livingstone, 1201 Ellis Ave., Fair Lawn, N. J.

FOR SALE—Transceiver, 2½ meters, 10 tubes including HY75, microphone, antenna; power pack 450 volts, 100 ma. Operates mobile on 6 v DC or fixed on 110 v AC. Parts cost \$125. Herb Baumgartner, 8637 Litzinger, Brentwood 17, Mo.

FOR SALE—No. 802 R.C.P. tube and set tester with chart, \$35. No. 304 R.C.P. tube tester (no chart) \$15. Portable P.A. system complete with 1 horn, \$35. Harry Hollander, 2136 77th St., Jackson Heights, New York.

FOR SALE—Hallicrafters Sky Ranger S-39 receiver, \$67.50. Almost new. Rupert Radio Service, 708 F Street, Rupert, Idaho.

SELL OR TRADE—New 15-watt amplifier for sig. generator or tube tester. J. Bazewick, 3000 No. Christiana, Chicago 18, Ill.

URGENTLY NEEDED—One ribbon for replacement in RCA Jr. Velocity microphone Type 74-B. All inquiries answered. Western Auto Associate Store, Madison, N. C.

WANTED—A Meissner signal shifter. Will pay cash or trade. What do you need? Alex A. Polityka, 248 Western Ave., Allegan, Mich.

FOR SALE—RCA No. 158 5" oscilloscope; Hickok 19XD crystal controlled sig. generator. Both like new. Also have Triplet 1210-A tube tester. T. Wojciechowski, 2837 Fulton St., Brooklyn 7, N. Y.

FOR SALE—Stancor 20P xmitter, \$50 with 75-meter coils. 40-meter 25-watt CW rig, \$40. 10-meter xtal, Bliley 29, 436 kc., \$5. Three HY69 tubes, new. \$3 ea. Two TU10B tuning units, \$4 ea., \$7.50 pair. Frank H. Carlson, New London, Iowa.

SWAP—Complete 1946 N.R.I. radio course incl. television and experimental ohmmeter. Would like a late model tube tester. W. T. Graham, 6624 Forest Ave., Brooklyn 27, N. Y.

FOR SALE—Astatic HP-16 phono pickup, \$14 postpaid. Want G.I. model D dual-speed phonomotor with turntable. Charles A. Idol, Madison, N. C.

FOR SALE—70 random copies of Electronics, QST, Radio, FM, Radio News, Electrical Communications from 1936 to 1944. All perfect, all different. \$6 plus shipping. Phillip Ross, 280 Wadsworth Ave., New York 33, N. Y.

FOR SALE—Kato rotary converter, 110 v DC to 110 v AC, 60 cycle. Used only one month. \$50. W. J. Donlay, 17 Hawthorne Ave., Buffalo, N. Y.

SELL OR TRADE—Triplet vac. tube voltmeter No. 1251, good condition. Want transmitter components, plate transformers, chokes, tubes, etc. or \$25 cash. R. E. Green, 703 N. County St., Waukegan, Ill.



Replace Wet Electrolytics with SPRAGUE TYPE RW

When replacing wet electrolytic capacitors, use Sprague Type RW. They're not substitutes! They're dry electrolytics of very high voltage formation specifically designed for use as wet replacements or for other difficult applications. Due to their extremely low power factor, lower capacity values give you better filtering. For instance, Type RW-25 rated at 25 mfd. is at least the equivalent of a 40 mfd. wet electrolytic. They'll stand high peak surges. They'll handle a-c ripples—and they fit the standard mounting holes. Ask your jobber for Sprague Type RW.

Write for the complete Sprague Catalog listing Capacitors and *Koolohm Resistors for every radio service. amateur and experimental need.

SPRAGUE PRODUCTS COMPANY
NORTH ADAMS, MASS.
JOBBER DISTRIBUTING ORGANIZATION FOR PRODUCTS OF THE SPRAGUE ELECTRIC CO.

YOUR OWN AD RUN HERE FREE! SWAP-BUY-SELL

Sprague will gladly run your own TRADING POST ad free of charge in the first available issue of one of the six radio magazines in which this feature appears. WRITE CAREFULLY or print. Hold it to 40 words or less and confine it to radio subjects. Sprague reserves the right to rewrite ads as necessary, or to

reject any that do not in our estimation fit in with the spirit of this service.

Harry Nathan Sales Manager

ASK FOR SPRAGUE CAPACITORS AND *KOOLOHM RESISTORS By Name!

*Trademark Reg. U. S. Pat. Off.

SOMETHING NEW IN TEST EQUIPMENT!

THE FEILER TS-3 SIGNAL TRACING "STETHOSCOPE"



Save Time...Earn More on Every Radio Repair Job!

There's nothing like the FEILER STETHOSCOPE for saving service time—solves the toughest repair problem in minutes. To isolate and locate trouble, you just "listen in" on or "look at" the signal as it progresses through the circuit. Traces trouble at First Grid, R.F., I.F., Audio; test parts; locates causes of mistracking, intermittance, distortion, etc. Features: 1" dia. aluminum probe with 3 ft. cable; Full 5" PM Speaker; R.F. vacuum tube voltmeter circuit provision for visual indication of R.F. voltages; Output meter provision; Headphone connection. In handsome brown-finished steel case with carrying handle; 8" x 11½" x 6"; wt., 10½ lbs. Operates on 105-125 volts, 50-60 cycles A.C. Complete with valuable Radio Service Guide.

MODEL TS-3 Signal Tracing STETHOSCOPE for A.C. operation. Complete with 2-1T4 (or 1L4); 1-6K6 (or 6F6), and 1-6X5 tubes.

ONLY
\$34⁹⁵

MODEL TS-2. Battery operated (uses 2—Burgess M30); completely self-contained. Same professional performance and appearance as the TS-3. Complete with tubes (less batteries). ONLY.....

\$29⁹⁵

IMMEDIATE DELIVERY! Place your order with your regular parts jobber. If he can't supply you, write for name of nearest local jobber stocking the FEILER STETHOSCOPE—or send your order to us direct.



**FEILER ENGINEERING CO. Dept. 1-B7
803 Milwaukee Ave., Chicago 22, Illinois**

- Ship me one TS-3 STETHOSCOPE
- Ship me one TS-2 STETHOSCOPE
- \$.....enclosed.
- Send me FREE descriptive literature.
- Send name of local jobber stocking TS-3.

Name.....
Address.....
City.....Zone.....State.....

will be largely lost through failure to reproduce them faithfully, and that the radio manufacturers will be blamed. They are giving their attention to the components on which the ultimate quality of sound-reproducing equipment depends; the drive mechanism for the record turntables, the pickup, the amplifier, and the speaker.

Of these several factors required in superior equipment, our concern here is with the drive motor, one of the most important contributions to smooth, "wow"-free turntable performance.

Unfortunately, up until now, too little serious attention has been given the special requirements of motors for sound equipment, even though two cardinal principles in the best quality sound reproducing apparatus driven by a motor are, (1) that the motor shall operate at constant speed without pulsations, regardless of changes in voltage supply to the motor; and changes in the load on the motor; and (2) that the motor's vibration noise level shall be below the level of audible reproduction, and not interfere with it in the slightest degree.

Every critical listener knows, whether or not he is conscious of the cause behind it, that any change in speed of the motor driving the apparatus while the record is being played, and any audible vibration noises ("background hum"), result in painful distortion and noise components that spoil listening pleasure. These annoyances can be exemplified by three specific effects contributing to inferior sound reproduction due to changes in driving turntable speed:

1. Changes in pitch—where speed changes are gradual, occurring from record to record, as the record changer turntable load increases from one to ten records;

2. "Flutter"—where speed changes are rapid, with resulting wobbling pitch variations, within a single revolution of the turntable;

3. "Wow"—where speed changes and resulting pitch changes occur at slower intervals (once or twice) within a single revolution of the turntable.

The cause of these annoyances can be found in the type of motors used in

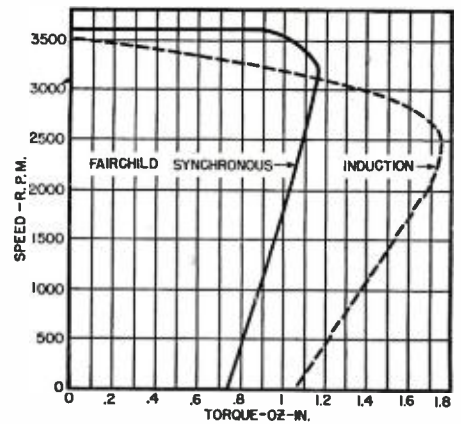


Fig. 1. Graphs show comparison of speed vs. torque characteristics at 117 volts, 60 c.p.s. Maximum efficiency of the synchronous motor is 24 per-cent as compared with 17 per-cent for an induction type.

non-professional record-playing equipment.

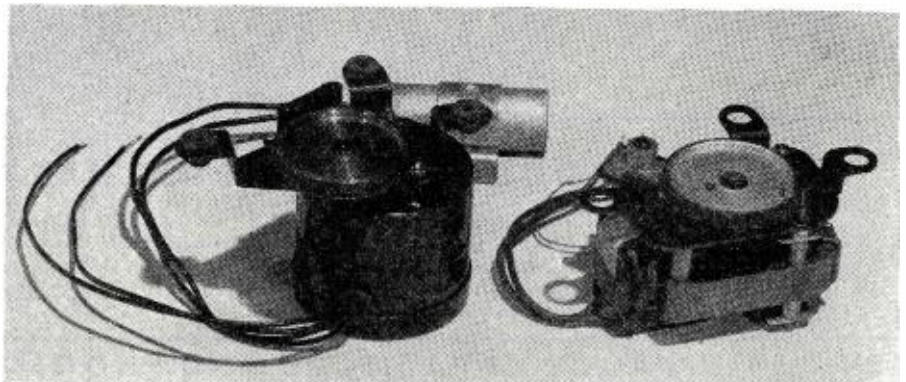
In the past, induction motors have been the most commonly used. Yet it is generally admitted that these shaded pole induction motors have poor speed stability, because speed variations with load and line voltage changes are inherent in them. The vibration noise level of these motors is by nature high due to greater torque pulsations, especially when price considerations have prohibited dynamic and magnetic balancing of the squirrel cage rotor for low-priced playback equipment.

Up to now manufacturers have chosen induction motors largely because there has been no economical low-cost synchronous motor (such as used in the best professional, expensive sound recording and transcription equipment). With the advent of a new low-priced synchronous motor, this situation changes for the better immediately.

A new synchronous motor has just been developed. Fairchild Camera and Instrument Corporation, well-known in the past fifteen years as manufacturers of professional sound recording and transcription turntable equipment, has introduced a new low-cost unit operating at synchronous speed of 3600 r.p.m. throughout its load range, on 117 volts/60 c.p.s. It is

(Continued on page 120)

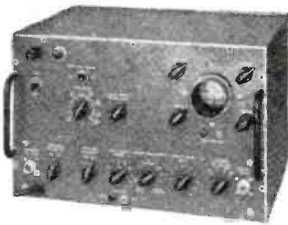
Synchronous motor compared with conventional shaded-pole induction motor.



RHS TELEVISION-SCOPE-POWER EQUIP'T

NAVY MODEL Q SYNCHRO-OSCILLOSCOPE

105 - 120v. - 60
cyc. operation.
Sweeps: 4, 15,
250, 1000 mi-
crosecond trig-
gered sweeps,
25 to 3000 cps.
saw - o - tooth
sweeps.
Trigger output:
+150 or -75
volts, 100 to
3200 cps.



Trigger input:
±10 to 150 volts.
Sawtooth-output: 250v. at 25 to 3000 cps.
Amplifier response: 30 cps. to 2.5 megacycles.
Grey wrinkle enamel cabinet, 9 tubes including
2A1 scope tube.
Used as a regular scope plus the advantage of
observing high speed wave shapes as in pulse
and television work.

COMPLETE with tubes, cables and carrying case **\$89.50**

OIL CONDENSERS

1 mfd. 600v.	\$0.35	1 mfd. 2000v.	\$0.95
2 mfd. 600v. ....	.60	2 mfd. 2000v.	2.10
4 mfd. 600v. ....	.75	3 mfd. 2000v.	2.95
8 mfd. 600v.	1.10	4 mfd. 2000v.	3.95
10 mfd. 600v.	1.40	10 mfd. 2000v.	6.95
1 mfd. 1000v. ....	.90	.05 mfd. 3000v.	1.95
2 mfd. 1000v.	1.05	.25 mfd. 3000v.	2.95
4 mfd. 1000v.	1.10	1 mfd. 3000v.	3.50
8 mfd. 1000v.	2.00	2 mfd. 3000v.	3.75
10 mfd. 1000v.	2.40	1 mfd. 5000v.	6.85
15 mfd. 1000v.	2.60	2 mfd. 4000v.	7.60
25 mfd. 1000v.	5.95	1 mfd. 7000v.	3.95
24 mfd. 1500v.	6.95	1 mfd. 9000v.	14.95

MICA CONDENSERS, SANGAMO

.001-20,000v.	\$9.95	.004-8000v.	\$2.25
.0005-20,000v.	9.95	.002-8000v.	2.25
.0005-8000v.	2.25	.006-6000v.	1.95
.00025-8000v.	2.25	.007-5000v.	1.75
.005-8000v.	2.25	.003-8000v.	2.25

G.E. Vacuum Capacitor
50 MMF. 7500v. **\$3.95**

HIGH CAPACITY CONDENSERS

2400 mfd.—50WVDC	\$1.95
4000 mfd.—18WVDC	1.95
4000 mfd.—30WVDC	2.95
1000 mfd.—15WVDC .....	.99

VIBRATOR POWER SUPPLY VOLTAGE REGULATED

6v or 12v dc Input. Delivers: 1.5vdc at 700ma;
1.5vdc at 700 ma; 7.5vdc at 300 ma; 90vdc at
45ma; 90vdc at 25 ma; 150vdc at 45ma.
COMPLETE with VR90/30; CK1005; & Vibrator **\$14.95**

METERS—G.E., WESTON, 3 1/2"

0-1.5 Ma.	0-8 Amps. R.F.
0-5 Ma.	0-15 Amps. R.F.
0-50 Ma.	0-3.5 K.V. w/shunt
0-100 Ma.	0-15 Vac
0-350 Ma.	0-350Vdc
0-500 Ma.	0-150 Ma. R.F.

Frahm Freq. Meter 58-62 cycles
Your choice any 3 1/2" METER... **\$3.95**

0-150Vac.	—10+20db.
0-20Vdc.	0 1ma.
0-10Vdc.	0-8Amp.

Your choice any 2 1/2" METER... **\$2.95**

WESTON SENSITROL RELAYS

110V—A.C. Reset—Model 705	
0-500 Microamps.	
0-50 Microamps.	
2-022 Microamps.	

SPECIAL—YOUR CHOICE... **\$12.95**

TUBES (Brand New)

ARMY-NAVY INSPECTED

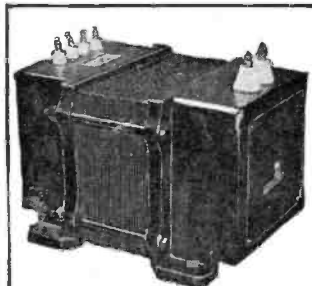
6C4	\$0.75	954	\$0.99
6J6 .....	.99	955 .....	.99
6F6 .....	.99	956 .....	.99
6L6	1.59	957 .....	.99
6V6	1.19	958	1.10
6C5 .....	.90	959	1.15
6J5 .....	.90	9002 .....	.99
6AL5 .....	.99	9003 .....	.99
6AC7 .....	.95	9004 .....	.99
6AB7	1.25	9005	1.10
6AG5	1.10	9006	1.15
6AG7	1.25	1619 .....	.99
6AK5	1.60	1625 .....	.89
6SN7 .....	.99	1626 .....	.89
6SL7 .....	.99	1629 .....	.89
VR-90 .....	.99	30 .....	.89
VR-105 .....	.99	1ETG	1.25
VR-150 .....	.99	884	1.50
811	3.25	2050	1.50
866 .....	.99	2051	1.50
813	8.95	257B/	
807	1.35	8001	14.95
15E	4.95	VT-127A	3.50
2AP1	4.95	726A/C	7.50
3BP1	5.95	6SH7 .....	.89
5BP1	6.95	7A4	1.45
5BP4	8.95	2C40	9.95
9JP1	14.95	836	3.50
814	8.95	872A	3.50
2V3G	1.75	211	6.95

SELENIUM RECTIFIERS

Full Wave Bridge Types

Input	Output		
18v ac.	12v dc	1-Amp.	\$1.95
18v ac.	12v dc	5-Amp.	4.95
18v ac.	12v dc	10-Amp.	7.95
18v ac.	12v dc	15-Amp.	10.95
18v ac.	12v dc	30-Amp.	16.95
36v ac.	28v dc	5-Amp.	7.95
36v ac.	28v dc	10-Amp.	13.95
36v ac.	28v dc	15-Amp.	19.95

Federal's New Midget Selenium 1.60
Immediate Delivery



AMERTRAN HEAVY DUTY PLATE TRANSFORMER

For your dream rig. Pri. 105-115v, 60 cycle. Sec. 3100-0-3100, full voltage across sec. 6200v at 700Ma. Rated 2KVA. **\$39.95**
Our Price

POWER SUPPLY FOR MARK 1-11-111 BC-19 OR OTHER EQUIPMENT

12 Amp-12v D.C. from 110v A.C.
Unnecessary to tear set apart. Leave
set portable.
COMPLETE READY TO **\$32.50**
PLUG IN

NATIONAL DRIVE UNIT

PW-0 or
NPW-0 Only **\$2.95**

TRANSMITTER SHELF T66CRN-10

Complete RF section uses 1-807 Crystal oscillator tripler,
1-807-RF doubler, 1-257B-RF tripler driving 2-257Bs,
RF amplifier in push pull, 1-6H6-RF output indicator. All
volts and current read on 2 Weston meters through panel
switch. Now on 110mc. Slight change to 144mc. Capable
500 watts output. Less tubes and crystal. **\$39.95**
Reduced to

OSCILLOSCOPE KIT

5CPI Cathode ray tube.....	ea.	\$6.95
Socket for 5CPI.....	"	1.98
Anode button for 5CPI.....	"	.35
Shield for 5CPI.....	"	1.49
2X2A Rectifier tube.....	"	1.25
Plate cap for 2X2A ceramic.....	"	.25
Socket for 2X2A ceramic.....	"	.20
Xformer, 1700v, 6.3v, 2.5v, 110v 60 cycle.....	"	7.50
Condenser, oil .5-2000v.....	"	2.10

ORDER SEPARATE OR
COMPLETE KIT..... Special **\$16.95**

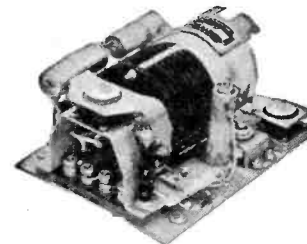
TRANSFORMERS—115v ac 60 cyc Hi-Voltage Insulation

6500v at 4 ma.	\$9.95
6000v at 2 ma.	7.95
3950v at 4 ma. tap at 1250v-1 ma.	7.50
3710v at 10 ma.; 2.5v at 3A; 2.5v at 3A.	9.95
2500v at 10 ma.	6.50
4000v at 2 ma.	6.50
442-0-442v at 1000 ma.	9.95
2.5v at 10 amps.	3.25
6.3v at 6.6 amps.	3.25
6.3v at 21.5 amp.; 2.5 at 2 amp.; 6.3 at 2 amp.	6.95
2.5v at 3 amp.	3.95
5v at 115 amp.	14.95
5v at 190 amp.	17.50

FILTER CHOKES—HI-VOLTAGE INSULATION

10 Hy.—200 ma.	\$2.25	12 Hy.—300 ma.	\$3.95
4 Hy.—250 ma.	3.95	15 Hy.—30 ma.	1.95
10 Hy.—250 ma.	3.25	20 Hy.—30 ma.	2.25
12 Hy.—150 ma.	2.95	75 Hy.—8 ma.	1.95
4 Hy.—600 ma.	5.95	15 Hy.—100 ma.	2.35

CARBON PILE REGULATOR



115V, 60 Cycles, 500 watt LOAD, 750 W. AIR BLAST
Uniform voltage to all equipment at any load to 500
watts. Regulates voltages to test bench and sets under
test. Line voltage regulator for output of gas driven
generators. Regulates line voltage from outlets in the
average home. Used in rural areas where line voltage
surges.

Excellent Buy at **\$14.95**

All material is new and guaranteed, unless otherwise specified.

No mail orders for less than \$2.50—20% deposit required with all orders.

RADIO HAM SHACK Inc.
63 DEY STREET • NEW YORK 7, N. Y.

Leo, WØGFQ

FIRST for
SERVICE
FIRST for
SAVINGS

The only "personal service" radio parts mail order house in the nation.



WRL GLOBE TROTTER TRANSMITTER KIT



Field Reports Testify To Its Superior Performance

FROM SANDUSKY, OHIO—"May I congratulate you on turning out such a hot little rig as the "Globe Trotter." It's amazing the way this flea-power transmitter bucks the heaviest QRM."
Jay Leibach

FROM BETHANY, W. VA.—"I am very well pleased with my WRL Globe Trotter (6L6-807). My first call resulted in a daytime report of 10db over R9 at 60 miles on 75 meter phone. The quality is excellent, and no hum is reported."
J. S. V. Allen, W8UNS

FROM SANDY CITY, UTAH—"The particular feature of the "Globe Trotter" that appeals to me is its versatility. With a mere flip of a switch emission can be changed to any desired band, and to either CW or PHONE. For the money charged for these sets in these days of high prices for everything else, it really is a buy!"
O. W. DeKemer, W7FST

IMMEDIATE DELIVERY!

Many other actual field reports of amateurs using the Globe Trotter testify to its excellent performance. It's the hottest ham equipment on the market today. The WRL Globe Trotter is capable of 40 watts input on C.W. and 25 watts input on phone on all bands from 1500 KC through 28 Megacycles. Incorporates the Tritet Oscillator using a 40 meter Xtal; Heising choke modulation; three bands, all pretuned; 10, 20, and 80 meters; two power supplies, one for 807 final and modulator tubes, one for speech amplifier and oscillator stage. 40 WATT INPUT
Cat. No. 70-300..... \$69.95

Complete including all parts, chassis panel, streamlined cabinets, less tubes, coils and meter. No. 70-312 Same as above, wired by our engineers..... \$79.50

1 Set Coils, Meter, Tubes..... \$15.15 Extra


New Type PHONO OSCILLATOR
Wired, less tubes, Cat. No. 16-191. **\$5.25**

No aerial required. Utilizes high quality loop both as part of oscillator circuit, and radiating medium. Trimmer provided to adjust frequency to any portion of broadcast band between 1250 KC and 1700 KC. Uses 35L6 and 35Z5 tubes

All well-known Receivers available on easy payment plan. Liberal trade allowance. Write us for your wants.

- Get Our New Flyer! Just Printed! Free!**
- Giant Radio Map (Size 3½ ft. x 4½ ft.).....15c
 - Handy Tube-Base-Calculator.....25c
 - Tube and Circuit Book.....10c
- *All prices quoted are domestic. Write for export prices.



Address Dept. RN-2 Council Bluffs, Iowa
Formerly Wholesale Radio Laboratories

Simple Code Practice OSCILLATOR

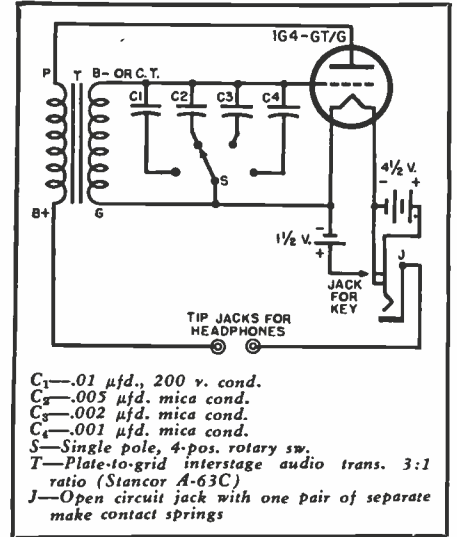
By RUFUS P. TURNER, W1AY
Consulting Eng., RADIO NEWS

This battery-operated, code practice oscillator can be constructed at a cost of only five dollars.

THERE is no reason why a one-student code practice oscillator should be complicated and expensive. The unit shown in the accompanying photographs and schematic gives a strong signal in a pair of earphones and is easy on its self-contained batteries. It is of neat appearance and can be used equally well with a key or code machine. It costs an even 5 dollars to build, but can be made even more cheaply by using less expensive parts and by using breadboard mounting.

The oscillator shown is built into a 6" x 6" x 6" wrinkle-finished steel "instrument box." A dime-store type of drawer pull is used as a handle. The two batteries are mounted on the back of one of the panels; all of the other circuit components on the back of the other panel. This complete construction may be seen in the second photograph, Fig. 3, in which the panels are shown removed from the case. Fig. 2 shows the external view of the assembled instrument.

Fig. 1 is the circuit schematic of the oscillator. The arrangement will be recognized as a simple tuned-grid, triode oscillator with inductive feedback. The feedback transformer, T, is an ordinary interstage audio unit with a turns ratio of 3 to 1. Primary and secondary polarities shown in Fig. 1 are correct for oscillation. The filament of the 1G4-GT/G tube is powered by a 1½-volt pen-size flashlight cell; the plate by a miniature, flat 4½-volt battery. A jack, J, is provided for the key or code machine.



- C₁—.01 µfd., 200 v. cond.
- C₂—.005 µfd. mica cond.
- C₃—.002 µfd. mica cond.
- C₄—.001 µfd. mica cond.
- S—Single pole, 4-pos. rotary sw.
- T—Plate-to-grid interstage audio trans. 3:1 ratio (Stancor A-63C)
- J—Open circuit jack with one pair of separate make contact springs

Fig. 1. Wiring diagram.

This is an open circuit jack with a pair of separate make-contact springs to close the filament circuit when the plug is inserted into jack J. Cord tip jacks are provided for the earphones. Oscillation frequency is controlled by the rotary switch, S, which cuts any one of the four grid capacitors into the circuit. The capacitances indicated in Fig. 1 for C₁ to C₄ give a good selection of tones. However, other values may be substituted to obtain other tones more pleasing to individual ears.

—30—

Fig. 2. Over-all view of completed code practice oscillator. Headphone and key shown connected in proper position.

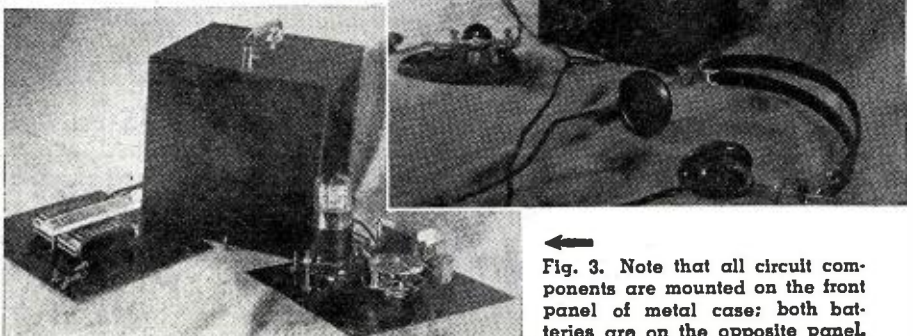
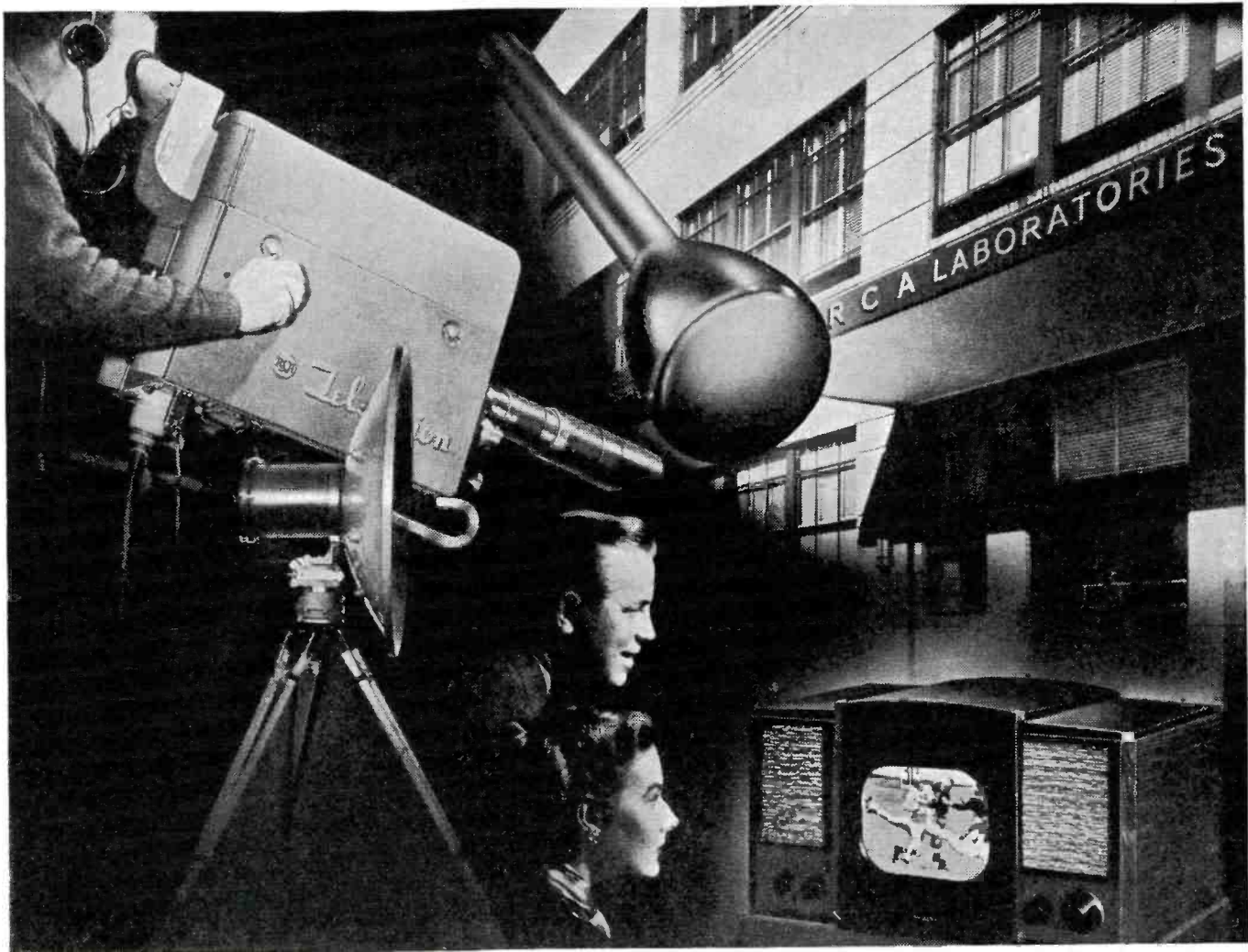


Fig. 3. Note that all circuit components are mounted on the front panel of metal case; both batteries are on the opposite panel.



Television camera, receiving tube, all-electronic receiver and radio relay equipment —are the result of pioneering and research at RCA Laboratories.

Behind every big stride in Television—RCA Laboratories!

From the scene of action—to your own living room—these RCA developments based upon research at RCA Laboratories mean *television at its finest*:

RCA Image Orthicon Camera sees whatever the human eye sees, even in the light of a match! Sports events on cloudy days or in twilight do not fade because this super-sensitive camera eliminates the need for strong lighting.

RCA Mirror-backed Kinescope—search-light brilliance for home television. All the lifelike realism and detail caught by the RCA Image Orthicon Camera is reproduced by this new receiving tube that loses none of the original brilliance.

RCA Victor Television Receiver—with the new RCA exclusive “Eye Witness” feature that “locks” the picture, keeps it bright, clear—as steady as a picture on the wall.

RCA Radio Relay equipment enables television stations to broadcast events taking place far from the studio, and eventually may link television networks. In television, as in radio, Victrola* radio-phonographs, records, or tubes, if it bears the name RCA or RCA Victor, it is one of the finest instruments of its kind science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P. M., Eastern Time, over NBC. *“Victrola” T. M. Reg. U. S. Pat. Off.



RCA VICTOR table model television receiver with the exclusive “Eye Witness Picture Synchronizer” that assures you *brighter, clearer, steadier* pictures. It is now available in some areas—see your local RCA Victor dealer.



RADIO CORPORATION of AMERICA



ESSE Specials!

SCR-522 100-156 Mc. RECEIVER AND TRANSMITTER

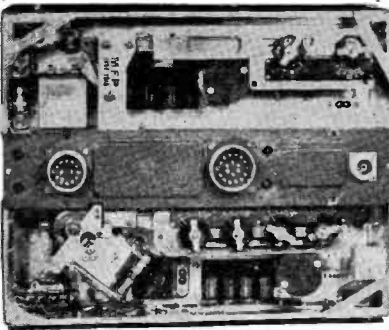
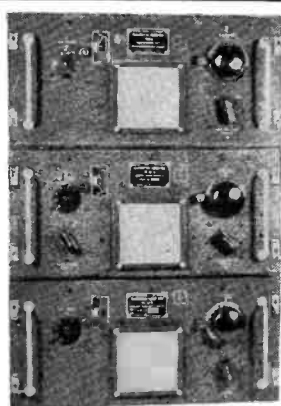
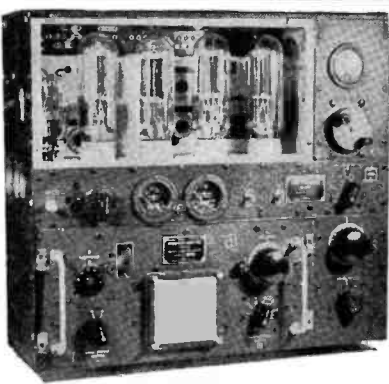
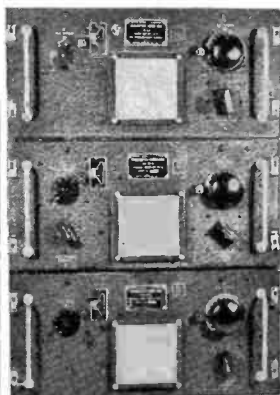
One of the most interesting and useful pieces of surplus equipment. Designed for plane and ground station use, this unit offers remote control of any four pre-selected crystal controlled frequencies in the spectrum of 100-156 Mc. This spectrum covers facsimile, air navigation aids, airport control, railroad, police, urban telephone, as well as the amateur band 144-148 Mc. October Radio News gives details for converting the SCR-522 receiver section, BC-624. Transmitter section, BC-625, is voice amplitude modulated and has an output of 8-9 watts.

Tubes used and included: 2-832, 3-12A6, 1-6G6, 2-65J7, 1-12J5GT, 3-12SG7, 1-12CC8, 1-9002, 3-9003, 1-12AH7GT.

These units were removed from planes but are guaranteed and are shipped in operating condition, including tubes, control head, and cable plugs ready to connect to dynamotor or other power supply.

Weight, 49 lbs. Shipping weight approx. 65 lbs.

Price.....\$39.95 each



TELRAD MODEL 18-A FREQUENCY STANDARD

Measures signals 100 Kc.-45,000 Kc., with check points at 10, 100, and 1,000 Kc. with a high degree of accuracy. Power supply is self-contained for operation from 110, 130, 150, 220, and 250 V. 25-60 cycles AC.

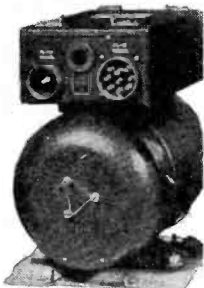
Complete with tubes, dual crystal, and instruction book.

Brand new, in original carton....\$24.95



BC-375-E GENERAL ELECTRIC MOPA TRANSMITTER

Used as liaison transmitter in bombers and ground stations. Frequency range of 200-500 Kc. and 1,500-12,500 Kc. is covered by means of 7 plug-in tuning units furnished. By slight modification operation on 10 and 20 meters is possible. Oscillator is self-excited temperature compensated type. Power amp. is neutralized class "C" using 211 tube and is equipped with antenna coupling circuit to match practically any antenna. Modulator is class "B" using two 211 tubes. Power supply is 24 V. DC dynamotor which furnishes 1,000 V. at 350 M.A. However, transformer shown on this page is ideal for construction of 110 V. AC power supply. Transmitter output conservatively rated at 42.5 watts, phone 75 watts CW, but may be pushed to 150 watts. Complete as shown with tubes, dynamotor, seven tuning units, and cable connector plugs. Removed from bombers but checked and guaranteed.



Price complete\$36.95
Weight, approximately 150 lbs.

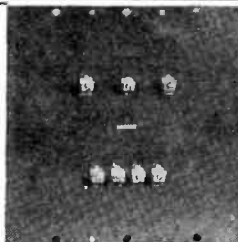
Dynamotor for 24 V. DC operation of SCR-522.....\$8.50. Wt., 39 lbs.



BC-348 COMMUNICATIONS RECEIVER

Excellent selectivity, sensitivity and stability make this the most outstanding of any receiver yet available from government surplus. This receiver will give outstanding performance wherever used. Built to withstand vibration and features gear driven 100:1 ratio vernier tuning control. Six bands—200-500 Kc. and 1.5-18 Mc. Two stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. DC dynamotor. Easily converted to 110 V. AC operation. These receivers used, but can hardly be told from new. Guaranteed operation. Models N, M, P, and Q available—please specify.

Price.....\$44.75 each



3-10 Hy. 750 ma. Swinging Choke for filtering of power. 5,000 V. insulation. Size 6 1/2" x 7 1/4" x 8".
Weight, 38 lbs.
Brand new, \$7.50 each

LS-3 LOUDSPEAKER

6" PM type, housed in heavy metal case. For use on BC-348 Receiver. Self-contained output transformer to match 4,000 ohm impedance. Used but guaranteed satisfactory.

Price.....\$7.50 each

H. V. PLATE POWER TRANSFORMER

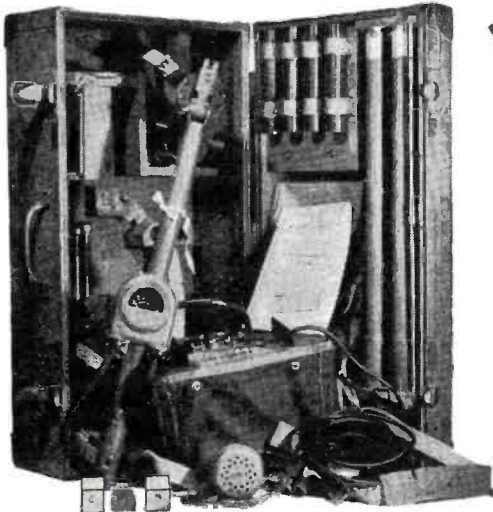
1425-0-1425 sec. at 750 ma. Pri. 110-115 V. 60-cycle, tapped for low and high power. These transformers were made for RCA equipment. Size, 10 1/4" x 10" x 8". Weight, 81 lbs.

Brand new.....\$17.50 each

TERMS:
CASH with ORDER
or 25%
BALANCE C.O.D.
All Items
Shipped Collect

ESSE Radio Company
130 W. New York St. Indianapolis 4, Ind.

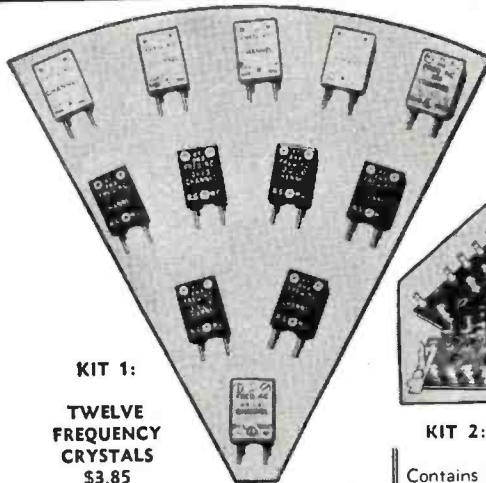
ESSE Specials!



AN/PRS-1 MINE DETECTOR

For detecting metallic and non-metallic substances by oral or visual indication. Used for locating pipes, treasure, etc. Complete as shown with spare tubes, carrying case and ready to operate by connection of batteries not included. Shipped in original overseas moisture-proof container.

Price, brand new.....\$14.95
Weight, packed for shipment, 101 lbs.

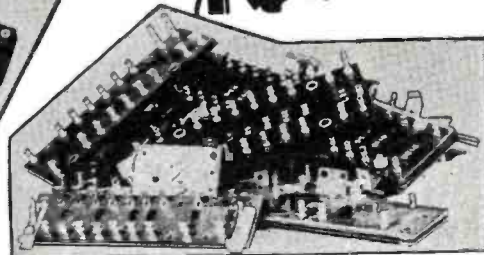


KIT 1:

TWELVE FREQUENCY CRYSTALS \$3.85

Contains assorted frequencies between 3,000 Kc. and 8,000 Kc. in FT 243 crystal holders. We pick at random from mixed supply and cannot select frequencies.

Complete Kit of 12 Crystals.....\$3.85



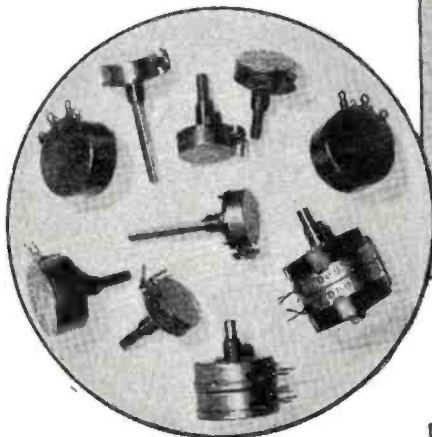
KIT 2: 25 RESISTOR MOUNTING STRIPS AND TERMINAL LUGS

Contains 9 bakelite resistor strips for mounting 2, 4, 9, 23, and 28 resistors which may be cut apart for any requirement. Also contains sixteen 1, 2, 3, and 5 lug terminal strips.

Complete Kit\$0.95

ITEMS FOR THE RADIO AMATEUR, EXPERIMENTER OR SERVICE MAN

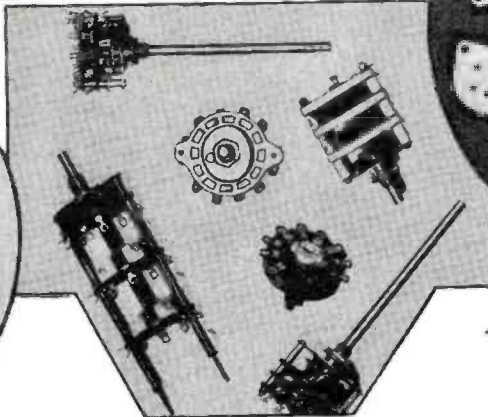
Available in kit form at a small fraction of their original cost—all brand new.



KIT 5: 10 POTENTIOMETERS

Contains 3-.5 meg. carbon with 3/8" length shaft, 2-3500 ohm carbon 1 3/8" shaft, 1-1000 ohm wire wound 3/8" shaft, 1-dual 25,000 ohm wire wound with 3/8" shaft, 1-dual 30,000 ohm wire wound with 3/8" shaft, 2-100 ohm wire wound with screw driver adjustment.

Complete Kit of 10 Potentiometers\$2.85



KIT 4: 6 ROTARY TAP SWITCHES

Contains: 1-3 pole 11 position non-shorting; 1-2 pole 5 position non-shorting; 1-6 pole 4 position non-shorting; 1-1 pole 9 position non-shorting power tap; 1 ceramic insulated special; 1-6 pole 4 position with double contact wipers on 4 poles and 2 positions on 5th pole.

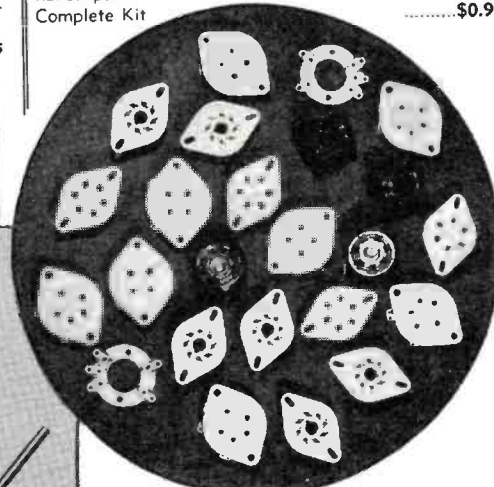
Complete Kit of 6 Switches.....\$1.85

CARBON THROAT MICROPHONE



Ideal for plane, portable, or mobile operation, also for construction of lie detectors, toys, etc. You can't afford to be without a few at the price. Adjustable elastic strap fits any neck. Works into 200 ohm impedance input circuit. Used, but in good condition.

Price.....\$0.25 each



KIT 3: 24 TUBE SOCKETS

Containing the following new Ceramic to-loss sockets: 2-Acorn, 6 octal Amphenol, 4-6 prong Millen, 4-5 prong wafer, 4-4 prong wafer, 2 molded bakelite, 2 octal female plugs and 2-7 prong tube tester sockets with center socket for checking pilot lamps.

Complete Kit\$2.35

Plate and Filament Transformer:

650 V. Ct. 150 Ma.,
6.3 V. 7.5 Amp., 5 V.
3 Amp. Secondaries, 110 V.
60 cycle AC Primary.
An excellent buy for the
set builder.
Brand New\$1.95

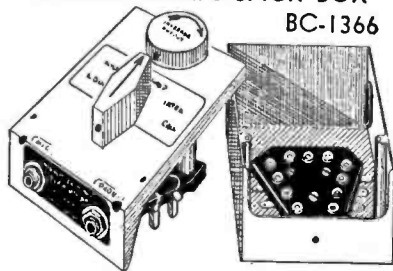


ESSE Radio Company

130 W. New York St. Indianapolis 4, Ind.

Liberty Leads in RADIO PARTS and EQUIPMENT

SIGNAL CORPS JACK BOX BC-1366



Cast aluminum box held together by 11 banana plugs; 2 jacks, 1 single and 1 double circuit, potentiometer, and double deck hand switch. Single unit 59c. Lots of 10 45c. Lots of 100 38c.

OIL-FILLED CONDENSERS

.1 MFD 3000 V (Round can)	\$1.25
.25 MFD 600 . . . . .	.10
.4 MFD 600 . . . . .	.10
.5 MFD 400 . . . . .	.10
.5 MFD 600 . . . . .	.10
.6 x.6 x.6 MFD. 90 60 cycle . . . . .	.75
.05x.05x.05 MFD. 150 V . . . . .	.75
.22x.22x.22 MFD. 300 V . . . . .	.75
1.0 MFD 400 . . . . .	.60
1.0 MFD 2000	1.50
1.2 MFD 600 . . . . .	.75
2.0 MFD 600 . . . . .	.75
2.0 MFD 1000	1.00
2.0 MFD 1500	1.25
2.0 MFD 2000	1.50
4.0 MFD 600 . . . . .	.60
4.0 MFD 1000	1.00
5.0 MFD 330 60 cycle . . . . .	.60
5.0 MFD 150 500 cycle . . . . .	.50
5.0 MFD 300 . . . . .	.50
5.0 MFD 600 . . . . .	.50
6.0 MFD 1500	1.50
7.0 MFD 600 . . . . .	.75
8.0 MFD 500 . . . . .	.60
7.0 MFD 600 60 cycle . . . . .	.60
12.0 MFD 330 60 cycle . . . . .	.50
14.0 MFD 600 . . . . .	.75
15.0 MFD 300 V . . . . .	.75
20.0 MFD 330 V 60 cycle	1.00
650.0 MFD 80 W V (Cornell Dubilier)	1.00

SPECIAL PRICES ON LARGE QUANTITIES

RECORD CHANGERS

Detroit—late model \$16.50 net
Crescent—late model \$17.50 net

RADIO KITS

6 Tube "Super Het" \$14.95
5 Tube "Super-Het" AC-DC \$12.95
Special 5 Tube "Super Het" with Slide Rule Dial \$19.95

25% Deposit with order, Minimum order \$2.00.

LIBERTY SALES CO., INC.
115 WEST BROADWAY · NEW YORK 13, N. Y.

What's New in Radio

(Continued from page 74)

ment directly proportional to G_m and a properly measuring instrument. Short and open tests of every tube element are also possible. Gas tests may run on all tubes with this instrument.



The entire unit is housed in a 10" x 10" x 5 1/4" metal case of hammered enamel finish, tan with brown trim. An attached handle provides easy portability.

The Triplett Electrical Instrument Co. of Bluffton, Ohio will provide additional information on this unit upon request.

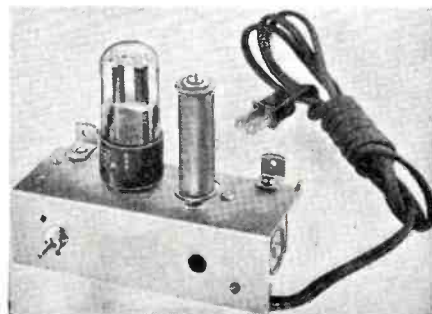
PHONO OSCILLATOR

D & M Manufacturing Company of Midland Park, New Jersey are introducing a new phono oscillator which may be used to link any record player or automatic record changer with any standard broadcast receiver.

With this unit no wire connections between the record player and the radio are required. An unusually strong signal completely blankets ordinary static or extraneous noise when the unit is located within 50 feet of the receiver.

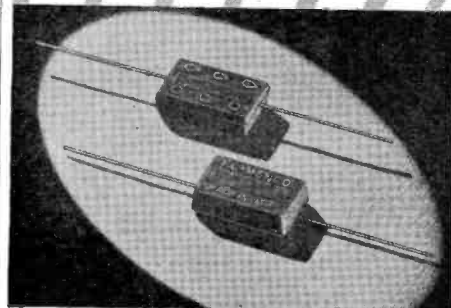
This oscillator, because of its small size, may be mounted in almost any record player. The unit weighs only 12 ounces including the tube. A dual purpose 12SL7 is used, the rectifier portion carries a load of less than 2 ma. which assures long tube life.

Transmitting frequency may be permeability tuned, by means of a slotted



screw, through a range from 550 to 1550 kc. Units are shipped tuned to 600 kc. Second harmonic transmission is equal in strength to transmission on the fundamental frequency so that in many cases the radio receiver can pick up the recorded music on

TOWARD NEW HORIZONS



Tested and proved in every important theatre of war, El-Menco Capacitors are now serving with equal merit in the products of peace. Insure the correctness of this important part of your product by specifying El-Menco Capacitors.

Write on your firm letterhead for our catalog. Foreign Radio and Electronic Manufacturers communicate direct with our export department, at Willimantic, Connecticut for information.

**THE ELECTRO
MOTIVE Mfg. Co., Inc.**
Willimantic, Connecticut

Phono-Bargains

1 Tube Phono Oscillator \$3.95
uses 117N7 GT tube (less tube)

Webster "56" Record Changer \$26.66
automatically stops after last record is played

AC-DC Phono-Amplifiers completely wired

1 TUBE uses 117L7 \$2.06
2 TUBE uses 50L6 & 35Z5 2.94
3 TUBE uses 50L6-12J5-35Z5 3.53
4 TUBE uses 12SL7-35Z5-35L6-35L6 5.29
(less tubes, speaker & volume control)

Phono Motors with Turntables \$3.49

2 Post V.M. Record Changer \$17.95
3 for \$52.00

Portable Phonograph Case

Two-tone Leatherette finish, dimensions
15 3/4" L x 14 3/4" W x 8" H \$9.95

Portable Automatic Phonograph Record-
Changer Case \$14.95

TEST EQUIPMENT

McMURDO-SILVER "VOMAX"
volt-ohmmeter \$59.85

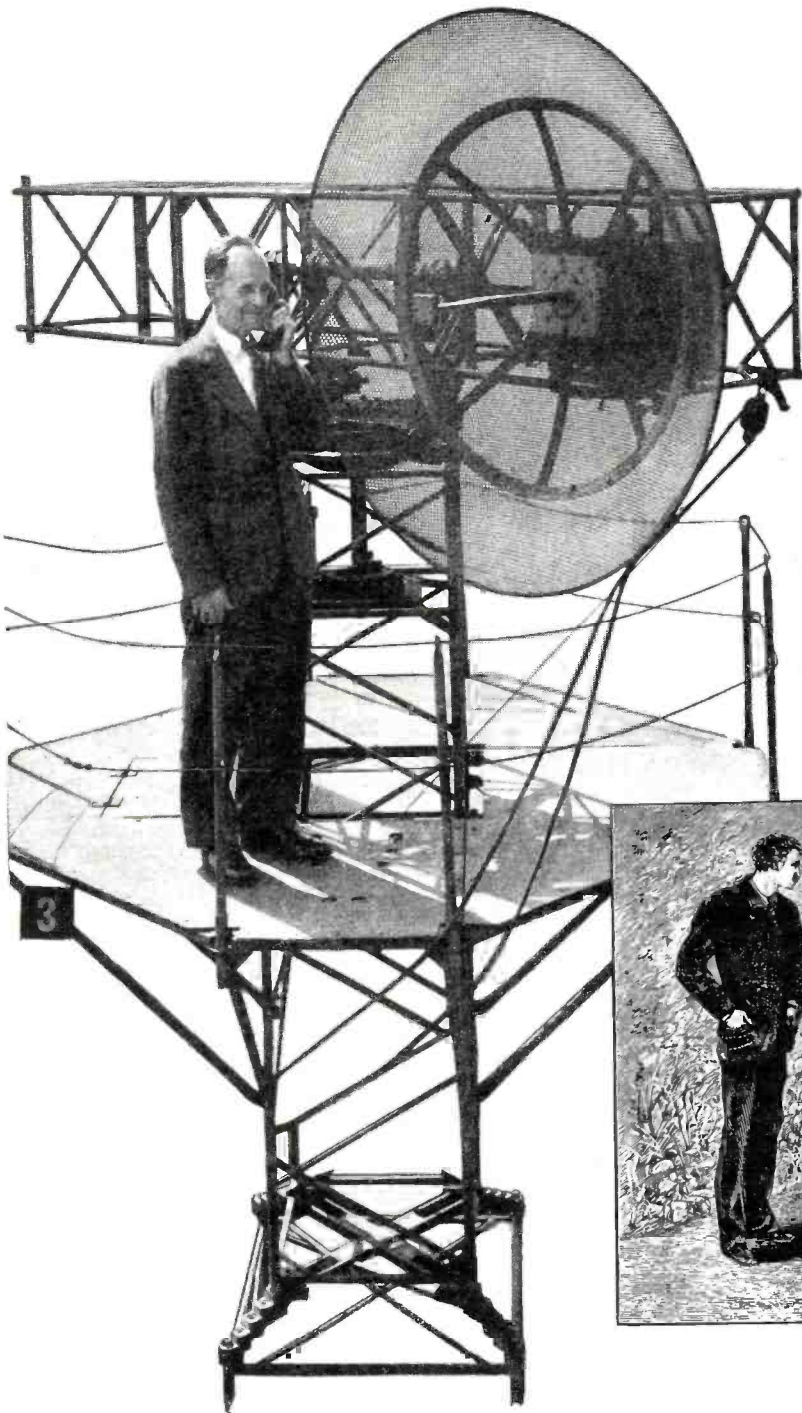
McMURDO MODEL 905 "SPARX"
signal tracer \$39.90

All items subject to prior sale

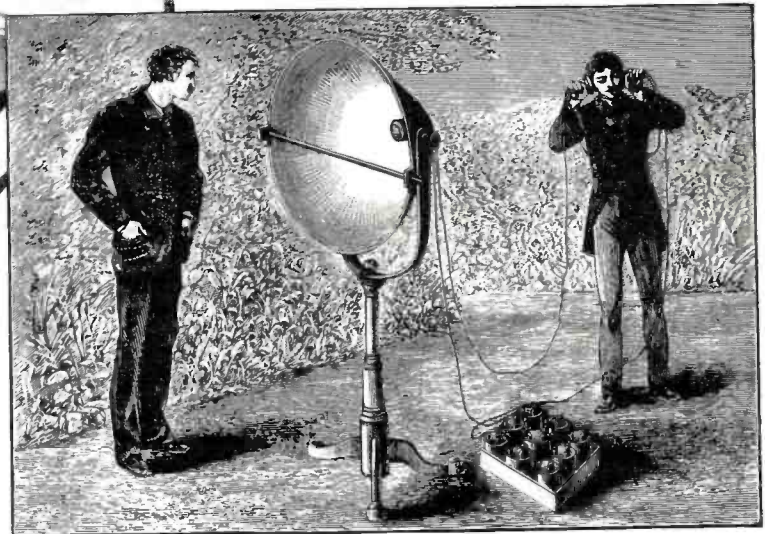
20% with order, balance C.O.D. We prepay express on \$50.00 orders in U.S.A.

ELECTRONIC PARTS, Inc.
Dept. A2

622 W. Randolph St. Chicago 6, Ill.



Words that rode on a beam of light



IF Alexander Graham Bell could look at the microwave antenna in the illustration, how quickly his mind would go back to his own experiments, 67 years ago!

For in 1880 the inventor of the telephone had another new idea. Speech could be carried by electric wires, as Bell had demonstrated to the world. Could it be carried also by a *light beam*?

He got together apparatus—a telephone transmitter, a parabolic reflector, a selenium cell connected to hand-phones—and “threw” a voice across

several hundred yards by waves of visible light, electromagnetic waves of high frequency.

Bell's early experiment with the parabolic antenna and the use of light beams as carriers was for many years only a scientific novelty. His idea was far ahead of its time.

Sixty years later communication by means of a beam of radiation was achieved in a new form—beamed

microwave radio. It was developed by Bell Telephone Laboratories for military communication and found important use in the European theater. In the Bell System it is giving service between places on the mainland and nearby islands and soon such beams will be put to work in the radio relay.

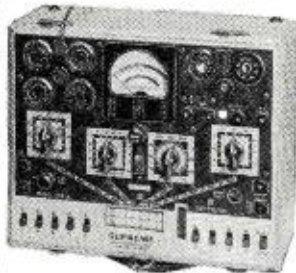
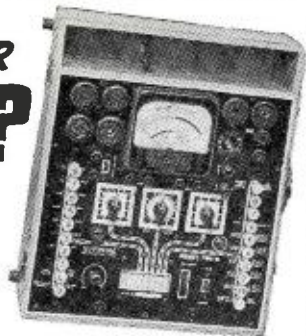
In retrospect, Bell's experiment illustrates once again the inquiring spirit of the Bell System.

BELL TELEPHONE LABORATORIES



HAVE YOU RECEIVED YOUR SUPREME?

While our production has not yet caught up with the heavy demand for SUPREME Testers, it is steadily increasing.



If you have not received your SUPREME Tube Tester, Set Tester, Oscillator, Oscilloscope, Multi-Meter, check with your Authorized SUPREME Distributor.



Big new catalogue now ready. For complete description of all SUPREME Testers, and Panel Meters, write today.



EXPORT DEPT. THE AMERICAN STEEL EXPORT CO., INC.
374 MADISON AVE., NEW YORK 17, N. Y.

SUPREME INSTRUMENTS CORP., GREENWOOD, MISS., U.S.A.

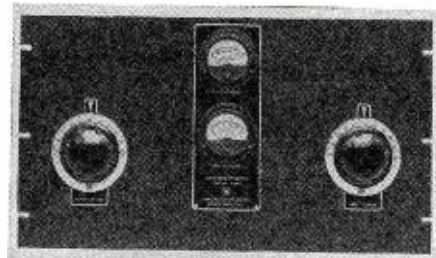
either of two settings without retuning the phono oscillator. The unit operates on 115 volts, a.c. or d.c., and includes a built-in scratch filter.

This oscillator is a product of the *D & M Manufacturing Company*, 51 Lincoln Avenue, Midland Park, New Jersey.

R.F. POWER AMPLIFIER

Of interest to the amateur is the new 500 watt r.f. power amplifier unit which has just been announced by the *James Millen Manufacturing Company* of Malden, Massachusetts.

This amplifier may be used as the basis of a high power amateur trans-



mitter or as a means for increasing the power output of an existing transmitter.

As shipped from the factory, the No. 90881 r.f. power amplifier is wired for use with *RCA* or *G.E.* 812 type tubes, but adequate instructions are furnished for readjusting for operation with other types of amateur transmitting tubes such as the *Taylor TZ40*, *Eimac 35T*, etc.

The amplifier is mounted on a 10½" relay rack panel. The panel contains the grid and plate tank tuning capacitor dials, as well as the grid and plate current milliameters. Plug-in inductors are furnished for operation on 10, 20, 40 or 80 meter amateur bands.

Additional details will be furnished by *James Millen Manufacturing Company*, Malden, Massachusetts.

PORTABLE PHONOGRAPH

Sonata Electronics Corporation of Chicago is currently offering their battery-operated, electrically amplified portable phonograph to the trade.



Known as the *TRELA HW-301*, this model plays records equally well indoors or out. The tilt-panel front and special battery amplification provide sufficient volume and clarity to permit it to be used on the beach or in a large

7 Days Free Examination

PRACTICAL RADIO INFORMATION

Including Frequency Modulation—Television, etc. Inside Radio Information for all Servicemen—Aircraft Pilots, Students. **AUDELS RADIO-MAN'S GUIDE** contains 772 Pages, 400 Diagrams & Photos is complete—gives Authentic Principles & Practices in Construction, Operation, Service & Repairs. Covers clearly and concisely Radio fundamentals—Ohm's Law—Physics of sound as related to radio science—Measuring Instruments—Power supply—Resistors—Inductors—Condensers—Transformers and examples—Broadcasting stations—Radio Telephony—Receivers—Diagrams—Construction—Control systems—Loud speakers—Antenna systems—Auto Radio—Phonograph pickups—Public Address Systems—Aircraft & Marine Radio—Radio Compass—Beacons—Automatic Radio Alarms—Short Wave—Coil Calculations—Testing—Cathode ray oscillographs—Static Elimination—Trouble Pointers—Underwriter's standards—Units and tables—Frequency Modulation—**REVIEW QUESTIONS & ANSWERS**, Ready Reference Index.

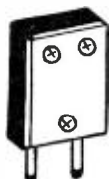
\$4 COMPLETE • PAY ONLY \$1 A MO. Get this practical information in handy form for yourself—Fill in and MAIL COUPON TODAY—

AUDEL, Publishers, 49 W. 23rd St., N.Y. Mail AUDELS NEW RADIO-MAN'S GUIDE for free examination. If O.K., I will send you \$1 in 7 days; then remit \$1 monthly until \$4 is paid. Otherwise I will return it.

Name _____
Address _____
Occupation _____
R. N.

POTTER'S BARGAINS

We still have



80 Meter XTALS
74¢
with holders

3,600 to 4,000 KC. Specify frequency to nearest 10 KC., and first and second choice. Large holders.

OUR NEW LOW PRICED CRYSTALS

80 Meters, Your frequency within 2 KC. \$1.49
40 Meters, Your frequency within 2 KC. 1.79
20 Meters, 3rd Harmonic Oscillators. 2.49
1816-1856 KC. for F.M. 2.49

The new crystals are in FT243 holders. All are made to your order. Please allow 10 days for delivery.

Crystal Finishing Kit

Consists of the following:
2 blanks to be ground to 80 meters.
2 blanks to be ground to 40 meters.
2 crystal holders for above.
2 grades of lapping compound.
Instructions for finishing.

SPECIAL 79¢

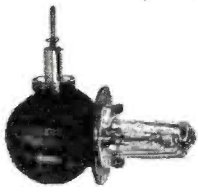
Rough Blank Kit No. 1, 12 rough blanks, well assorted as to thickness so as to finish to various frequencies. Special.....79¢

10 assorted crystal holders. Thousands sold and still going strong. Only 99¢. Postage 3 lbs. extra.

POTTER RADIO CO.

1312-14 McGee St., Kansas City 6, Mo.

MICROWAVE PARTS AND EQUIPMENT



Magnetrons!!
Type 2J32 (JAN.) just released. The 2J32 is designed for 10 cm. operation. Rated at 300 kw peak pulse power. Complete information supplied. Brand new, packed in individual protective cartons. The 2J32 is listed at \$200.

OUR PRICE \$25.50
3J31's just received. One cm. magnetron listed at \$95.00.
OUR PRICE 18.95
KLYSTRON oscillator tubes 2K25/723ab, designed for 3 cm. operation. New. Packed individually. Listed at \$38.00 7.75
1B24 T-R Tube (with complete information) 2.98
Duplexer using 1B24 10.00
30 mc oscillator-amplifier with 2 6AC7's. Uses 723ab, Waveguide input, xtal detector. With 6AC7's with 6AC7's and 723ab 16.50
Thermistor Beads (D-170396), for use with UHF and Micro-Wave Equipment (List \$3.00). In separate sealed containers95

3 CM WAVE GUIDE SECTIONS

Silver Plated Narrow Band Directional Couplers with a 20 DB drop with:

- A. Straight wave guide section 6" . . . \$ 3.95
- B. 15° bend in wave guide 15" 5.90
- C. 30° bend in wave guide 10" long. . . . 4.75
- D. 90° bend in wave guide 15" long also 90° bend in coupler. 6.50

SECTIONS

- E. T Section with choke terminations . . . 6.00
- F. 2 1/2 foot silver plated with 90° bend (2" radius) 5.50
- G. 150° bend with 90° twist 3 1/2" radius with pressurizing nipple and coax coupler 3.95
- H. 2 1/2 foot 3 cm wave guides choke to cover fitting 4.95
- J. 5 foot 3 cm wave guide section per foot 1.95
- K. Feed Horn 3 cm. 3.50

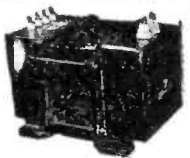


PLATE TRANSFORMER MADE BY YAMERTMAN. 115 v. 60 cycle primary. 6200 volt-ct-700 mill sec. secondary. Size 11"x14"x10" . . . \$39.95
1/2 WAVE RECTIFICATION TRANSFORMER. 115v-60c/3200v @ 150 mls. MADE BY KENNYON . . . \$7.25

CHOKES

- 12hy-12 hy @ 150 ma., 15 amp. rating. each price \$4.25
- 15 hy @ 165 ma 200 ohms DCR. Price . . . 2.00
- 59 hy @ 100 ma 850 ohms DCR. Price . . . 2.00
- 2.6 hy @ 800 ma stud and terminals at bottom 5.95

NEW POWER SUPPLY for LM-18 freq. meter. Output: 290 v. at 20 ma; 13 v. at 600 ma. Input: 105-125v. at 60 cps; 260 ma; 27.6 W. type 84 rectifier tube; shock mounted. Complete with input and output cables; tube included . . . **\$14.75**

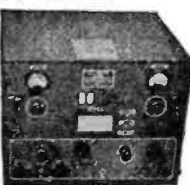
OHMITE WIRE WOUND RHEOSTATS

- Model H 250 Ohms 25 Watt \$0.98
- Model H 125 Ohms 25 Watt98
- Model J 6 Ohms 50 Watt 1.25
- Model J 1800 Ohms 50 Watt 1.25
- Model K 3600 Ohms 100 Watt 2.25
- Model L 250 Ohms 150 Watt 3.00
- Model N 22 Ohms 300 Watt 3.00
- Model P 1200 Ohms 225 Watt 2.75

NEW USN NAVY MODEL RAK-7

SHIP RECEIVER

15 kc. to 600 kc. 6-tube receiver with: AVC-Band pass filter-Audio filter - Noise limiter - Precision tuning with a Vernier dial - Voltage regulated power supply with three tubes, for 60 cycle, 115 volts. Can be battery operated. Complete with spare parts box weighing 73 lbs., spare tubes and inst. book. . . . **\$69.50**



KILOWATT KOMPONENTS!

SONAR SOUND DETECTION UNIT!!!

Ideal for detecting underwater sounds, such as fish swimming in schools, within a 15 mile area. Using a Rochelle salt crystal, which is about 1000 times more sensitive than quartz, as the active unit the sound is transmitted up to a 60 ft. length of cable. It is completely enclosed in a solid rubber sheath. This sound detector was originally used in harbor defense. Coupled to an audio amplifier, this can be found to have many valuable applications. Ask for SD-1. **\$9.95**

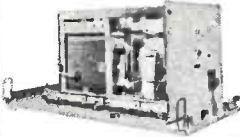
PULSE AMPLIFIER

Signal Corps type BC409. Designed for 115 volts. AC 60 cycles. Component parts worth several times the price of this unit. Slightly used. Following are a few of the items that make up the unit.
1-304TL (Elinac)
1-3200 volt. 4,000 W.V. GE Pyranol condensers.
1-3200 volt. 150 MA power transformer.
1-Variac 5 amps. General Radio type CU-200.
1-5 volt. 26 Amp. fil. transformer (for 304 TL).
1-2.5 volt. 10 Amp. fil. transformer (5000 volt insulation).
1-1 mfd. 1,000 volt. GE Pyranol.
1-2 mfd. 1,000 volt. GE Pyranol. **\$59.50**



RA-58-A HI-VOLTAGE POWER SUPPLY

Ideal for breakdown insulation testing, or as a source of power for a pulse transmitter. This unit supplies continuously variable voltages between 500 and 15,000 volts DC at 35 ma. A voltage doubler circuit using two 705A rectifiers and two 1 mf condensers is employed. RMS ripple voltage at maximum power is 6%. THIS UNIT OPERATES FROM 115 v/60c. Variable voltage is obtained by means of a Variac in the primary circuit of the high voltage transformer. Size is 21"x17 1/2"x29" deep. Net weight 314 lbs. This unit sells for the low price of. . . . **\$116**



SPECIAL ITEMS

- Filament transformer 115v/60 cps Input; 6.3v @ 1.6 amps/6.3v @ 1.6 amps Output. 25,000v Air insulation. KS-8767 \$3.95
- Tube shields for 2A1.98
- Transmitting key; 200 watt.79
- Hook-up wire, stranded, 100 ft.95
- Mycalex strips, 1/4"x3/4"x14 1/2", ea.10
- 12 for \$1.00. Minimum order.60
- Hand generator type GN-45B. Output: 6v-3a/500v-.14a, rated speed 60 cps. 5.95
- Antenna loading coil, Heavy duty, with six (6) variable taps, 6 3/4" long x 1/4" dia. 2.95
- Visor for 5" scopes.75
- Broadcast band push-button tuning units. Inductive and capacity types. 1.98
- Matched pair precision resistors, 6.33 megs. . . 1.50
- Completely punched chassis for 2 inch scope, with some sockets 1.50

B-29 Computer Amplifier, containing 8 JAN6SN7 amplifier tubes, 1-6X5 GT 8-relays, 5-neon glow lamps, completely wired amplifier circuit with many components. This fine amplifier was designed for use with remote controlled guns. This buy sells for. **\$9.95**

Low Voltage Power Supply for AN/AP5-10, using 3-6X5 GT's, and 1-9006, complete with 6 chokes, 1 power transformer, and filter condensers. **\$4.50**

All merchandise guaranteed. Mail orders promptly filled. All prices F.O.B. New York City. Send Money Order or Check. Shipping charges sent C.O.D.

COMMUNICATIONS EQUIPMENT CO.

131-A Liberty St. New York City 7, N. Y.

Telephone WH 4-7658

A. C. RELAYS

- DPDT 10a contacts. 115v/60 cps. coil Allied \$1.79
- SPST 5a. ac: 115v cont. 115v/60 cps. 1.49
- SPDT contacts: 5a coil rated 115v/60c 1.39
- DPDT 115v/60c. cont. rating 5a @ 50v. . . . 1.69
- DPST Telephone type; 2p. 1 cl; 1 open; cont. rating. .5a @ 50v. coil rating 3.5 ma (@ 12K ohms) 1000 vac. 1.05
- DPDT Stellite Insulated 10A Silvered Contacts. Made by Leach 1.95



1-F Crystal filter for BC-312. BC-342. Resonant at 470 kc. Crystal included. **\$6.95**

OIL-FILLED CONDENSERS

- 500 mf 200 vdc. \$1.95
- 2000 mf 50 vdc. 2.25
- 4000 mf 30 vdc.25
- 1 mf 300 vdc.30
- 2 mf 300 vdc.35
- 4 mf 300 vdc.55
- 4 mf 400 vdc.55
- 1 mf 600 vdc.35
- 2 mf 600 vdc.40
- 3 mf 600 vdc pyr.65
- 4 mf 600 vdc pyr.70
- 6 mf 600 vdc pyr.95
- 10 mf 600 vdc pyr. 1.49
- 15 mf 300 vdc.90
- 1 mf 1000 vdc.90
- 2 mf 1000 vdc. 1.10
- 1 mf 1500 vdc. 1.20
- 4 mf 1500 vdc.30
- 2 mf 600 ac/1000 vdc.95
- 2 mf 4000 vdc. 5.95
- 1-1 mf 7000 vdc. 4.95



- G.E. Pyranol 23F47 2mf 4000v List \$30. \$5.95
- G.E. Pyranol 23F49 1mf 5000v List \$27. 4.75
- C-D TC-50010 1mf 5000v List \$30. 4.50
- G.E. 14F191 .1mf 1000v List \$37. 6.75
- G.E. Pyranol .06 mf 15,000 vdc. List \$25. 5.95
- G.E. 14F136 Pyranol .75 mf 20 KV DC. \$22.00

SANGAMO MICA CONDENSERS

- F3L .0003 mfd 8000v list \$29. \$3.75
- F3L .0015 mfd 8000v list \$31. 4.00
- Solar type SX .0015 mf 3000v-list \$9.95. .75
- Sangamo G-4 .004 mf 20kv (List \$110) \$25.50
- Sangamo G-3 .006 mf 10kv (list \$87.50) 19.50

A. VHF Variable Condenser. 15-60 mmf. 3/8" air gap. 11 rotor plates. 6 stator, with feedback provision. Designed to operate in a tuned grid, tuned filament circuit. Listed at \$148. Our price. **\$10.95**

B. Split Stator. Cardwell PK-200-QD; 30-200 mmf per section. Special Hi-Volt. **\$9.95**
Listed at \$60.

C. Johnson Type 500D35. Maximum cap. 500 mmf., min 35 mmf., .08" spacing. 3500v. Listed at \$11.75. Lowered to. **\$4.75**

SILVER BUTTON MICA CONDENSERS

- stud. mtg. (Erie/Centralah.) 175-180-185-245-335 mmfd 400 vdc, each. . . . \$0.05
- lots of 100 4.50

AUDIO TRANSFORMERS

- Line to Voice coil transformer. Pri. 600 ohms. Sec. 6 ohms. 1200 Test volt. . . \$1.75
- Audio output transformer Split pri. 1500 ohms each side. Secondary impedance 85 ohms center tapped-6:1 ratio. 100 Watts output 7.50
- Modulation xfmr: typical for 211's (C.L.A./ 30V) 1.35
- Modulation xfmr: 807 to pr 807's in parallel 1.00
- Modulation xfmr: pr 811's to 813. 5.00

TUBE BUYS!

Tube Type	Approx. List	Your Cost
3BP1	\$15.00	\$ 3.95
3FP7	27.00	2.98
5BP1	20.00	4.95
5CP1	45.00	4.95
5CP7	48.00	4.95
5FP4		4.95
5FP7	32.00	4.25
5JP2	48.00	8.95
837	2.80	1.50
872A	7.50	3.50
705A	22.50	7.50
211B-WE	85.00	50.00
2C40	155.00	95.00
2C40		5.95
2C43		8.95

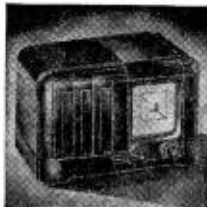
Sockets for 5CP1, 5BP1, 3BP1, 705A, 829, and 723 A/B tubes. \$9.95 ea.

SELSYN MOTORS

Ideal for remote control, or for antenna rotation. Size 5G. 115 V/60 cps. Cost per pair. **\$7.75**

BUILT-IN QUALITY
 Made Our Famous
RADIO & PHONO KITS
 A National Success!
 THE IDEAL KITS FOR
 STUDENTS • SCHOOLS
 HOSPITALS • SERVICEMEN
 AMATEURS

NEW!



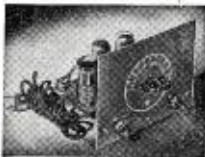
S-5 (Illustrated)...Complete Kit including tubes, Bakelite cabinet and instructions.

Our Model S-5 uses the universally accepted superheterodyne circuit containing the following tubes: 12SA7, 12SK7, 12SQ7, 50L6, 35Z5 and tunes from 550 Kc to 1600 Kc. Model



Complete and ready for assembly.

Model S-6X, our latest, a 6-tube 2-band receiver kit, equipped for either 110 or 220 volts, AC or DC...covers the following ranges:
 550 Kc
 1600 Kc
 6-16 Mc



Our model R-3 is a 3 tube Receiver of the Regenerative type. This receiver is the 110 volt type and operates at a frequency of 550 Kc to 1500 Kc by means of a plug-in coil. The power supply is self contained in the receiver thus eliminating the need for a separate power pack. This kit comes completely disassembled.



New! Sensational!
**COMBINATION
 RADIO &
 PHONO KIT**



- 5 tube superheterodyne radio
- Beautiful walnut finish cabinet
- 5" Alnico V Speaker
- Astatic L-72 pick-up

Ready for assembly.

**All Kits Are Furnished Complete,
 Less Wire & Solder**

Direct Shipments to All Parts of the World! 25% Deposit on C.O.D. Orders
 Write for FREE Catalog.

RADIO KITS COMPANY

Dept. K
 120 Cedar Street, New York 6, N. Y.

hall. The model is hand-wound by means of a special disc and plays two records with one winding.

The cabinet is covered with leatherette and is equipped with a sturdy handle. The total weight of the unit is about 21 pounds.

Sonata Electronics Corporation, 624 South Michigan Avenue, Chicago, Illinois, will supply additional details on this item.

FEILER STETHOSCOPE

Feiler Engineering Co. of Chicago have introduced their new signal tracing "Stethoscope" which has been designed to facilitate servicing of radio receivers by cutting down time expended to located parts failures, inter-



mittents, noise, mistracking, low sensitivity causes and distorted tone.

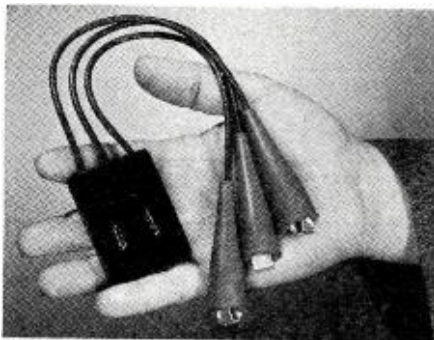
Available in two models, the TS-2 battery operated and the TS-3 a.c. operated, this unit is completely portable and utilizes low current drain miniature type vacuum tubes.

A new type probe, 1" in diameter and 4 3/8" long, is made of aluminum and houses a miniature tube, isolating network and associated circuits for the special detector-amplifier.

A data sheet covering both of these models will be forwarded upon request to Feiler Engineering Co., 803 Milwaukee Avenue, Chicago 22, Illinois.

POLYVOLTESTER

Fox Valley Instrument Company has announced a new pocket test instrument which distinguishes between directions of phase rotation; 220 and



110 volts, a.c. or d.c.; a.c. and d.c. and identifies positive and negative wires on d.c.

Known as the Polyvoltester, this unit is characterized by rugged construction and imperviousness to damage regardless of how the instrument

is connected to any of the systems mentioned above.

In operation, the unit features no switches to turn, no metal to touch, no meters to read and no moving parts to wear out.

Further details of this unit will be furnished by Fox Valley Instrument Company, Box 603, Ingleside, Illinois.

-30-

10-Meter Converter

(Continued from page 56)

If a standard 1500 kc. i.f. is available, one of its sections may be used for the primary of T_1 , with a jumble winding for the secondary.

The coils L_1 , L_2 , L_3 , L_4 are wound on one and one-half inch lengths of one-half inch outer diameter polystyrene tubing. Bakelite tubing would have served just as well. L_1 consists of twelve turns of No. 18 enameled wire, wound to a length of 3/4", with L_2 consisting of two turns of number 32 d.s.c. around the cold end. This primary is designed for use with a low impedance antenna, and if 300 ohm line or some similar feeder is to be used, L_2 should be increased to 4 turns.

L_3 is seven turns of number 18 enameled wire with a winding length of 1/2", with L_4 being three turns of number 32 d.s.c. It is important that L_4 be wound in the same direction as L_3 or the oscillator will not function.

In mounting the tube socket care should be taken to orient the socket so that pins number 3 and 4 are toward the front of the chassis. This will insure the shortest leads and greatest ease in wiring.

The trimmer condensers C_2 and C_3 are mounted under the chassis on either side of the tube socket. Placement of other parts may be seen from the photos.

For ease in tuning, a 2" diameter dial pulley from an old receiver was fastened to the shaft of the tuning condenser, and driven by a length of dial cable from a shaft and panel bearing assembly.

Switching from regular operation of the receiver to operation with the converter is accomplished by means of the d.p.d.t. switch, S_1 . A short length of coaxial cable runs from this switch, out through the back of the chassis for input to the antenna and ground terminals of the receiver. Input to the converter is through a standard microphone connector.

A pointer from a small radio is fastened to the condenser shaft in front of a piece of opaque celluloid to indicate the frequency.

The case for the complete converter is constructed from the same material as the chassis, and measures 4" wide, 3 1/4" high, and 4 1/4" deep. The rear cover is fastened permanently in place by means of small sheet metal screws, while the front cover is held to the chassis by means of locknuts on the switch and tuning shaft. This front cover has a 1/2" lip all around. The

McGEE'S MILLION DOLLAR WAR SURPLUS SALE

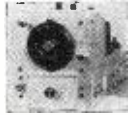
8000 PIECES IN STOCK—AIRCRAFT TRANSMITTERS—RECEIVERS—MODULATORS I.F.F., ETC.

McGee's Big 3 month clearance sale (Feb., Mar., April). Over a million dollar stock of war surplus (Gov't. cost). No priority needed; order now. Send 25% deposit; balance sent C.O.D. Canadian and American Possession customers send full remittance and ample postage. All prices F.O.B. Kansas City, Mo. Phone Victor 9091.

BIG SCOOP! WESTERN ELECTRIC AIRCRAFT SURPLUS

Aircraft Receivers

These Army surplus aircraft receivers may be operated from a 24 volt AC filament supply and any lowpower 250 volt B supply; or the tubes changed to the 6 volt type. There is plenty of room for a power transformer and rectifier tube; in place of the dynamotor. This receiver is very selective and sensitive; has RF stage and BFO. Made by Western Electric and you never saw finer wiring. Offered complete with tubes; 12K8, 3-12SK7, 12SR7 and 12A6, but less 28 volt dynamotor. Specify the frequency you desire. We have about 1500 available.



- BC-454-B Superhet Receiver 3 to 6 MC. Your Cost\$9.95
- BC-453-B Superhet Receiver 200 to 500 KC. Your Cost\$9.95
- BC-455-B Superhet Receiver 6 to 9 MC. Your Cost\$9.95
- Very special: All 3 of the above receivers; with shock mounting rack.....\$27.95
- 28 volt dynamotor (snaps on receiver chassis) \$1.95 3 for.....\$5.50

BC-456-E Western Electric Modulator Unit

Companion unit of BC-457-A and BC-458-A. Complete with 12J5 and VR150 and 18Z5. Gives necessary output to modulate above transmitters. We have a few more modulators than transmitters and are offering them at a ridiculously low price. You can salvage many parts from this modulator unit. Offered complete with tubes. Very special \$4.95. 3 for \$13.95. Dynamotor 28 volts input; 250 volts 160 MA output continuous. Snaps on modulator \$3.95 each; 3 for \$10.95.



This is the Ham's Delight—Army Aircraft Transmitters

BC-457-A 4 to 5.5 MC
BC-458-A 5.3 to 7.5 MC

This really fits the ham's dream. Ideal for a 55 watt transmitter with 575 volts at 250 MA plate supply, or VFO to drive a high power rig. It's a companion unit to the 454-455-453 series aircraft receivers. Made by Western Electric and really rugged. The oscillator will hold the frequency, even under rough operating conditions. Has 12J5 3L O. and 2-18Z5 (807) in parallel as final P. A.; or buffer to feed into a high power rig. Built in crystal dial calibration checker. Antenna loading inductance. Complete conversion data to VFO or FM oscillator is covered in CQ magazine; May '46 issue. Why not use this for your VFO? It's a real buy. 1000 to sell; at the ridiculous price of \$14.95; with tubes. BC-457-A Transmitter 4 to 5.5 MC. Complete with 4600 KC crystal.Your Cost \$14.95
BC-458-A Transmitter 5.3 to 7.5 MC. Complete with 6200 KC crystal.Your Cost \$14.95
Special. Both of above on shock mounting rack\$28.95
20 to 10 antenna current meter in case; ideal for loading above transmitter.Each \$2.95



ARMY BC-645 I.F.F.



ARMY BC-645 I.F.F. UNIT. Net \$16.95. Early in the war, when radar picked up a plane, there was no way of knowing whether it was friendly or not. That was before BC-645 was invented. BC-645 sent out a signal that identified the plane as American. It probably saved more lives than any other piece of electronic equipment made. With some modifications the set can be used for 2-way communication, voice or code, on the following bands: ham band 420-450 mc., citizens radio 460-470 mc., fixed and mobile 480-480 mc., television experimental 470-500 mc. Equipment capable of doing the jobs of the modified set sells for hundreds and hundreds of dollars. The 15 tubes alone are worth more than the sale price. 4-7F7, 4-7H7, 2-7E6, 2-6F6, 2-955 and 1-We316A. It now covers 460 to 490 mc. Each BC-645 is shipped with a Belmont factory printed conversion diagram, showing how to make AC power supply modulator and how to make Transmitter and Receiver changes. Most Hams and experimenters already have the few parts necessary. New BC-645 with tubes less power Supply.....\$16.95

SENSATIONAL SURPLUS BUY.



BC-654-A. Transmitter-Receiver 12 watts CW. 8 watts phone. 3800 to 5800 KC \$19.95. Used but in apparently good order. Offered with 3-307A tubes but less receiver tubes. The 7 tube superhet receiver has 2 RF stages. Designed for 1 1/2 volt octal tubes. Could be converted to heatable tubes. Has built in 200 KC crystal calibrator. The 200 KC crystal and 0-3 RF thermocouple ammeter and 3-307A tubes are worth the price we are asking for the whole unit. First come first served. BC-654-A transmitter-receiver less power supplyNet \$19.95
BC-654-A Complete with all tubes and spare tubes. Net \$24.95. 2 for \$47.50.

RADIO-PHONO COMB. KIT



Build this beautiful portable combination radio phonograph. We furnish everything. Beautiful two tone portable case, latest rim drive phono motor, Astatic crystal pick-up. All parts to build high quality 5 tube AC-DC radio. Tubes broadcast 550 to 1650 KC, has tone control, loop antenna. 6" Alnico 5 PM speaker. Tubes 12SA7, 12SK7, 12SQ7, 50L6 and 35Z5. Simple diagram furnished. Kit Model RP-12.....Your Cost \$29.95

Beautifully made, highly polished walnut cabinet with hinged lid. Plays 10" records with lid closed. Latest rim drive phono motor and high output Astatic crystal pick-up. High power JT-5 push-pull 3 tube AC-DC phono amplifier (wired and tested). Heavy duty 5" Alnico 5 PM Speaker. Single record player kit Model WL-3.....Your Cost \$19.95



Snyder top quality auto antennas all have 36" shielded lead in. Individually packed.
3 Section Side Cowl 66" C-3L.....Net \$1.79
4 Section Side Cowl 100" C-4.....Net 2.49
3 Section Fender Cowl only 8" closed, 55" extended FC-4Net \$3.95
4 Section Deluxe swing angle.....Net 2.69
Teeny Weeny I.F. Trans. 456 KC 3/4"x2" double slug tuned. Both 1st and 2nd.....\$1.49 per set
Teeny Weeny 500,000 ohm volume control. D.P.D.T. Sw. 3/8" Dia. 1 1/2" shaft.....Net 88c
Pillow speaker; very thin; easily attached to radio. Made by Carron. Very Special.....Net \$2.95
Auto Antenna; full 66" 3 section slide cowl. Shipped with 36" separate lead. Red Hot Special \$1.09. Each 10 for \$9.90

Two-Tube Phono Oscillator, \$3.69

COMPLETE, WIRED AND TESTED. 800 to 1500 KC. Model B-4. Has audio gain stage for proper power output. Complete with tubes ready to operate. \$3.69.



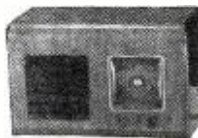
Mike Oscillator model C-4 is similar to model B-4 except has added gain stage for crystal mike. Complete with 3 tubes and fader control \$4.95. Crystal mike \$4.90 extra.

Write for latest bargain flyer of radios, parts kits, tubes and war surplus.

McGEE RADIO CO.
1225 McGee St., KANSAS CITY, MO.

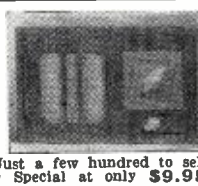
COMPLETE RADIO KITS

5-TUBE AC RADIO KIT superhet circuit using new permeability tuning unit. Covers broadcast 550 to 1700 KC. Beautiful walnut cabinet 12x7x6 5/8" A5 PM speaker. Everything complete, includes 6SA7, 6SK7, 6SQ7, 6L6 and 5Y3 and diagram Model K-5A. Net \$16.95



KIT K-7A 7 tube AC superhet 550 to 1700 KC. Has push-pull audio stage with tone control and 6 1/2" in. alnico 5 PM speaker. Conventional circuit with AVC. Similar in appearance to model K-5A except has slightly larger cabinet. Everything complete including diagram and tubes 6SA7, 6SK7, 6L6, 6SN7, 2-6G6, 5Y3. A real value.....Net \$19.95

OUR LEADER KIT \$9.95. 2 gang cond. AC-DC tube TRF kit 550 to 1600 KC Kit K-4R, a TRF job with a walnut cabinet and 5" alnico 5 PM speaker. All parts furnished; including tubes and diagram. Has direct drive dial and a very simple standard circuit. An ideal kit for the student or experimenter. Just a few hundred to sell.....Very Special at only \$9.95



NEW PLASTIC CABINET AC-DC SUPERHET KIT. Cabinet size 7x6 1/2x10 1/2". Attractive slide rule dial. Positive drive permeability tuner. Receives broadcast 550 to 1650 KC. Has latest Alnico 5 PM speaker. Loop antenna; all parts simplified diagram and tubes 12SA7, 12SK7, 12SQ7, 50L6 and 35Z5 furnished.....Kit P-48 Net \$12.95



4 TUBE 1 1/2-90 VOLT FARM RADIO KIT. Offered in same cabinet as the above Kit Model P-48. The same high gain broadcast superhet circuit. Complete with 4 tubes; 1R5, 1T4, 1S5, 3S4 and diagram. Less battery pack. Kit model PB-48. Your Cost \$10.95

JAN OR REGULAR BRAND TUBES CARTONED OR UNCARTONED

SPECIAL AT .49		SPECIAL AT .69	
39/44	42	116	7A7
74	6C8	1D5	7A4
37	27	1H4	7H7
5Y4G	6Y6	5U4	12Z3
6V3GT	6B6	7A6	5Y4
6C8G	6AC7	7C5	6K6
6F8G	6SH7	14B6	6F6
1033	56	7Y4	6Y6
1034	6B4G	7Z4	12SF7
12SN7	80	5Z3	12SQ7
6SN7	6K7	6SK7GT	45
6SD7	12J5	6SK7GT	38
		6SQ7GT	6SJ7

VERY SPECIAL JAN 6L6M .99
LOCTAL 1 1/2 Volt Tubes: 11N5, 11R4, 11D5, 11B4, 11A6. Special\$1.49

NAVY RBZ PORTABLE MINIATURE RECEIVER. Same as we advertised in November '46 Radio News; except it covers 2 to 5.5 megacycles. Weighs only 5 lbs. complete with battery. 200 to sell. Net \$14.90
Navy RBZ 5 to 13 megacycles complete with battery. Net \$14.95

LATEST IN PHONO-KITS

High Power Push-Pull Amps

You can save money by assembling your own record players. All the kits listed below are complete; nothing else to buy. In 15 or 20 minutes any of these kits will be ready to sell to your customers.
*The model JT-5 high power push-pull 3 tube AC-DC amplifier is furnished with record player kits complete; wired and tested and furnished with tubes and speaker. The push-pull circuit assures good base response even at low volume. For servicing convenience and connecting to pick-up, a schematic diagram is furnished.

KIT J-15 SINGLE RECORD PLAYER. Attractive ready cut walnut finished cabinet with latest 78 RPM phono motor and light weight crystal pick-up and *JT-5 push-pull AC-DC amplifier and 4" alnico 5 PM speaker. This player will surprise you in appearance and performance.
Kit J-15 Dealers.....Net \$15.95 complete



KIT J-16 AUTOMATIC RECORD PLAYER. Beautiful walnut finished, made to fit cabinet; latest single post automatic record changer and *JT-5 high power push-pull AC-DC amplifier (wired and tested) and heavy duty 5" alnico 5 PM speaker. This kit makes a deluxe home record player.
Kit J-16 Dealers.....Net \$29.95 complete
KIT J-16A. Same as J-16 except with leatherette base instead of walnut. Dealers.....Net \$26.95 complete

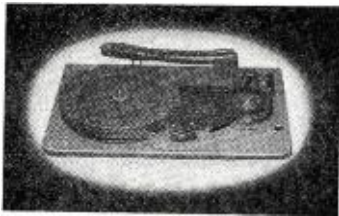


KIT J-18 PORTABLE AUTOMATIC RECORD PLAYER. Beautiful portable leatherette case and latest single post automatic record changer and *JT-5 3 tube AC-DC push-pull amplifier (wired and tested) and heavy duty 6" alnico 5 PM speaker. We have sold hundreds of these to our dealers and they keep coming back for more. A real value. Kit J-18 Dealers.....Net \$33.95 complete



KIT J-19 SINGLE RECORD ATTACHMENT. Attractive walnut finished base with motor cut out, latest 78 RPM rim drive phono motor and light weight, high output crystal pick-up. Easily attached to any radio or amplifier.
Kit J-19 Dealers.....Net \$9.95 complete
Model B-4 phono oscillator (fits under base). DealersNet \$3.69





MAGNETIC WIRE RECORDER

One full hour of recording. Full range fidelity in recording and reproduction. Records from standard phonograph records and radio. Home or office recordings made with microphone. ALL YOU NEED IS A RADIO OR AMPLIFIER.

MAGNETIC WIRE RECORDER (as illustrated) with Crystal Microphone, Crystal Phono Pick-Up Arm, Spool of Wire, 40 K. C. Oscillator, Schematic Diagrams, Instruction Manual.

Price F.O.B. Staten Island, N. Y.\$97.50

Additional Spools of Wire..... 5.50

Limit: One to a purchaser. No Radio Mfrs. C.O.D. orders honored with \$50.00 deposit.

SOUND MIRROR

The Brush Magnetic Tape Recorder. Records 1/2 hour on metallic impregnated paper tape. Extra reels available. Erase and rerecord countless times. Complete unit housed in beautiful wooden cabinet. Contains amplifier, speaker, 3 motors and non-directional crystal mike. Simply plug into 60 cycle, 110 volt, AC line. Write for additional information and price.

BRUSH MAIL-A-VOICE

Model BK-501. Records magnetically on ferrous coated paper discs. Supplied with self-contained amplifier and microphone, for 110 volt, AC 60 cycle use. Compact carrying case. Ready to record and playback. MAIL-A-VOICE recording discs may be folded and mailed.....\$49.50



M-110 Western Electric Sound Powered Microphones. Complete with chestplate and 20' of high grade microphone cable, \$6.50; with 50' length of wire\$7.50

CONDENSERS

Cat. No.
C-120—1 mfd. @ 400v, oil fill, rec. 30c, or 6 for \$1.50
C-121—Aerovox, 1500 Mica, .000025 @ 10,000v, 2.00
C-124—1 mfd. 1000v. oil fill C.D. @ 30c, 4 for 2.50
C-125—Surgue bathrub 3x.1 mfd. 600v, d.c. .25

FILTER CHOKES

F-102—Raytheon 25hy @ 65ma. Hi-volt Ins. \$1.15
F-105—Raytheon Shy @ 60ma. Herm. Seal. .60

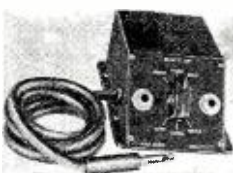
TRANSFORMERS

A-111—Line match. Var. line imped. Tap. pri.\$1.00
A-130—Television & Scope. Pri.-115-230v. 50-60 cps. Secondaries 355r @ 250ma. 710r @ 200ma. 1420r @ 170ma. 385v @ 20ma. 5500v @ 2ma. Half case. Mounts 18 color coded leads. 7"x6 1/2"x5".....10.00

MISCELLANEOUS

M-105—5-inch P.M. Speaker.....\$ 1.75
Altec Lansing Model 600 Dia-Cone 12" Speaker 68.00
X-314—Telegraph Keys. Excellent for amateurs .75
T-103—Delta T Pads Centralab. 500 ohm carbon. Screw-slot shaft. Excellent for amp. & recording50
T-150—25000 ohm 9 watt wire wound Rheostat .30
ALTEC LANSING SPEAKERS and AMPLIFIERS.
BROOKS AMPLIFIERS.

REDUCE C.W. QRM.



X-315 AIRCRAFT RADIO BEAM FILTER

Filter Tuned to 1020 cps. and can be used to eliminate interfering C.W. signals. Used with aircraft receivers, to fly radio marker beam, or receive voice signals from marker beam stations.....\$4.50

SEND FOR OUR BARGAIN FLYER

50% Deposit with C.O.D.s. Min. Order \$3.00. Many other items & specialties. Quality sound & recording equipment. Write us your needs.

CLARION SOUND ENGINEERING CO.
363 Victory Blvd. Staten Island 1, N. Y.
Gibraltar 7-8033

chassis is held in the case by the two screws which may be seen protruding from the rear of the chassis.

Two leads are run through shielding for the hot "A" lead and "B" plus, with the shielding being used for the negative "B" and grounded "A" lead.

A semicircular hole is cut in the front cover, and covered with green celluloid to permit viewing the dial. Illumination is supplied by a 6 volt pilot light located behind the dial.

No provision has been made for the turning off of the unit when not in use, as most operation at this station is on the ten meter band, but a switch could be provided in the hot "A" lead for this purpose.

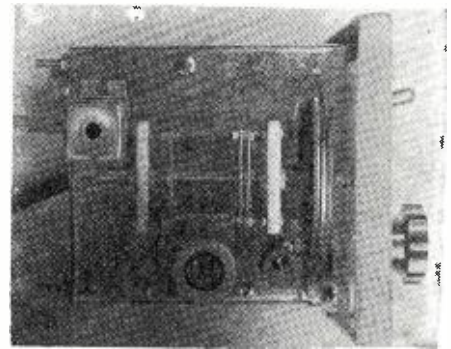
Several published articles on converters using 6J6s as mixers have shown a 50 ohm resistor for the cathode bias. In order to operate efficiently as a detector, it is necessary that the tube be operated on the straight portion of its curve, and high bias is necessary. Accordingly a 1200 ohm resistor is used for cathode biasing in this application. The oscillator grid leak is returned directly to the cathode so that only the grid bias developed across this resistor is applied to the oscillator grid.

It was decided that the frequency range of the converter should be from 27 to 29.7 mc. to cover both the new "QRM" band and the entire 28 to 29.7 band. The oscillator operates on the low side of the signal frequency, and as the i.f. frequency was chosen in the vicinity of 1600 kc. the fundamental range of the oscillator is 25.4 to 28.1 mc.

When construction has been completed, the proper voltages should be applied, with a 25 ma. meter connected in series with the "B" lead. Oscillation will be indicated by an increase in the plate current when the stator plates of the oscillator condenser are touched with the finger. If this indication is not observed, it is probable that the tickler winding, L_s , is reversed.

If all is well in the oscillator section, the frequency of the oscillator should be checked by means of an accurately calibrated receiver. The first step is to set the high frequency end with the tuning condenser at minimum capacity by adjusting the trimmer C_1 . The tuning condenser should then be turned to maximum and the frequency again checked. If the frequency is too low, the turns of the coil L_3 should be spread slightly and the high frequency end again realigned. In the event that the oscillator does not reach a low enough frequency at maximum tuning capacity, the turns of L_3 should be pushed together and the procedure repeated.

When the oscillator range is within limits, the output of the converter should be connected to a receiver tuned to the vicinity of 1600 kc. This frequency need not be exact but should be in an interference free spot near this point. The trimmer condenser in the output transformer T_1 should then be peaked for maximum noise in the receiver.



Top view of completed converter shows placement of various parts.

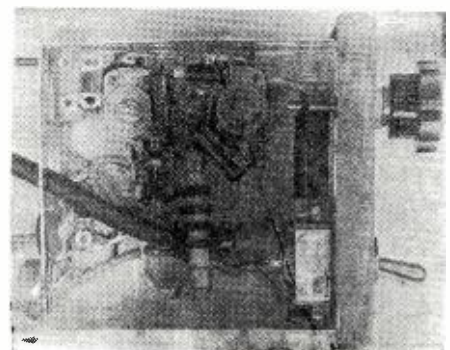
An antenna may now be connected to the converter, and the converter slowly tuned over the band in search of signals. If a signal generator is available, this problem is much simplified. The trimmer condenser C_1 should be adjusted for maximum response. At least two points in the band should be checked for tracking between the oscillator and mixer portions. When all adjustments are proper the point of maximum response of the trimmer condenser C_1 will be the same at either end of the band. The same procedure followed on the oscillator coil may be followed here for adjustment of the range.

The receiver usually used at this station is provided with an antenna input circuit of 75 ohms impedance. Accordingly, the tap on the secondary of the output transformer T_1 is used for an accurate match between the converter and receiver. Most of the standard communications receivers in use by amateurs, however, are designed for an antenna of approximately 300 ohms, and if this type of receiver is used the entire secondary should be used.

When the converter is used with an auto radio the tap is used as this type of receiver has a very low input impedance. The antenna which normally goes to the auto radio should be connected to the input of the converter and either unit is then ready for instant use simply by flipping the switch S_1 .

The small current drain of the converter, only six milliamperes at 100 volts, may be easily obtained from almost any receiver using the normal plate supply of 200-250 volts, by means

Under chassis view indicates the simplicity of final wiring.



Selected as one of the Nation's Foremost

RADIO-ELECTRONICS courses
of DeForest's Training, Inc.
recommended by the New
York Museum of Science
and Industry

DeForest's Training Inc. wins Museum's Certificate of Merit for Home Study and Residence courses... First school of its kind to be so honored

ELLERY L. PLOTTS
Nationally Known Radio
Station Consulting Engineer

Nationally Known Radio Engineer Endorses DeForest's Training, Inc.

"The Home Study course of DeForest's Training, Inc., is a short cut to the fascinating and profitable field of Radio and Electronics," says Ellery L. Plotts, nationally known radio station consulting engineer and former special research associate at Harvard University's Radio Research Laboratories.

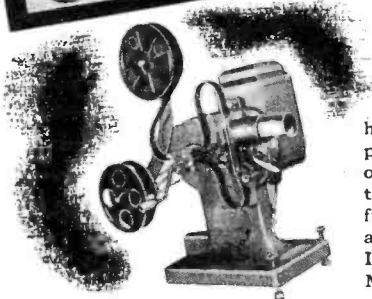
"Now is the time . . . to prepare to enter the field of Radio and Electronics . . . No greater opportunity is afforded the high school student . . . the war veteran . . . or the man who wants to make more money," says Ellery L. Plotts, nationally known radio station consulting engineer and former special research associate at Harvard University's Radio Research Laboratories.

"Investigation reveals that these DeForest's Training, Inc., courses are as modern as they are thorough. Each home study student has the use of a motion picture projector, which gives advantages heretofore unknown in home study training. The comprehensive kits of Radio parts are unusually valuable inasmuch as they enable a man to get practical, on-the-job experience in his own home. Further study enables me to highly recommend either the home study or resident course," says Ellery L. Plotts.



Enjoy Real Movies at Home

Through the courses of DeForest's Training, Inc., you not only learn-by-doing and reading, but you also have the use of a motion picture projector and 12 reels of film. No other course affords this opportunity to learn important Radio fundamentals faster and easier at home. DeForest's Training, Inc., also includes instruction in Motion Picture Sound Equipment, FM Radio and Television.



Choose This Selected Course for Radio-Electronic Training

DeForest's Training, Inc., only, gets you off to a brighter future by supplying "ALL 4" of these major training benefits AT HOME . . . (1) Learn-By-Seeing Movies, (2) Illustrated Loose-Leaf Lessons, (3) Learn-By-Doing Radio Equipment and (4) Employment Service.

8 Kits of quality Radio parts provide the practical experience you need . . . enabling you to build and operate SEVEN different Radio Receivers, a Radio Telephone, Wireless Microphone, Photo Electric Cell Devices and dozens of other marvels in this Electric Age.

Get the complete facts now and see how quickly YOU may get started toward this field of outstanding opportunity. Mail the coupon today.

Says Course Is Worth Many Times Cost

"I think the visual training part of your course is 'tops'! I think your course is worth many times more than what you actually charge for it. I truly believe this is the field to get into for any man interested in a real future and the welfare of his family's peace and security."



HAROLD J. ELLIOTT,
701 Miller Avenue., Ann Arbor, Michigan

DEFOREST'S
TRAINING, INC.
CHICAGO, ILLINOIS

February, 1947

WRITE TODAY FOR FREE INFORMATION

DEFOREST'S TRAINING, INC.
2533-41 N. Ashland Ave., Dept. RN-D2
Chicago 14, Illinois, U. S. A.

Send me your big book "VICTORY FOR YOU," showing how I may make my start in Radio-Electronics with your modern home training plan. No obligation.

Name..... Age.....

Address..... Apt.....

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

If under 16, check here for special information.

If a discharged veteran of World War II, check here.



METER SPECIALS

MICROAMMETER

TRIPLETT, 3 1/2" Round, flush Bakelite case, white scale, Knife edge pointer 0-100 microampere, 100 millivolt movement, 1000 ohms resistance with Volt Ohmmeter scale as illustrated. Complete with wiring diagram showing circuits to make it into a 10,000 ohms per volt analyzer. This meter was made for the Gov't to be used in the Model I-166 Volt ohmmeter.



Surplus—New—Guaranteed
GOV'T INSPECTED

ONLY \$6.95

Prepaid in U.S. and Canada



MILLIAMMETER
WESTINGHOUSE, 3 1/2" Square Bakelite case, white scale, long narrow Spade pointer, 0-1 M.A. movement, 55 ohms resistance with standard 0-1 M.A. scale as illustrated. Complete with paper Volt-Ohm Milliammeter scale. This meter was made for the

Gov't to be used in various types of radio transmitters and receivers.

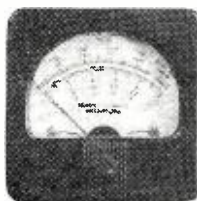
SURPLUS—NEW—GUARANTEED
GOV'T INSPECTED

ONLY \$4.95

Prepaid in U.S. and Canada

MILLIAMMETER

SUN, 3 1/2" Square Bakelite case, white scale, Knife edge pointer 0-1 Milliamper movement, 100 ohms resistance, as illustrated, with a special "Insulation Resistance and Leakage Current" scale. This scale reads 1.0, 2.5, and 5 milliamperes. 550 volts lineal characteristics and up to 2.5 megohms with linear divisions. This Milliammeter was made by Sun for the Gov't to be used in an Insulation Resistance Test Set.



SURPLUS—NEW—GUARANTEED
GOV'T INSPECTED

**SPECIAL
ONLY \$3.95**

Prepaid in U.S. and Canada

We carry a complete line of Electrical Instruments. Send for Free Circular.

MARITIME SWITCHBOARD

336 Canal Street

New York 13, N. Y.

of a dropping resistor of 12,000 to 17,000 ohms in series with the "B" lead of the converter. A resistor of the 2 watt size will be ample in any case. The voltage at the converter should be measured by means of a high resistance voltmeter to insure that the voltage does not exceed 125 volts under any conditions.

-30-

Airborne Television

(Continued from page 59)

operation. This overcomes a serious limitation of the smaller, unattended *Block* system.

Basic operation of the *Ring* equipment (Fig. 8) is somewhat similar to the *Block* equipment previously described, with the important addition of a large Control and Switching Unit and related monitoring facilities.

One camera is mounted in the nose of the plane (Fig. 7), and a second camera is generally mounted in the waist (Fig. 6). The output video signals of both cameras are fed to the Control Unit. There the video signals are amplified and combined with appropriate sync and shading signals. The output of one camera is selected by a switching arrangement.

The combined output, video plus sync and shading signals, then passes through a modulator stage, and the amplified signal is used to grid-modulate the power output stage of the transmitter. Also, much as in the *Block* system, a sync signal is used to plate-modulate the final stage of the transmitter. Thus the power output stage combines both grid and plate sync modulation, maintaining constant the percentage of sync modulation.

The scanning system of the *Ring* equipment uses 567 lines, 40 fields, interlaced to form 20 frames per second.

Interlaced scanning is preferable to sequential scanning (used in the *Block* system) in order to reduce the problem of adjacent-line halation. This also acts to cut down the bandwidth, because of the resulting half number of frames—as compared with sequential scanning.

The video pass band is from 20 cycles to about 8 megacycles, and about 6 db. down at 10 megacycles.

Peak power output of the transmitter is slightly more than 1 kilowatt. And the transmitter operates (temporarily) in the 90 to 102 megacycle band.

The *Ring* system of airborne television is, of course, superior to the *Block* system. But the *Ring* equipment was purposely designed for much greater range and much greater picture fidelity. Chief advantage of the *Ring* system over its cousin-televisor, is that the *Ring* equipment permits optimum utilization of every variable component of the complete television system; optimum lens aperture settings, in accordance with sky, light, and terrain conditions; optimum focus

conditions; optimum shading; maximum video gain; continuous control of percentage modulation of the video transmitter; and continuous operational or tactical control of cameras to permit viewing of the target at all times with maximum clarity.

A typical image televised by the *Ring* equipment is shown in Fig. 5.

Public Recognition

The relative effectiveness of the *Block* and *Ring* airborne television systems was demonstrated to the public for the first time recently by engineers of the *RCA*, *NBC*, and the U. S. Navy.

Naval authorities assigned to the demonstration a fast, high-flying *JM-1 Marauder* (B-26) carrying *Ring* equipment. The plane cruised over Baltimore and Annapolis, picking up scenes and action along the way and transmitting the images directly to a bank of television receivers at the Anacostia Naval Air Station.

Then proceeding to a rendezvous, miles away, the *Marauder* trained its *Ring* cameras on mock combat scenes that involved dive-bombing, smoke-screen laying, strafing, and dog-fights. The receivers at Anacostia faithfully portrayed the action, eye-witnesses of events far beyond the horizon.

Two smaller planes were equipped with lightweight short-range *Block* equipment. These planes cruised above the Potomac relaying their televised images back to the receivers at the Naval Air Station.

Thus typical wartime uses of airborne television became a grim, factual, visual reality.

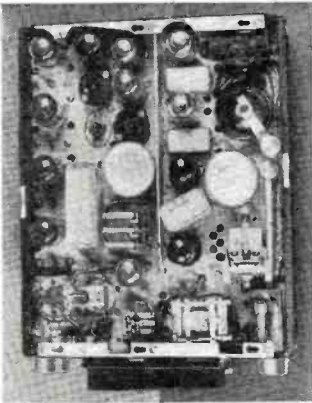
But there were still other uses of the equipment during actual wartime.

These same television systems were used to direct pilotless, over-age bombers or "crash" boats laden with explosives against enemy concentrations. These television systems were also used for the observation of gunfire, and reconnaissance in connection with amphibious landings. They were used in observation planes for artillery spotting, gun control, map-making, and other urgent reconnaissance functions. They were used to transmit maps and charts between ships and aircraft. They were used to observe dangerous operations from protected or remote positions. They were used to guide free-falling, radio-controlled aerial bombs, flying torpedoes, and assault drones.

Airborne television systems were used to direct explosive-laden gliders against land and sea targets. They were used for obtaining eye-witness information under conditions of space, speed, or peril which would preclude the gathering of required information by personal or any other means.

Many of these applications had specific and historic codes names. A *Block*-equipped Navy glider was known as a "Glomb"; a Navy crash boat with television eyes was "Campbell"; and use of *Block* gear in over-age bombers was termed "War

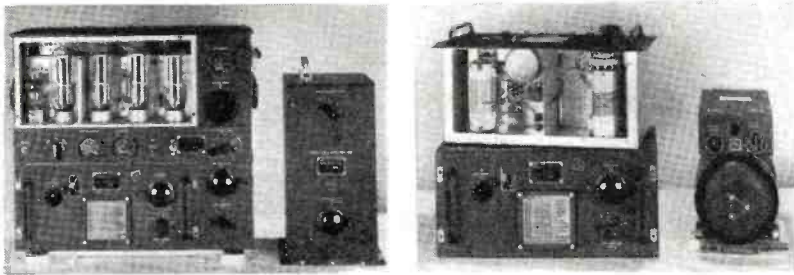
General Electric RT-1248 15-Tube Transmitter-Receiver



TERRIFIC POWER (20 watts) on any 2 instantly selected, easily pre-adjusted frequencies from 435 to 500 Megacycles. Transmitter uses 5 tubes including a Western Electric 316 A as final. Receiver uses 10 tubes including 955's as first detector and oscillator, and 3-7H7's as IF's, with 4 slug-tuned 40 MC. IF transformers, plus a 7H7, 7E6's, and 7F7's. In addition unit contains 8 relays designed to operate any sort of external equipment when actuated by a received signal from a similar set elsewhere. Originally designed for 12V operation, power supply is not included, as it is a cinch for any amateur to connect this unit for 110V AC, using any supply capable of 400V DC at 135 MA. The ideal unit for telephone use as in a taxicab, or for any kind of remote control applications as with drone airplanes. Instructions and diagrams supplied for running the RT-1248 transmitter on either code or voice, and for using the receiver as either an AM or FM set. As an FM set, the receiver section of the 1248 is capable of better results than almost any of the commercial FM sets on the market, largely as a result of the superb engineering and meticulous workmanship employed in constructing the converter, oscillator and IF sections.

Supplied in original cartons with 15 tubes. Your cost **\$29.95**. 10% less if ordered in lots of 2 or more. If desired for marine or mobile use, the dynamotor, which will work on either 12 or 24 V.D.C. and supply all power for the set, is only \$15.00 additional.

BENDIX SCR-522—Very High Frequency Voice Transmitter-Receiver—100 to 156 MC. This job was good enough for the Joint Command to make it standard equipment in everything that flew, even though each set cost the Gov't \$2500.00. Crystal Controlled and Amplitude Modulated—High Transmitter Output and 3 Microvolt Receiver Sensitivity gave good communication up to 180 miles at high altitudes. Receiver has 10 tubes and transmitter 7 tubes, including 2-832's. Furnished complete with 17 tubes, **AND POWER SUPPLY** for 12 or 24 volts, also remote control boxes and cable connectors. We include complete diagrams and instructions for the simple conversion of the 522 to full 110 Volt 60 Cycle operation. Your cost. Brand New—**\$44.50**.



General Electric 150-Watt Transmitter: Brand New!

Cost the Government **\$1800.00**. Now Only **\$44.50!!!**
(Can be used by amateurs without any changes or modifications!)

This is the famous transmitter used in U. S. Army bombers and ground stations during the war. Its design and construction have been proved in service, under all kinds of conditions, all over the world. The entire frequency range is covered by means of seven plug-in tuning units which are included. Each unit has its own oscillator and power amplifier coils and condensers, and antenna tuning circuits—all designed to operate at top efficiency within its particular frequency range. Transmitter and accessories are finished in black crackle, and the milliammeter, voltmeter, and RF ammeter are mounted on the front panel. Here are the specifications: **FREQUENCY RANGE:** 200-500 Kc. and 1500-12,500 Kc. (Will operate on 10 and 20 meter band with slight modification.) **OSCILLATOR:** Self-excited,

thermal compensated, and hand calibrated. **POWER AMPLIFIER:** Neutralized class "C" stage, using 211 tube, and equipped with antenna coupling circuit which matches practically any length antenna. **MODULATOR:** Class "B"—uses two 211 tubes. **POWER SUPPLY:** Supplied complete with dynamotor which furnishes 1000 volts at 350 milliamperes. Complete instructions are furnished to operate set from 110V AC. **SIZE:** 21 1/2 x 23 x 9 1/4 inches. Total shipping weight, 250 lbs., complete with all tubes, dynamotor power supply, seven tuning units, antenna tuning unit, the essential connector plugs, and two profusely illustrated instruction books, all in the original factory packing case. These transmitters are priced to move fast; quantities are limited! Order today, and be the proud owner of one of the finest rigs obtainable.

Brand new 274 N COMMAND SETS, including 3 separate 6 tube superhet receivers, 2 separate transmitters, each with 40 watts output, and a 24 V. dynamotor unit. Bargain price for all 6 pieces complete with tubes—**\$39.95**.

SIX BAND COMMUNICATIONS RECEIVER

Featuring continuous coverage from 1500 KC to 18000 KC on a direct reading dial with the finest vernier drive to be found on any radio at any price—extreme sensitivity with a high degree of stability—crystal filter and phasing control—BFO—antenna compensator—transmit-receive relay—standard 6 volt tubes. Contains a plate supply dynamotor in compartment within the handsome

black crackle finish cabinet, the removal of which leaves plenty of room for installation of a 110V, 60 or 25 cycle supply. These new receivers, which make any civilian communications receiver priced under \$200.00 look cheap and shabby by comparison, are only **\$44.50**. Power supply kit for conversion to 110V, 60 cycle, is only \$8.50 additional.

THE INSTRUMENT BARGAIN OF A LIFETIME

NEW BC-221 FREQUENCY METERS with calibrating crystal and calibration charts. A precision frequency standard that is useful for innumerable applications for laboratory technician, serviceman, amateur, and experimenter, at the give-away price of only **\$39.95**.

SERVICEMEN

Check This Column for Lowest Prices on Quality Parts

TUBES: A warehouse full. Including the new miniatures. Order all types you need. We'll try to supply you completely. Special this month: Sylvania 6V8gt—3 for \$2.00; RK-75 or 307 Transmuting tubes only \$2.50 each; 6180—89c; 6SD7 (replaces 6SK7)—59c.

POWER TRANSFORMERS—Half-shell type, 110V 60 cy. Centertapped HV winding. Specify either 2.5 or 6.3V filament when ordering.
For 4-5 tube sets—650V, 40MA, 5V & 2.5 or 6.3V...\$1.49
For 5-6 tube sets—650V, 45MA, 5V & 2.5 or 6.3V... 1.75
For 6-7 tube sets—675V, 50MA, 5V & 2.5 or 6.3V... 1.90
For 7-8 tube sets—700V, 70MA, 5V & 6.3 or two 2.5... 2.35
For 9-11 tube sets—700V, 100MA, 5V & 6.3 or two 2.5V 2.85
For 9-15 tube sets: 600V, 150MA; 5V & 6.3V... 2.95

TRANSFORMERS—All types in stock. **AUTO-TRANSFORMERS:** Steps up 110v to 220v, or steps down 220v to 110v—\$1.95. **FIL. TRANS.:** 6.3v, 8 Amps.—\$1.98; 5v, 10 Amps.—\$1.98; Universal Output Trans. 8 Watt—89c; 18 Watt—\$1.29; 30 Watt—\$1.89. **AUDIO TRANSFORMERS:** S. Plate to S. Grid. 3:1—79c; S. Plate to P.P. Grids—79c; Heavy Duty Class AB or B. P.P. inputs—\$1.49; Midget Output for AC-DC sets—69c; **MIKE TRANSFORMER** for T-17 Shure microphone, similar to UTC uncser type—\$2.00.

MICROPHONES—All types, nationally known brands. Bullet crystal—\$5.45; Bullet Dynamic—\$7.45; Mike Jr.—60c; Handy Mike—90c; Lapel Mike—93c; other types at lowest prices.

CONDENSERS—**PAPER TUBULAR** 600 WV.—001—8c; .002—8c; .005—8c; .01—9c; .02—9c; .05—10c; .1—10c; .25—23c; .5—36c; **ELECTROLYTICS:** 8mfd. 200v—20c; 10mfd. 35v—20c; 30mfd. 150v—23c; 20/20mfd. 150v—35c; 30/20mfd. 150v—46c; 50mfd. 150v—43c; 8mfd. 475v—35c; 10mfd. 350v—65c; **OIL-CONDENSERS:** 4mfd. 600v—49c; **VARIABLE CONDENSERS:** 3 gang 350mfd.—83c; 7.5-20mfd. 1750v. Extra long shaft Hammarlund—only 69c; Miniature Variable condensers: 25mfd.—39c; 50mfd.—49c; 75mfd.—49c; 100mfd.—54c; 140mfd.—69c.

PERMEABILITY TUNERS—Attractive slide-rule dial, compactly replaces dial, tuning condensers, oscillator and antenna coils in broadcast band receivers. Special \$3.43. **WILLARD** rechargeable 2 volt storage batteries for G.E. portable radios \$2.95.

SPEAKERS—PM dynamic type—4"—\$1.55; 5" \$1.55; 6"—\$1.95; 8"—\$3.95; 10"—\$5.95; 12"—\$7.50.

CRYSTAL PICK-UPS—Two nationally known makes, one regularly \$6.10, only \$2.79, the other at \$3.43.

PHONO-MOTORS—110V 60 Cycle with turntable and high quality crystal pick-up—\$7.95.

WIRELESS RECORD CHANGERS—These are beauties—two post, with featherweight plastic and chrome pick-up. Plays 10" and 12" records indifferently through any radio without connections. Complete with your choice of blue leatherette or walnut stained cabinet, priced at only \$28.95.

PHONO CABINETS—Beautiful, portable leatherette covered with or without speaker grille—\$7.75.

PHONO AMPLIFIERS—A real AC, 110V, 60 Cycle, 6 Watt Amplifier suitable for PA systems and phonographs; with a husky power transformer. Complete with tubes—\$12.95.

PUBLIC ADDRESS AMPLIFIERS—25 Watts peak output, 5 tubes, separate controls for Microphone and Phono Inputs. \$65.00 value for only \$32.00.

HIGH VOLTAGE (5000V) rotary ceramic D.P.D.T. switches 49c.

RELAYS—Guardian SPST 12-24v. has heavy duty 15 Amp. Contacts—\$1.25; Guardian 12 to 24v D.C. triple make, single break relay, 5 for \$3.75; Sigma supersensitive 2000 ohm D.C. SPDT Relay. (May be adjusted to operate on less than 1 Milliampere)—\$2.50.

SELENIUM RECTIFIERS—Dry disc type 1 1/2" by 1", 1.2 Amp. maximum, suitable for converting DC relays to AC. or supplying filament sources in portable radios, converting DC meters to AC applications, and also may be used in low current chargers—90c.

METER RECTIFIERS—Full wave, may be used for replacement or in construction of all types of test equipment—\$1.25. Half Wave—90c.

FILTER CHOKES—200, 300, 400, 500 ohm light duty—59c; 200 ohm hvy. dty.—99c; 250 MA, 35 ohms DC res. Made for U. S. Navy. Fully shielded—\$1.95.

PLIERS KIT—Khaki case with 4 alloy steel pliers of different designs. Flatnosed, pointed-nose, adjustable parrot-nose, and adjustable slip-joint. Brand new. Complete—\$2.85. Screwdriver type **SOCKET WRENCH KITS**—Handle with 6 attachable sockets—69c. **ALCOHOL BLOWTORCH** 99c.

REPLACEMENT CABINETS—Beautiful leatherette cabinet for portable radios—\$3.95. Silvertone model 4619, 9x10x10 1/2"; model 4465, 5x10x8—\$1.50 each.

WIRE—No. 18 POSI 2 conductor parallel zipcord, brown. 250' spools—\$5.25. 500' spools—\$9.95. No. 18 PO brown rayon covered parallel lampcord. 500' spools—\$12.25. No. 18 SV round rubber covered double wire for wash machines, vacuum cleaners, etc. 250' spools—\$6.95. Rubber covered mike cable 250' Spools—\$25.00. All kinds hook-up wire 1c per ft. transmission line. 50 ohm impedance R3BU, cut to any length, 8c per ft. Single stranded conductor shielded lead with brown rubber over shield, super special, \$1.20 per 100 ft., \$10.00 per 1000 ft.

PORTABLE AIR COMPRESSOR—Attaches to any 1/4 H.P. motor. Just the thing for refinishing radios, painting cars, blowing out chassis, etc. 100 lb. gauge and syphon type gun with 1 1/2 feet of rubber hose included. Pressure adjustable to stay constant at any value up to 100 lbs.—Net price—\$22.25 prepaid.

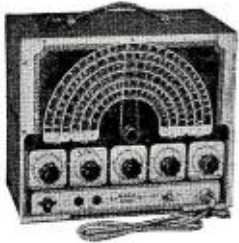
Famous Collins Autotune Transmitter

This is the well known unit used in Army and Navy planes that features automatic motor tuning of any of 11 front-panel pre-selected frequencies up to 18,100 Kc., as well as the manual tuning possible any time. The transmitter operates on voice, CW, and MCW on all frequencies. This beautifully designed unit uses an 813 final, and push-pull 811's as modulator, measures 2 1/2 x 1 3/4 x 11, and weighs 70 lbs. Estimated average power output is 150 Watts. Plans provided for easy 110v. conversion. Complete with 24v. dynamotor & all tubes & connectors, only \$139.95.

Write for literature describing any units you wish more information on.

LEONARD LEADING VALUES

SIGNAL GENERATOR



E-147

\$49.50
NET

RANGES
FROM
100 kc - 75 mc

Multicolor dial has eight scales in color for easy reading. Large plastic pointer assures fine frequency tuning. Handsome gray crackle finish metal case is ruggedly built for absolute stability.

6L6 PUSH PULL OUTPUT 35 WATT

Completely shielded. Class AB1. Primary 6600 Ohms-Sec. 2-4-8-15-500 Ohms.

F-147 SPECIAL LIMITED QUANTITY \$3.89

PLUG-IN ELECTRONIC CONDENSER

60-30-30 mfd 450 V.D.C.W.

G-147 SPECIAL LIMITED QUANTITY 83c

ATTENUATOR

Impedance 100,000 Ohms Attenuation 3.0 DB per step to 57 DB then infinity at 388

H-147 SPECIAL LIMITED QUANTITY 89c

PHONO MOTOR and PICK UP KIT

SPECIAL

\$5.95

Complete



Crystal pick-up—Top quality constant speed motor.

ELECTROLYTIC CONDENSERS

ETCHED—FOIL—CARD BOARD ENCASED—METAL ENCASED

8-450	38c	8-8-450	65c
16-450	56c	20-20-150	65c
30-150	40c	40-40-150	73c
40-150	42c	50-30-150	65c

Have a complete stock on hand of Sprague, Amperite, Aerovox, Bew, Turner, I.R.C., Shure, and other nationally known parts and equipment. Dealers and Servicemen supplied.

Send 10% deposit with order—Balance C.O.D.

LEONARD RADIO INC.
69 CORTLANDT ST.
NEW YORK 7, N.Y.

Weary." Another smaller television camera, developed by RCA and known as "Mimo," was used for guiding aerial bombs. This type bomb was tagged "Roc."

Last of the important war-developed electronic miracles to be revealed to the public, military airborne television was perfected through the joint efforts of the Bureau of Ships and the Bureau of Aeronautics of the Navy Department—and the Research and Development Laboratory of the Radio Corporation of America, in conjunction with the National Broadcasting Company.

Into the Future

A look into the future promises many exciting applications of airborne and highly mobile television equipment.

Already mentioned has been "on-the-spot" reporting of disasters and other events of public interest, which can then be rebroadcast to millions of television-equipped American homes.

Airborne television gear will likely replace test pilots in experimental planes of supersonic speeds, or in any planes in which there is an element of risk while in flight. Television equipment can not only give electronic "eyes" to the plane, but also transmit to ground control headquarters complete up-to-the-second readings of instruments and testing apparatus.

Plane navigation will be greatly assisted by airborne television, when televised reports and maps of terrain surrounding airports, as well as the general lay-out and activity of the airports themselves, can be flashed to incoming pilots in time to avert landing difficulties.

This form of visual transmission of terrain would also be invaluable to marine navigation.

Portable or airborne television sets will make possible hazardous explorations by scientific expeditions. Television pictures would provide vivid clues to the perils of such exploration groups.

Fixed installations of minute television sets will be widespread in industry, becoming the "eyes" in factories and large-scale production enterprises. This will be a new and precedent-shattering means of coordinating activities and the means of watching and controlling, from a distance, manufacturing processes and situations that might otherwise be inaccessible or too perilous to humans.

Many other applications of this type of extremely lightweight, compact, and portable television equipment can be expected in the future.

It's good to think of a world at peace again.

But should war ever strike our country once more, airborne television will be destined to play an extremely important role in both offensive and defensive action, because to date it is the most practical and feasible means of controlling guided missiles.

SURPLUS BARGAINS

CLOSE-OUTS

TRANSMITTER, BC-653-A, 80 meter, lots of good parts. See our ad page 151 Oct. RADIO NEWS. Brand new w/spare tubes, less power supply, while they last. \$59.95

AUDOLYZER, Supreme 562, 95 KC to 14 MC, used, good condition. Only one at 65.00

DYNAMOTOR, PE-94-A. Input 24 VDC @ 13 A, output 300 VDC @ 260 ma, 150 VDC @ 10 ma, 14.5 VDC @ 5' amps. Used. 5.95

CONDENSERS

MICA, .005, .004, .002, .001, 5000 V. \$1.50

.1 mfd, 2000 VDC, C-D square can. 2.45

50 Ass't rec'vg mica Incl. silver. 2.50

FILTER, 6 mfd 1500 VDC oil-filled Aerovox. 2.25

2 mfd 2500 VDC Incco, rect. can. 3.50

1 mfd 1000 VDC GE Pyranol, rect. can. .85

.5 mfd 2000 VDC C-D rect. can. 1.35

3500-3500 mfd, 25-25 VDC Solar plug-in. 1.95

CERAMICS, fixed 10 mmf, 10 for. 1.00

Variable 5-20 mmf, half silver, 10 for. 2.00

HEADSETS, Air Corps EXTENSION CORDS, HS-33, 600 ohms— for Air Corps' phones, good, used. \$1.00 plug, jack, 5' cord. 10 for \$8.50 Used, each. .50c

MODULATION TRANSFORMERS

60 W, poly-Z, Stancor A3893. \$ 5.50

125 W, multi-match Thordarson T11M76. Less plugs. 15.00

175 W, PP 35T, RK12, T40 to PP TZ40 Stancor A3829. 8.00

MISCELLANEOUS

KEYER, for code on paper tape, includes 7 tubes, photo cell, used, good. \$45.00

AMPLIFIER, aircraft interphone w/6F8G. 4.95

REMOTE UNIT, RM-29 w/ringer, magneto, jacks, plugs. Use in pairs for telephone system. 4.95

Quantities limited. Postage additional. Minimum order \$2.00. Write for FREE LIST Terms: Net cash, 25% deposit on COD Your friendly radio dealer

ELECTRONIC SUPPLIES
317 E. 2nd St. Tulsa 3, Okla.

MORE SMASH BUYS at National Radio Distributors

NOW! IMMEDIATE DELIVERY

The New and Improved National Radio & Phono Kits The Original and Still the Finest



All parts brand new and unconditionally guaranteed against defect. No War Weary Surplus. Component parts are perfectly matched for easy wiring and top-notch performance. These kits also feature new Alnico V speakers. Beautiful Plastic Cabinet. Built-In Loop Antenna, Dust-Proof backs, and illuminated Airplane dials. Instructions include clearly drawn, easy to follow schematic diagrams.

MODEL N. R. 7-5 TUBE 105-125 A.C./D.C. SUPERHETERO-DYNE. Uses 12SA7, 12SK7, 12SQ7, 50L6 & 35Z5 Tubes. Net Price. \$11.95

Lots of 3. Net Price. 10.95

Kit of 4 Matched Tubes. Net Price. 4.50

MODEL N. R. 5-5 TUBE TWO BAND A.C./D.C. SUPERHETERO-DYNE as above. Freq. Range: Band 1.550 to 1900 K.C. Band 2.5.5 to 18 Meka-cycles. Net Price. \$13.95

Lots of 3. Net Price. 12.95

Kit of 5 Matched Tubes. Net Price. 4.50

MODEL N. R. 1-4 TUBE A.C./D.C. 105-125 T.R.F. Uses 12SK7, 12SJ7, 50L6 & 35Z5 Tubes. Recommended for Students, Schools, Hospitals and Institutions. Net Price. \$10.95

Kit of 4 Matched Tubes. Net Price. 3.50

New Vanity Portable Electric Phonograph

Completely assembled, ready to plug into 110V. A.C. line. As small as a Lady's Vanity case. Measures 12"x10"x5 1/2".

- 5" Alnico V speaker, cone sealed underneath turn-table.
- Full 1 1/2 Watt Beam Power Output, with Tone & Volume Control.
- Luxurious Two-Tone leatherette covered carrying case.
- Will play 10" & 12" records. List Price. \$34.50

Please Remit at least 25% with order. We will ship balance C.O.D. We carry complete stocks of Supreme, Precision, Duo-tone Bright Star, Webster, Stancor, Merit, etc.

WRITE FOR COMPLETE CATALOG It's FREE!



Your Net \$22.95

Cable address, "ENARDEE," New York

National Radio Distributors

899a Southern Blvd., New York 59, N. Y.

RADIO NEWS

America finds a new, easy way to save

OUT of the war has come one blessing—a lesson in thrift for millions of those who never before had learned to save.

Enrolled under the Payroll Savings Plan in thousands of factories, offices, and stores, over 27 million American wage earners were purchasing "E" Bonds alone at the rate of about 6 billion dollars worth a year by the time V-J Day arrived.

With War Bond Savings automatically deducted from their wages every week, thrift was "painless" to these wage earners. At the end of the war, many who never before had bank accounts could scarcely believe the savings they held.

The moral was plain to most. Here was a new, easy way to save; one as well suited to the future as to the past. Result: Today, millions of Americans are continuing to buy, through their Payroll Savings Plan, not War Bonds, but their peacetime equivalent—*U. S. Savings Bonds*.



From war to peace! War Bonds are now known as U. S. Savings Bonds, bring the same high return—\$25 for every \$18.75 at maturity.



Out of pay—into nest eggs! A wage earner can choose his own figure, have it deducted regularly from earnings under Payroll Savings Plan.



New homes to own! Thousands of new homes, like this, will be partially paid for through Bonds wisely accumulated during the next five to ten years.



Keeping cost of living in check! Buying only needed plentiful goods and saving the money which would bid up prices of scarce goods keeps your cost of living from rising. Save automatically—regularly.

Weekly Savings	SAVINGS AND INTEREST ACCUMULATED	
	In 1 Year	In 10 Years
\$ 3.75	\$195.00	\$2,163.45
6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

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

*Contributed by this magazine in co-operation
with the Magazine Publishers of America as a public service.*



Skilled Technicians OF BY FOR RADIO

OUR young men come to us from every walk of life—from the farm—from the city—rich and poor—many ex-GI's. They represent every race and creed but they do have ONE thing in common.

They're all men OF Radio, BY Radio and FOR Radio. They've grown up with a "cat's whisker" and a set of headphones as playthings. The only lullabies they remember are the ones they heard over Dad's Battery Set, with all the knobs, dials, and switches, when radio itself was an infant.

These young men have never known a world without radio, and they never want to. Radio has molded their minds, provided them with an absorbing hobby and given them the means of earning a good living.

SKILLED MEN FOR RADIO

Now, with their training at National Schools behind them, they are prepared to contribute their skill, talent and creative ideas to an industry which is literally a part of them.

We feel fortunate indeed to have had the privilege of awakening the dormant abilities of many men now holding prominent positions in Broadcasting, Communications, Radio Sales and Service, Television and Electronics. And we look forward with pleasure to an ever-broadening educational program, designed to train still more men to fill the thousands of specialized positions radio will require in the future.

During the four decades since we first began to build men for Industry, we have kept accurate student records and compiled unusually complete performance charts. Thus we have acquired a keen insight into the most effective ways to inspire radio-minded men to APPLY their training, and to use their creative abilities to the best advantage of themselves and their employers.

REPORT TO INDUSTRY—FREE!

You'll be impressed by our methods and observations, as they apply to YOUR personnel problems. You'll welcome an opportunity to learn how we inspire our students to ACTION, how we develop in them those vital traits of character which make them an asset to any employer.

We know you'll want to send for our "Report to Industry." Whether you employ one man or hundreds, you will enjoy and profit by this factual, informative presentation.

Send for it today! No obligation.

NATIONAL SCHOOLS
Pioneers of Technical Trade Training Since 1905
Los Angeles 37, California

Mail to: PUBLIC RELATIONS DIRECTOR
National Schools—Figueroa at Santa Barbara
Los Angeles 37, California
Please send me "Report to Industry"

Name: _____
Firm: _____
Address: _____
City _____ Zone _____ State _____

N-18

International Short-Wave

(Continued from page 68)

tive competition in the form of English language broadcasts. Spurred by this competition, several of the other Panama radio stations are considering an increase in their English language broadcasting. Some even propose—as HOX does—to broadcast a full daily schedule in English.

"Thus far, the English language broadcasting over HOX and HOXA has been limited largely to musical programs based on commercial discs, and newscasts. In addition, the English staff has presented several programs of a special nature on the occasion of U.S. and Panamanian holidays. With the recent arrival of a library of World Service transcriptions and programs, English Program Director Cooper now plans an expanded series of programs—including many live programs using local talent.

"The Spanish program staff of *Radio Central America*, headed by Salustiano Chacon, formerly of CBS, New York City, has naturally been more fortunate in the matter of being able to use live talent. Latin America is a land of music where nearly everyone likes to sing or strum a guitar, or both, and Panama is no exception. Panama is noted for several highly-individual musical forms, mostly connected with traditional national dances.

"All indications point to a considerable growth in radio activities on the Isthmus of Panama. As previous-

ly noted, seven more stations are in various stages of construction, of which at least two are scheduled to be on the air about the time you read this.

"Business circles predict an expansion of English broadcasting, especially in view of the expected increase in activity in the Canal Zone. Before the war, a great number of people were employed in the Canal Zone in connection with the construction of a third set of locks for the Panama Canal. The war halted the project, but it has been under consideration again recently along with proposals to convert the present lock canal into a sea-level canal or to construct another canal at a different location. No matter which project is selected, it appears likely that there will be a considerable increase in activity in the Canal Zone within the near future, with a subsequent upward trend in volume of business and prosperity.

It is expected that HOXA, 15.100, will broadcast a special DX program sometime soon for readers of RADIO NEWS. Definite arrangements have not been completed, but will be announced shortly.

* * *

Re The Byrd Expedition

First report to this Department of reception of NAVE, station aboard Adm. Byrd's "Mt. Olympus," of the Antarctic Expedition, came in early in December from Lynn McLaughlin, Charleston, West Virginia:

"I have been listening to some interesting point-to-point work from the 'Mt. Olympus,' Adm. Byrd's Antarctic Expedition; call-letters of 'Olympus'

A SIMPLE NOISE LIMITER

By R. J. HAGERTY, W6JMI

THE problem of installing a noise limiter in a receiver not so equipped usually involves procuring bias voltages, installing condensers, resistors, potentiometers, etc., and generally becomes a complicated business.

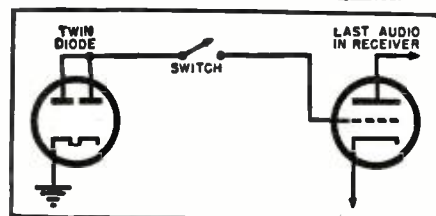
In searching around for a simple noise limiting device it occurred to us that the diodes of a tube, whose cathode was connected to ground, would be sufficient to cut off the noise peaks. Carrying the idea a bit further we figured that if the sharp peaks of noise, such as caused by automobile ignition, were cut off in the audio, reception would improve.

In practice the circuit shown in the accompanying diagram has proven very practical. It is of the utmost simplicity—using only one tube, one switch and no other parts. The only voltage necessary is the filament voltage. It has a further advantage in that it will not upset any existing circuits and no tuning is required. We used a 6SQ7 because it was immediately available in our junk box although a 6H6, 75, 85 or similar tube could have been used. The cathode is connected directly to ground. The diodes are connected in parallel and then to the switch for cutting limiter in or out of the circuit. The other side of the switch is connected directly to the grid of the last audio amplifier in the receiver.

In operation, signals of low to medium intensity are not affected but on sharp bothersome noise, the kind that plays havoc with ten meter reception, the limiter "clips" off the peak and shunts it to ground. On broadcast reception distortion will be present due to the clipping of the highs—but this is no problem in communication work. It is the simplest and cheapest noise limiter possible and one that has helped us immeasurably on ten meters. We have tried potentiometers in the diode and the grid circuits in an effort to improve same but the improvement was so slight that it wasn't worth the effort. We know that it isn't the best noise limiter in the world but for simplicity and low cost it can't be beat and it has made communication possible that would have been impossible without it.

—30—

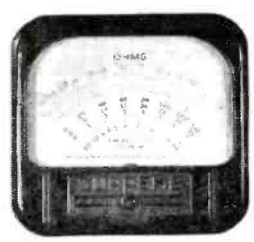
Schematic diagram of noise limiter.



BETTER VALUES from ARROW!

SUPREME FOUNDATION METER

40 Micro Amps. 25,000 ohms per volt. 4 1/2" square. Mfd. by Supreme Instruments Corp. **\$8.95** Each.....



HICKOK 2 1/2" 0-150 Volt AC Voltmeter
Each..... **\$2.49**

HEADPHONES

Signal Corps, 8000 ohms and 200 ohms, each..... **\$2.49**
2000 ohms, Trimm, each.... **\$1.79**

SPEAKERS

PM Alnico 4"	Each	Dynamic 12"	Each
5"	\$1.65	1000 ohm field	\$5.95
6"	2.25	3" PM Hvy. Duty Speaker	1.59
4"x6"	2.15	8" PM Hvy. Duty Speaker	4.95
6" extra hvy.	2.85		

COAXIAL CABLE

50 ft. of coaxial cable RGU8, 52 ohm, with 2 Amphenol plugs, 1 on each end each **\$1.19**

KITS

Kit of 10 assorted volume controls up to 2 meg. less switch..... **\$1.59**
Kit of 20 5 to 20 watt resistors 1.89
100 assorted—1/2 & 1/4 watt resistors, all popular sizes... 2.19
100 assorted 1 & 2 watt resistors, all popular sizes... **\$2.95**
100 assorted Bathub condensers, up to 2 mfd. at 400V, per 100..... **\$2.95**

TRANSFORMERS

4-5-6 Tube Power Transformer, 110-120V, 6.3V and 5V winding..... **\$1.89**
7-8-9 Tube Power Transformer, 110-120V, 6.3V and 5V winding..... **\$2.59**
6L6 output transformer..... **\$1.79**
Single output for 50L6, 25L6, 6V6..... **\$5.55**
Single pentode output for 42, 43..... **\$5.55**
AC-DC Chokes. 250 ohms... **.45**

POWER TRANSFORMER—NAVY TYPE

159 ma; 6.3V at 6.5 amps; 5V at 3 amps..... Each **\$3.29**

2 Post VM RECORD-CHANGER..... Each **\$16.95**

SURPRISE PACKAGE

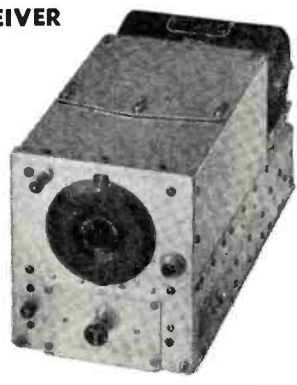
For the experimenter, radio serviceman, handy man, repairman, "ham," hundreds of valuable miscellaneous radio parts. **\$1.59**
10 lbs.....

ANTENNA

10 1/2 ft. sectional antenna, collapsible. AN-131A..... Each **\$1.89**

ARMY AIRCRAFT RECEIVER Model BC-946-B

Broadcast band from 520 to 1500 KC, tube complement, 3—12SK7, 1—12SR7, 1—12A6, 1—12K8; can be used with 24V dynamotor supplying A & B power; can be converted to AC or DC or 32 volt sets; 3 stages of IF used, uses 3 gang condenser, complete with tubes and schematic. **\$12.95** Each.....
Dynamotor DM32A. Each..... **\$4.95**



USED SIGNAL CORPS RECEIVERS

6 tubes; 3—12SK7, 1—12SR7, 1—12A6, 1—12K8; 190-550 Kc. (specify freq. desired) 3-6 mc; power 28 VDC. Complete with tubes, whole receiver at cost of tubes only, original cost \$99.23, **\$6.95** slightly used. Your cost, each.....

3 1/2" AUTOMATIC TIME METER

60 cycle 110 volts. This time meter consists of a cyclometer driven by a Telechron synchronous motor. Connect to an electric circuit; it will measure and indicate the number of hours or minutes that the circuit is in use. Shpg. wt., 61 lbs.—list \$17.00. **\$4.95** Your cost.....

CONDENSERS

Oil Filled		Tubular Electrolytic	
Standard Brands	Ea.	40-30 mfd; 150V.....	59c
2 mfd; 600V.....	39c	50-30 mfd; 150V.....	69c
4 mfd; 600V.....	49c	2500 mfd; 3V.....	49c
3 mfd-3mfd; 600V.....	69c		
.5 mfd; 3000V.....	89c		
10 mfd; 1000V.....	\$1.85		

MICA CONDENSERS

All popular sizes, 100 assorted..... **\$2.95**

PICKUPS

Low pressure crystal..... **\$2.20**

PLUGS

PL55 Plugs.....ea. 20c | PL68 Plugs.....ea. 20c

JACKS

JK26.....ea. 20c

CARBON MIKE

T-17-B Carbon mike.....ea. **\$1.49**

SOCKETS

Molded octal sockets, each..... 7c
Lots of 100..... **\$5.00**
Ceramic sockets with metal ring, each..... 9c
Lots of 100..... **\$7.00**

VIBRATOR

4-prong, used in 90% of auto radios, Each..... **\$1.49**

CONDENSER KIT

600 Volt By-pass Condensers, 70 assorted .01; .02; .05; 1..... **\$4.95**

TRANSMITTING TUBE 5BP1.....ea. **\$3.95**

VEEDER-ROOT METER AND CASE

Counts no. of ft. of trailing wire antennae; no. turns when winding on coil applicable for many uses; flexible shaft can be attached and connected to another device for counting without direct attachment; speed 300 ft. per minute for reeling out; beautiful bakelite case, jeweled dialite, pilot light enclosed, 3 position switch, counts up to 1000. Each..... **.95c**

Wholesalers, dealers, institutions, and other quantity purchasers . . . write, wire, phone for quantity prices.

Dept. C

ARROW SALES, INC.
59 WEST HUBBARD STREET • CHICAGO 10, ILLINOIS
Telephone: SUPERIOR 5575



AMPLIFIERS

5-Tube Guitar Amplifier with 12" speaker. Has 2 guitar and 1 micro input. Volume and tone controls, pilot light, and fuse.
 Assembled Complete. OUR SELLING PRICE...\$42.50
 LIST PRICE..... 84.50

3-Tube Guitar Amplifier with 8" speaker.
 Assembled Complete. OUR SELLING PRICE...\$26.50
 LIST PRICE..... 54.50

Kit of complete parts for assembly of 3-Tube PHONOGRAPH, including cabinet.....\$27.50



New Automatic Record Changer Unit

with 1 or 2 remote 10" speakers in cabinets. Plays records for schools, auditoriums, etc. Can be used as a P.A. system or to play electric guitars. Plays 10-12" or 12-10" records.
 List Price.... 1 speaker.....\$118.50
 List Price.... 2 speakers..... 134.50
 OUR SELLING PRICE.... 1 speaker.... 72.50
 OUR SELLING PRICE.... 2 speakers.... 84.50



PARTS BARGAINS ALL NEW (NOT Surplus)

- CONDENSERS:
 - .01-.02-.05-1. w.v.—600".....\$9.00 per 100
 - 20 Mfd. 50 w.v..... 0.26
 - 30 Mfd. 450 w.v..... 0.52
 - 10 Mfd. 450 w.v..... 0.35
 - 16-16 Mfd. 450 w.v..... 0.78
 - 16 Mfd. 450 w.v..... 0.40
 - 8-8 Mfd. 450 w.v. with a 10 Mfd. 50 w.v. Dry condenser with a chassis clamp.....\$0.72
- Assorted as required. All values of condensers at comparable prices.
- RESISTORS: 1/2 watt resistors..... \$3.00 per 100
- 1-watt resistors..... 4.50 per 100
- Assorted as specified by you.
- CRYSTAL PICK-UP ARMS—complete..... \$2.25
- HOOK-UP WIRE, #22 solid push back, color coded, per 1000 feet..... 5.60
- GENERAL ELECTRIC METERS. R.F. Ammeter, 2 1/2" case, 0 to 1.0 Amp..... 5.25
- GRUEN METERS. 425UA-DC, 2 3/4" square case with multi-range dial. Make your own tester..... 5.50
- TUBES:

5Y3G/T.....\$0.43	6SC7 Metal...\$0.78
5U4G......60	6SF5 Metal.... .60
6V6G/T......72	50L6G/T......72
6N7 Metal.... 1.02	35Z5G/T......56
6L6GA..... 1.18	
- 120 M.A. POWER TRANSFORMERS—700 VCT, 6.3 VCT 3.7 A., 5VC3A..... 4.10

Many other items—send us your needs. ALL PARTS NEW (Standard Brands from Recognized Manufacturers)—COMPLETE WARRANTY.

All Prices FOB Los Angeles. 25% with order. Balance C.O.D.

D H D Electronics and Appliance Co.

3025-R SOUTH FLOWER STREET
LOS ANGELES 7, CALIFORNIA

are NAVE (pronounced *Navy*), operating on 12.250, 15.930, 15.960, 9.288; among frequencies in the United States worked by NAVE were (announced) 15.610, 10.010, 15.370, 15.830, 14.800, 17.900, 15.835, 11.460, 20.820, 20.800. When first picked up, NAVE was in the Canal Zone, and had a better signal here than did the American network stations contacting it." We join Mr. McLaughlin in his "hope we can follow them down to the Pole!"

(It will be appreciated if readers will send in details of reception of NAVE to your ISW Editor, 948 Stewartstown Road, Morgantown, West Virginia, U.S.A.)

* * *

UN Sessions

At your request, Roger Legge, New York City, has compiled this list of United Nations Broadcasts from the United States; this will be of especial interest to overseas readers. (Time is GMT.)

To Europe—WNBI, 17.780 (16.87 m.), 1500-1830; WNRI, 13.050 (22.99 m.), 1500-2315, and on 6.190 (48.47 m.), 2330-0030; WNRX, 21.610 (13.88 m.), 1500-1845, and on 9.750 (30.77 m.), 1900-0030; WOOC, 15.200 (19.74 m.), 1500-2130, and on 11.870 (25.27 m.), 2200-0030. (When there is no UN broadcast on the air, these stations carry "Voice of America" programs.)

To Latin America—WCBX, 15.270 (19.65 m.), WLWL-1, 9.750 (30.77 m.), WLWO, 11.790 (25.45 m.), and WRCA, 9.670 (31.02 m.), 0215-0315, except Monday.

To Australasia—KNBA, 9.490 (31.61 m.), KNBI, 9.490 (31.61 m.), and KRHO, Honolulu, 9.650 (31.09 m.), 0745-0845, except Monday.

Mr. Legge reports that the relays to Europe during the day are mainly relays of UN Sessions; the Latin America and Australasia broadcasts are programs put on by UN. The UN sessions can be relayed by any station so desiring.

In addition to the above, the Canadian Broadcasting Corporation's International Service, with studios in Montreal, is using its powerful s.w. transmitters at Sackville, New Brunswick, for relaying UN broadcasts overseas.

* * *

Report On Swedish DX Program

Reception of the special DX broadcast from the Swedish Radio, Stockholm, November 24, 1946, dedicated to readers of RADIO NEWS, varied in many quarters, from "good" to "inaudible." High sunspot activity—and in many places, local QRN—prevented good reception in most points of the United States and Canada; some DXers reported bad QRM from a New York transmitter, interfering with reception of SBT, 15.155, while SDB-2, 10.780, was hampered by CWQRM.

QSL cards on the broadcast are being sent out direct from Stockholm to all those who sent in correct reception reports. We wish to thank the Swedish Radio and Arne Skoog, Stockholm, for having made possible this fine broadcast which had as its theme "the part SW radio can play as a medium for a better understanding between the peoples of the world."

SBT, 15.155, continues to send a good signal daily to the Eastern United States in its North American beam, 10-10:55 a.m., while SDB-2, 10.780, is usually a good signal afternoons in the Home Service relay. The Swedish Radio, Stockholm 7, Sweden (Sverige), would appreciate reception reports at any time from those who pick up the Swedish transmissions anywhere in the world.

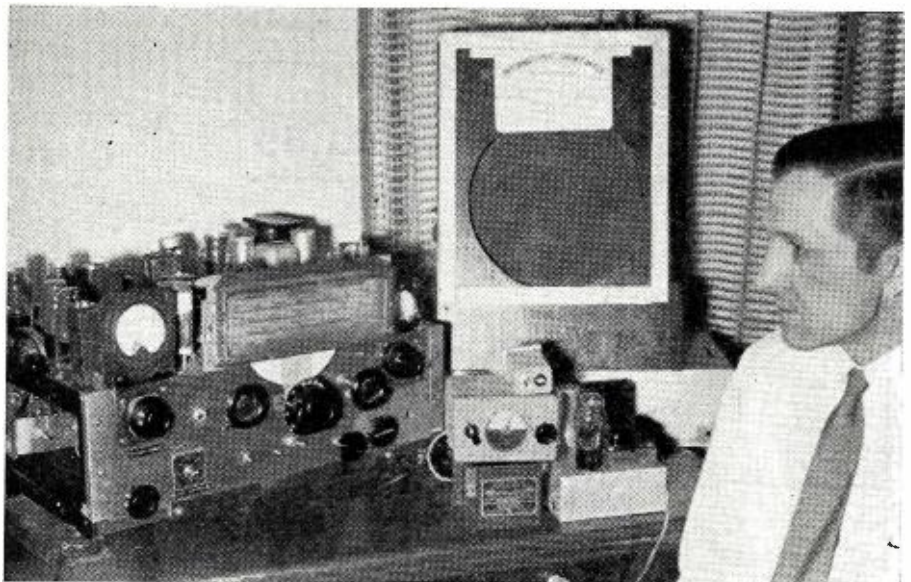
* * *

Radio Club Notes

England—New editor of the "Short Wave Review," official organ of the British Short-Wave League, is J. Wm. Charge 34, Winborne Drive, Pinner, Middlesex.

Italy—Direct from the Radio Club

Henry Ecklund of St. Paul, Minnesota is an avid short-wave listener. His record of bringing in the DX is especially noteworthy considering that all his work is done on this home-constructed receiver which employs four 6V6s in push-pull parallel, 25-watts output and class A amplifier. His specialty is the Far East.



Snap-on

Octo-Grip

TRADE MARK

SCREW DRIVERS



THE Right Driver FOR EVERY JOB . . .

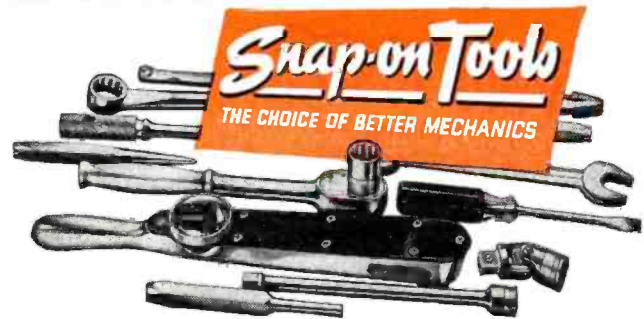
● Use of the right screw driver for the job is a factor which, multiplied many times during the course of a working day, affects production importantly. Snap-on helps you select the right screw driver . . . makes more than 75 different models, including Phillips screw driver in both one piece and detachable heads, Reed & Prince drivers, offset and hammer head and spark testing drivers . . . in fact, every type of screw driver needed for industrial use.

Snap-on OCTO-GRIP screw drivers in particular are built for modern production needs . . . with nickel-molybdenum alloy steel blades . . . tested precision ground hard-tempered tips, non-slip shock-proof OCTO-GRIP plastic handles.

Snap-on screw drivers, like Snap-on's 4,000 other tools,
February, 1947

are distributed through 37 factory branches, one of which is conveniently near you. Write for information.

SNAP-ON TOOLS CORPORATION
8120-B 28TH AVENUE • KENOSHA, WISCONSIN



WAR SURPLUS! RADIO PARTS

COMPLETE KITS OF "HARD-TO-GET" CRITICAL ITEMS!

Cat. No.	Quantity	Description	Price Per Kit
122	3 lbs.	Asstd. Screws and Washers	1.00
123	5	Asstd. CO-X-Cables W/Connectors	1.00
124	5	Asstd. Volume Controls	1.00
125	10	Asstd. Bath Tub Condensers	1.00
126	300	Asstd. Terminal Lugs	1.00
127	200	Asstd. Cable Clamps	1.00
128	2000	Asstd. Aluminum Rivets (Solid)	1.00
129	200	Asstd. Banana Plugs	1.00
130	1000	Asstd. Lock Washers	1.00
131	1500	Asstd. Flat Washers	1.00
132	500	Asstd. Nuts	1.00
133	500	Asstd. Eyelets	1.00
134	100	Asstd. Motor Brushes	1.00
135	200	Asstd. Knobs	1.00
136	5	Asstd. Wafer Switches	1.00
137	5	Asstd. D.C. Relays	1.00
138	20	Asstd. Tube Sockets	1.00
139	20	Asstd. Jewels and 3 Pilot Lights	1.00
140	100	Asstd. Brackets	1.00
141	25	Asstd. Terminal Strips & Boards	1.00
142	100	Asstd. Fuse Clips	1.00
143	50	Asstd. Little Fuses 3AG and 4AG	1.00
144	25	Asstd. Fuse Holders 3AG & 4AG	1.00
145	25	Asstd. Shock Mounts	1.00
146	25	Asstd. Fuse Posts	1.00
147	100	Asstd. Ceramic Stand-off Insulators	1.00
148	10	Asstd. Photo. Tubes	1.00
149	25	Asstd. Midsize Tube Shields	1.00
150	50	Asstd. Tube Clamps & Brackets	1.00
151	15	Asstd. CO-X-Connectors	1.00
152	100	Ft. Asstd. Vinolite etc. Tubing	1.00
153	3	Ft. Lengths	1.00

MALLICRAFTER I.F. TRANSFORMERS

Nos. 50c175, 50c176, 50c177, 50c178	—5.25 MEG	Each	1.00
No. c282 1st I.F.	4.55 KC	Each	1.00
No. 51B335-T2	30 to 40 MC	Each	1.00
No. T-5-R 2nd I.F.	4.55 KC	Each	1.00
No. 50B090 1600 KC		Each	1.00
No. T-2-R 30 to 40 MC		Each	1.00

15' 8 Conductor Cable with Male & Female Connectors Each \$1.00

TUBES

The Following Types of Tubes at \$1.00 Each.

6H6, 6X5, 6SJ7, 5R4GY, 6J6, VR105, VR150, 6AC7, 6C4, 6SL7, 12SN7, 9008, 3B7, 6B4, 6AG7, 6AL5, 6AC5, 2D2D, 5Y3, 2X2, 6AG5, 2C26.

Filter Chokes, Type 363-H 8 Hy. 120 MA. D.C. 1500V Test Each \$1.00
LCU3C Oscillator Unit for 6C-683 Receiver Each \$1.00

Time Delay Relay Set for Two Seconds, 50/70 Cycles, 115 Volts A.C., Calibrated at 60 Cycles, S.P.D.T. Switch, 10 Amps, W.D. 473, Type Galvin 50C48746.

\$5.00 Each

Hallcrafters Power Transformer No. 52C084, Used in RDC1, Primary 1-2-3-4, 220 V. or 115 V. Secondary Voltage 9-10-11, 270 V. at 150 MA., 6.3 V. Heater Taps (5.6), 4 Amps, 5 V. Heater Taps (7.8) 2 Amps.

\$3.50 Each

Hallcrafters Dual Reactors No. 56C048, Used in RDC1, 865.4, 18 Henries, 150 Mils. 865.5, .3 Henry, 1.7 Amps. Each \$2.00

Oil Filled Capacitors in Metal Cans
8.5-8.5 MFD 10-20% 1000 V. 5x3 1/2x2 \$2.00
.03 MFD 7500 V.D.C. G.E. No. 25F403 2.00
.25 MFD Vitamin Q 3000 V.D.C. 3 3/4x1 3/4x1 2.00
4 MF 800 V.D.C. 4x2 1/4x1 1.00
1.00 MF 200 V. D.C. 40 to 65 C.W.E. 1.00
3 1/2x4 3/4x1 3/8 1.00
4 MF 400 V.D.C. 50 C. 85 C 3 3/4x1 3/4x1 1.00
.5 MFD 600 V.D.C. Sprague 2x1 3/4x1 1.00
1.0 MUF 500 V.D.C. G.E. 2x1 1/4x3/450

Mica Condenser 2 MFD 2200 V. 4 1/2x4 1/2x2. 3.00
2 Gang Condenser Min. 35 MMFD Swing 275-305 MMFD 1750 Volts Test 1.50

All items listed above are subject to prior sale. Terms cash with order. F.O.B. Chicago, Ill. Remit only exact amount of purchase. If pre-paid include postage charges.

IRVING JOSEPH

220 S. Halsted St.,
Chicago 6, Ill.

Buyer and Distributor of
Surplus Stocks

D'Italia, Rome, comes this data: "Immediately after the end of the war, the Radio Club D'Italia started its activity. It tries to gather the amateurs who are scattered all over the country, and we want to line them up and to give them such an organization that finally also the amateurs would have a personality, a real, genuine ego. At the present time, many new and old elements are united in the Radio Club D'Italia and we fight on all levels the perennial bureaucracy of this country. Indeed, at the end of May, 1946, the Allied Control Commission gave permission to the amateurs to start working but in five months the Italian authorities have failed in bringing out the necessary legal provisions, and for this reason, the amateurs are still in the same condition in which they were under the fascistic rule." (Letter was dated September, 1946, and since that time, I believe Italian "hams" have returned to the airwaves.)

"We had organized an exchange service QSL, which avails itself of the principal airlines of the world; we had established schools for radiotechnicians in which we wanted to train the great number of new and inexperienced amateurs; two great annual contests have been organized for the OM, open to all OM from all countries, with two cups being assigned as prizes. These contests will take place every year during January and February.

"Three categories of members are represented in the Radio Club D'Italia: Transmission amateurs; listeners; and students of theoretical radiotechnics.

"Presidency of the Radio Group is held by KTA (Pietro Spriano), with two advisers—the TQ (Luigi Ivaldi) and the WR (Oscar Buglia Gianfigli). Headquarters is in Alessandria, Via Alessandro Sappa No. 1. Address of the Office for WSL movement is R.C.I., P.O.B. 147, Alessandria, and there is a

QSL exchange every other week." Official publication of the club is called "Radioschemi."

Spain—This information regarding officers of the R.C.E. (Radio Club Espanol) comes from Luis Diez Alonso:

President, Javier de la Fuente, Plaza de las Brisas, Sardinero, Santander; vice-president, Luis Diez Alonso, Daoiz y Velarde, 25, Santander; second vice-president, Luis Perez Alvear, EAJ32, Radio Santander, Santander; editor of club bulletin, Arturo Moreano, Stos. Martires, 5 Letr "B," Santander; secretary, Francisco Bercedo, Martillo, 13 segundo, Santander.

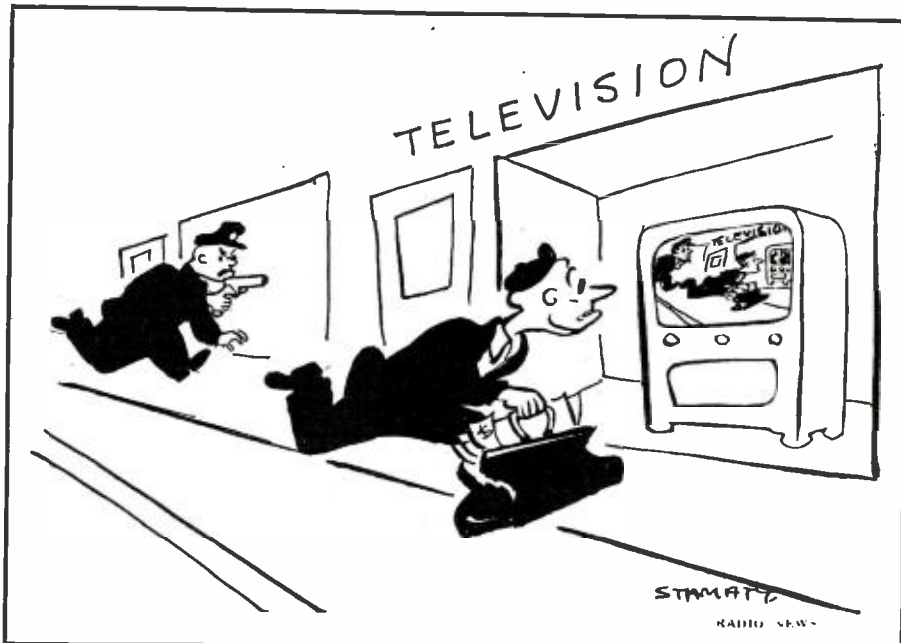
U.S.A.—Persons wishing sample bulletins of the URDXC are now requested to send along ten cents to cover cost of mailing out. Requests should be sent direct to Charles Norton, president, Universal Radio DX Club, 7507 Holly Street, Oakland 3, California, U.S.A.

Verifications

Radio SEAC, G.P.O., Colombo, Ceylon, is verifying widely now with a black and white, odd-size QSL card which is sent via airmail. (Cooley)

Mervyn P. Laubscher, South Africa, writes: "My airmail report on XGOY, 9.635, Chungking, of May, 1946, was verified by an airmail card which I received six weeks after mailing my report; it is a plain white card with 'The Voice of China,' address, and frequencies in black; in the left-hand corner is a drawing of a panda; verie was signed by the director of the station, Fung Chien." Reports for XGOY may be addressed simply to XGOY, The Voice of China, Central Broadcast Administration, Chungking, China; while they may not be required, it is suggested that an IRC accompany reports.

Gote Olsson, Sweden, reports that The Turkish Press Department, Radio Branch, Ankara, Turkey, is now sending out a new verification card; it has an attractive outline map of Turkey



ANNOUNCING THE

Symphonette



IMPROVED CLARI-TONE CHASSIS *

275% MORE POWER

GREATER SENSITIVITY

LESS DISTORTION

BETTER TONE QUALITY

LONGER SET LIFE

LONGER TUBE LIFE

In the SYMPHONETTE radio-phonograph table combination with automatic record changer, CLARION has achieved another masterpiece of compact efficiency. By means of the revolutionary and exclusive CLARI-DISC rectifier, a reserve of power up to 275% allows undistorted tone from a whisper to symphonic volume.

*Patent Applied For

"Calls the world to your door"



Clarion

AMERICA'S FIRST
AUDIBEL RATED

RADIO

WARWICK MANUFACTURING CORPORATION • 4640 WEST HARRISON
CHICAGO 44, ILLINOIS

In New Jersey...
...it's **VARIETY**

**SUPERIOR
Model 670
Super-Meter**

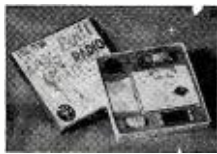


A Combination Volt-Ohm Milliammeter plus Capacity Reactance Inductance and Decibel Measurements.

Complete with test leads and instructions **\$28.40**

RADIO KITS by "EASY BUILT"

Model No. 2



Model No. 2 Kit. AC-DC. Electric Battery Kit with Cabinet complete with Tube, Special Variable Condenser, Earphones, Resistors, Hardware and Special Fittings. Completely Wired Tube Socket. Diagram on Mounting

Base—Ready Cut and Drilled. **\$5.01 each**

Model No. 2B. Battery operated, easy tuning, attractive wood finish cabinet. Complete with Tube, Coil, Battery, Headphone, Hardware and Base. **Special \$3.33**

List Price \$4.98
Kit No. 1 \$2.13
Kit No. 1X \$2.13

Federal Telco SELENIUM RECTIFIER

Replaces Rectifier Tube..... **\$1.09 each**
6 or more..... **99c each**

PHONO MOTOR with TURNTABLE

60 Cycles 115 Volts \$3.95

Suitable for every phonograph instrument where low cost and dependable performance are required.



\$3.95

Famous Brand

VOLUME CONTROLS WITH SWITCH

75c each 10 for **\$6.96**
5,000, 10,000, 25,000, 50,000, .1 meg., .25 meg., .35 meg., .35 meg 70,000 ohm tap, .5 meg., .5 meg 50% tap, 1 meg., 1 meg 50% tap, 2 meg 50% tap. Outside diam 1 1/4", shaft length 3", flat 1/4".

RESISTOR CABINETS

All wood construction. Six shelves, 24 compartments **\$3.89**

R.C.A.-T65 CABINET

Packed in original carton. Beautiful inlaid veneer with grill cloth. Speaker baffle for 5" speaker. Rubber feet. **\$4.95 each.** Three for **\$14.00**

Bargain! Guaranteed!

100 Assorted Bypass Condensers

10—.001—600v	10—.01—600v
15—.002—600v	10—.02—600v
10—.005—600v	10—.05—600v
15—.006—600v	10—.1—600v
	10—.5—200v

Value \$11.00
Special \$6.95

SPECIAL! 20 x 20 150 WV, Electrolytic condensers, Fresh stock, guaranteed. Value **10 for \$4.95**
\$8.75

Write Dept. N-2 for our FLYER. 20% Deposit with order required. Please add sufficient postage. Excess will be refunded.

Variety ELECTRIC CO., Inc.
601 Broad St., Newark 2, N. J.

with an antenna mast rising from Ankara. Other recent veries received by Mr. Olsson include those from VLH3 and VLR2, Australia (cards are slightly different for these respective calls, signed by same person); CXA19, Uruguay, which sent along a colorful brochure on Difusoras del Uruguay; and WNRX.

W. J. Arthur, West Virginia, reports that HH2S, Port-au-Prince, Haiti, verifies promptly; stated "actual" power is 300 watts, using an east-west bi-directional radiation; stated frequency as 5.943, but no schedules were furnished.

From the Directorate-General, All India Radio, New Delhi, we learn that they "send QSL cards in verification of reception reports from listeners; it is *not* necessary to send International Reply Coupons as we do not make use of them; all reception reports from foreign listeners are sent for verification and acknowledgment to Station Engineer, AIR, Delhi." (Reception of all AIR stations—including Madras, Bombay, Calcutta, and so on—should be reported to AIR, Delhi.)

Rex Gillett, Australia, reports a nice verie from HS8PD (*note official call sign*), Bangkok, Siam; this very colorful card with yellow background, features a map of Siam and below the map the skyline of Bangkok, both being in white; "the card is a worthy addition to any collection," Gillett states; his verie was marked, "Yours is our second report since the war." Frequency was given as 6.040 but is nearer 5.990, according to Mr. Gillett; power was given as 900 watts. HS8PD's schedule was stated to be 5-6:30 a.m.; the CBLX station, HS7PJ, on 825 kcs. and HS8PD, however, were stated to be in parallel between 7-9:15 a.m.

On December 1, 1946, William Cooley, Fairchance, Pennsylvania, received verification from CBLX, 15.090, 7500 watts, Montreal, Quebec, Canada; it was stated that studios are in Montreal, transmitter at Vercheres, and operating time was listed as 7 a.m.-8 p.m. daily; card was signed by J. Marcotte who added the footnote, "This frequency has been in use only since October 23, and *you are the first one reporting reception of CBLX.*" simply address, CBLX, Montreal, Quebec, Canada.

A Swedish correspondent, Gunnar Persson, has received a letter verification from Sudwestfunk, Baden-Baden, Moltkestrabe 5, Kaiserin Elisabeth, French Zone of Germany; gave frequency of 6.321, with schedule of 2 a.m.-12:45 p.m., Sundays from 2 a.m. to 6 p.m. The same monitor has received a QSL card from Norway with picture of Oslo; this verified the Fredrikstad experimental short-wave transmitter on about 6.185, scheduled 12 noon-1:30 p.m. and 3:45-5 p.m. with 8 kw. power; address, Administration of Telegraphs Radio Department, Broadcast Division, Oslo, Norway (Norge). Also reported is "the new QSL card with map of Italy" from

Value Plus!



MODEL 100

ACID ETCHED PANEL

**Electronic
Voltmeter Ohmmeter**

Gives you constant accuracy and guaranteed performance. A stable bridge circuit type vacuum tube meter for measuring AC-DC voltages and ohms. Actual tests establish its superiority. Simple to operate. Hand calibration and hand calibrated multiplier resistors assure constant accuracy and stability.

Measures DC volts up to 600 with constant input resistance of 11 megohms. Resistor in the DC probe permits readings in signal-carrying circuits. Positive or negative indications through a reversal switch. Net price, \$75.00.

Meter Ranges: DC 0-3; 0-30; 0-150; 0-300; 0-600. Multiply by 4 with external probe. AC 0-3; 0-30; 0-150; 0-300. Ohms 0-1000; 0-10M; 0-100M; 0-1 Meg.; 0-100 Meg.

ELECTRONIC MANUFACTURING CO.
714 RACE STREET. HARRISBURG, PA.

MONITOR CRYSTALINER

Model 201



\$69.50

F.O.B. Los Angeles

TIME SAVING: No stabilizing warm-up period necessary. Frequencies required for receiver alignment instantly selected. No confused dial.

ACCURATE: All signals are crystal controlled—Accurate to .1 of 1%.

DEPENDABLE: Always in adjustment. No variable condensers to wear. No coils to age. Dependable as the ageless crystal itself.

COMPACT: Occupies a minimum of bench space. As light and portable as a Kodak.

ATTENUATION: Efficient attenuator provided. Maximum output approximately 10 volts. Continuous attenuation through two ranges.

COMPLETE COVERAGE: Twenty-three direct crystal controlled frequencies from 175 to 8700 KC. Harmonics as high as 140 MC.

MODULATION: Frequencies on dial and their harmonics may be modulated with a 400-cycle (crystal controlled) tone.

AC OPERATION: 50-60 cycles, 110-120 volts. Electrostatically shielded isolation power transformer. Send in your name for our mailing list.

RADIO EQUIPMENT DISTRIBUTORS
312 W. Pico Blvd., Los Angeles 15, California

RADIO NEWS

Radio Italiana, Via Arsenale 21, Torino, Italy (Italia). And from Spain came a letter verifying reception of Radio S.E.U., Station EDV10, Diego de Leon, 48, Madrid, Spain (Espana).

Buddy Giles, Texas, recently received verification from JLU-2 and JVV-2, Tokyo, Japan, signed by Major Carl E. Frisby; address, Technical Supervisor, Japanese Radio Systems, Headquarters, 8th U.S. Army Signal Office, Tokyo Communications Center, A.P.O. No. 181, c/o Postmaster, San Francisco, California, U.S.A.

This Month's Schedules

Alaska—A letter verie from WXFG gives power as 600 watts; said is beamed to Seattle. Uses a frequency of around 12.255 and can be heard usually around 10 p.m.-1 a.m., irregularly. (Rice)

Albania—ZAA, 7.852, *Radio Tirana*, has English news between 4-4:15 p.m. daily now. (Hughes)

Andorra—*Radio Andorra*, 5.985 (varying), has a *daily English* period between 3:30-4 p.m., produced by Freemantle Overseas Radio Network, London; is good level in England. (Rowden) This station is heard well in the eastern U.S., mostly in Spanish, to around 7 p.m. closedown.

Australia—VLC9, 17.84, to Eastern North America evenings, has been dropped; only VLA9, 21.600 is used, 7:15-8:30 p.m. The special DX program continues to be given at 8:10 p.m. Saturday, immediately following the 8 p.m. newscast. The West Coast beam, 11:45 p.m.-12:45 a.m., is heard over VLA4, 11.77; VLB9, 9.615; VLC4, 15.32; and VLG7, 15.16; the special DX program on Sunday is at 12:30 a.m. (Balbi)

For the 11 a.m.-12 noon beam to West Coast, currently in use are VLA8, 11.76; VLC6 (or VLB9), 9.615; and VLG4, 11.84. (Balbi)

VLR2, 6.150, Melbourne, signs off at 9 a.m. (Dilg) Usually has a good signal here in West Virginia mornings; relays the BBC news from London at 8 a.m., followed by Australian news.

Here in the East, VLQ2, 7.215, Brisbane, has had improved signals lately; news is heard well at 8 a.m. VLW7, 9.52, Perth, which signs off at 11 a.m., is one of the best Australians this winter.

VLC10, 21.680, is being used again to Britain, 2-3:15 a.m., replacing VLA2, 9.615, which was used only a few days on this transmission. (Balbi) Is heard on West Coast, 4:15-6:30 p.m., to Forces in Pacific; opens rather weak but signal improves to fairly good during last hour; in this beam, the 19- and 25-m. band frequencies are inaudible on West Coast. (Dilg) All three—21.680, 11.77, and 15.200—are sometimes heard in the East in this transmission.

Bermuda—SFD2, 10.335, was heard recently at 8:58 a.m. contacting WOG2. (Ferguson) Call is probably "ZFD2."

British Somaliland—*Radio Somali*, 7.126, Hargeisa, is being heard again



Model MX Smooth Power Motor

ENCLOSED FIND

Smooth Power

The new die-cast bearing brackets on *Smooth Power* MX Phonomotors make them all 'round better motors. They allow more accurate centering of the motor in the field, which results in an even torque and aids in the elimination of vibration.

This improvement is typical of the advanced engineering that features our complete line of motors, recorders and combination record-changer recorders. Their quick pick-up to full, constant speed, their quietness and freedom from vibration and wow . . . all will delight you and your customers.

Your own fine products will give *smoother* performance when they're equipped with *Smooth Power* mechanisms.

NOTE TO INDIVIDUAL USERS:

Smooth Power motors are sold only through established trade channels.

THE GENERAL INDUSTRIES CO.
DEPARTMENT MR • ELYRIA, OHIO

WATERMAN

DOES IT AGAIN!



A NEW PORTABLE

INDUSTRIAL AND TELEVISION

POCKETSCOPE

MODEL S-11-A

AN OSCILLOSCOPE OF UNUSUAL VERSATILITY and UTILITY

LIGHT . . . COMPACT . . . EFFICIENT

A 3-inch oscilloscope for measuring AC and DC... Amplifiers for vertical and horizontal deflection as well as intensity... Linear time sweep from 4 cycles to 50 kc with blanking of return trace... Sensitivity up to 100mv/in... Fidelity up to 350 kc through amplifiers... Attenuators for AC as well as for DC... Push-pull amplifiers... Anti-stigmatic centering controls... Trace expansion for detail observations.

Direct connections to deflecting plates and intensity grids accessible from rear... Retractable light shield... Detachable graph screen... Handle... Functional layout of controls.

Light weight: 8 3/4 lbs. . . \$99 F.O.B. PHILA.
Portable size: 11"x 7"x 5" . . .

WATERMAN PRODUCTS COMPANY
INCORPORATED
PHILADELPHIA 25, PENNSYLVANIA

... and the
GENERAL PURPOSE

POCKETSCOPE

MODEL S-10-A

Widely known, widely used by engineers, industry, amateurs and laboratories for convenient, efficient and accurate testing and measuring requirements... an instrument of versatile application and dependable performance.

\$66 F.O.B. PHILA.



MINIATURE

LOWEST PRICES YET!

EXTRA-SENSITIVE HEADSETS

Manufactured to meet rigorous U. S. Government specifications! Both types extremely sensitive and employ matching transformers for hi-impedance outputs. Each employs miniature phone units with Alnico magnets. The "MINIATURES" are a lightweight compact type with soft-rubber eartips, flexible rubber cord, rubber spring-clip and standard phone plug.

\$195
PRICE COMPLETE

"NOISE-PROOF" headsets employ the same hi-efficiency phone units but in rubber cushioned magnesium earcups that fit snugly and comfortably over each ear. Ideal for hams and commercial operators, recording engineers, aircraft pilots and others. Their superiority for comfort and efficiency over regular headsets is overwhelming.

\$298
PRICE COMPLETE

Send check or money order for postpaid delivery. Dealer and Distributor inquiries invited on quantity.

TAYBERN EQUIPMENT CO.

120 GREENWICH ST.

NEW YORK 6, N. Y.



NOISE-PROOF

HOW AVAILABLE

SERVICE DEALERS



4 in 1

Job Cards
Shop Cards
Postal Notices
Storage Signals

JOB CARD STYLING

STYLED TO ORDER
"CUSTOM TAILORED"
SERVICE

Radio Press MORGANTOWN WEST VIRGINIA

The HOUSE OF A MILLION RADIO PARTS

BARGAINS for SERVICEMEN, AMATEURS, EXPERIMENTERS

No. 01—0 to 1 Standing Wave Meter—used to check Feeder—and for Field Strength Meter . . . \$4.95
No. 300—McClintock 0-300 D. C. Milliammeter 3 1/2" Square . . . \$3.93
No. 500—McClintock 0-500 D. C. Milliammeter 3 1/2" Square . . . \$3.93
No. 350—C. E. 3 1/2" Foundation Meter—Make your own Volt-Ohm Milliammeter Unit . . . \$6.95

Thousands of other bargains in stock for immediate shipment. Write for catalog.

LIFETIME SOUND EQUIPMENT CO.
Dept. 55 Toledo 2, Ohio

mornings on the West Coast, best around 9:15 a.m. (Dilg)

The BSWL reports that *Radio Somali* opened in 1942 in Harar (Abyssinia) as a local force station, using a homemade transmitter of about 200 watts made from captured enemy material; it moved from Harar to Hargeisa in 1943 and was taken over by the Government there, which had purchased a 600 watt American transmitter (amateur type), used as the *Radio Somali* station until November, 1943. Hargeisa is the temporary capital of British Somaliland, and is situated 110 miles southwest of Berbera, the chief seaport; QRA of *Radio Somali* is Information and Broadcasting Department, Hargeisa, British Somaliland.

Bulgaria—LZB, 7.460, *Radio Sofia*, is heard in England daily with an *English* program between 3:30-3:40 p.m. sign-off. (Hughes)

Burma—Official schedules received direct from *Radio Rangoon* list *English* transmissions as 8:15-8:45 p.m., with headline news at 8:30 p.m., on 9.543; 1:15-2 a.m., with news at 1:30 a.m., on 6.035; and 8:40-10:15 a.m., with news at 8:45 a.m., and headline news and summary of next day's programs at 10:10 a.m., on 9.543; those are "weekday" schedules, and for Mondays, *only* the last period is listed. Programs are heard *daily* between 6:15-7 a.m. in Hindustani, presumably on 6.035.

Canada—CKRZ, 6.060, is a new station added by the CBC's International Service in the Caribbean and Latin American beam, 6:20-7:35 p.m. daily; in this beam, CKRA, 11.76, is heard at the same time daily, *except* Sunday when it runs to 9:05 p.m. close-down. The European beam is radiated on CKNC, 17.82, 9:30 a.m.-12:45 p.m. daily, and 7 a.m.-12:45 p.m. Sunday; CKCX, 15.19, 9:30 a.m.-12 noon daily, and 7 a.m.-12 noon Sunday; CKCS, 15.32, 12:05-3 p.m. daily; CHOL, 11.72, 1-6 p.m. daily; and CKLO, 9.63, 3:15-6 p.m. daily. Incidentally, the CBC is sending out a fine monthly booklet entitled "*Canada Calling*," from the new address of the International Service, CBC, P.O. Box 7,000, Montreal, Quebec, Canada. (Flitcraft, Cooley)

CKRO, 6.150, Winnipeg, Manitoba, has "Night Final" news at 12 midnight; CKRX, 11.72, also Winnipeg, is heard as late as 12 midnight. CBRX, 6.160, Vancouver, British Columbia, has news at 2:45 a.m., usually is fair signal. (Reed) This latter one usually is heard well here in West Virginia with the news at 12 midnight.

Cape Verde Islands—CR4AA, 6.465, Praia, is correct call. (URDXC) *If this station is still on the air, your ISW Editor would welcome schedules.*

Celebes—*Radio Makassar's* 5.030 frequency recently has been a much better signal than its 9.260 (varying) outlet; peaks around 7 a.m. (Dilg)

Ceylon—*Radio SEAC*, 11.77, Colombo, is heard with very poor quality in its 7:30 a.m.-12 noon transmission, being QRM'd by G.V.U., London,

RADIO NEWS



FREE!
Radionic Catalog

Typical Radionic Catalog Values

Thousands of items, illustrated, described and priced in our new 1947 catalog. Hams, Servicemen, Experimenters, Engineers, Schools, Institutions, Govt. Depts., Industrial Organizations, Laboratories, etc. will find this book a great help in their search for "hard-to-find" equipment.

RECORD CHANGERS

VM, Model 200B	\$17.75
Detrola, Model 550C	18.26
Erwood, Model 105	23.45
Garrard, Model 60LC*	67.92
Collaro, Model 196*	76.58
WEBSTER 50, 55 and 70* In Stock	
*(Mixes 10" and 12")	

SPRAGUE Complete Line

PHONO MOTORS	
Alliance	\$3.75
Ballantine	4.41
Webster M-15	IRC Complete Line

PILLow SPEAKERS

Brush Husatone	\$9.55
Tolex	8.25

CLAROSTAT Complete Line

RECORDING EQUIPMENT	
Rek-O-Kut, Model G	\$125.00
3 3/4 and 78 RPM transcription turntable.	

Rek-O-Kut, Model B5	\$175.00
Cut 120 lines per inch.	
Rek-O-Kut, Model RKD-16	165.44
33 and 78 RPM, 16" recording motor assembly.	
VM-2 Recording level meter	29.50
T-45 Matching transformer	9.50
500 or 8 ohms to hi-imp.	
Brush RC-20 Crystal cutter	14.70
± 3 db, 50 to 9000 cps.	

WARD LEONARD Resistors and Relays

WESTON	
Model 779, Analyzer	\$ 75.00
1000 and 20,000 ohm/volt.	
Model 697, V-O-M	26.52
Model 798 Tube Tester	183.53
Genuine Mutual Conductance	

PERCO Complete Line

TRIPLETT	
Mod. 3212 Counter Tube Tester	\$62.23
Mod. 2413 Portable Tube Tester	48.51
Mod. 2432 Signal Generator	86.73
Mod. 2400 V-O-M	48.51
Mod. 625N V-O-M	44.18
Leather case for 625N	
Mod. 666H V-O-M	19.60
Leather Case for 666	
Roll Chart for 2413	4.90

SPEEDWAY

Elect. Hand Drill No. 69 1/4" chuck	\$11.80
Elect. Hand Drill No. 89 1/2" chuck	29.95
Elect. Hand Drill No. 89J 1/2" Jacobs chuck	34.95
Portable Bench Grinder No. 117	14.95
Coarse and fine grinding wheels	
Combination stand for No. 69 and 117	5.25
Drill Stand No. 209 for 489 drill	12.95

BURGESS BATTERIES Complete Line

TRIMM HEADPHONES	
Acme, 2000 ohms, double	\$1.62
Dependable, ohms, double	2.45

TELEGRAPH KEYS

Speed-X Mod. 515	\$7.35
Speed-X Practice Set No. 450	2.65
Speed-X Buzzer No. 400	1.06
Speed-X Standard Key No. 310	1.91
Vibroplex "Original"	15.95
Vibroplex Champion	9.95

RUB-R-LITE

Flashlights, with batteries	\$1.20
PRECISION	
Mod. 954-P Tube Tester	\$97.22
Mut. Cond. type and Battery tester.	
Mod. 832-S V-O-M	\$22.58
Mod. 864 Lab. Multi-range Test	58.40
Mod. 915 Tube and Battery	82.73

POTTER & BRUMFIELD Complete Line

SUPREME	
Mod. 546 3" oscilloscope	\$ 87.70
Mod. 576 Signal Generator	67.57
Mod. 562 Audolyzer	124.46

NATIONAL COMPANY Complete Line

R C P	
Mod. 447 V-O-M	17.59
Mod. 705 Sig. Gen.	48.51
Mod. 322 Tube Tester	40.67
Mod. 322P Portable Tester	44.59
Approved Electronics A-20	
Sig. Gen.	49.50
BOES Signal Tracer Probe	7.77
Meter Inc. V-O-M 5000 ohms/volt	22.50
5000 ohms/volt	
Waterman Pocketscope	52.83
Electron Tracer (Sig. tracer)	87.71
Meissner Analyst	111.57
Electronic Designs ED-100	48.95

ELECTRONIC MEAS. CORP. —

True Mutual Conductance Tube Tester, Model Z00B	\$55.81
HAMMARLUND Complete Line	
MC MURDO SILVER	
Vomax VT V-O-M	\$59.85
Cap. Res. Bridge Mod. 904	49.90
Dynamic Sig. Tracer Mod. 905	39.90

DUMONT

3" Oscilloscope Mod. 164E	105.00
5" Oscilloscope Mod. 208B	235.00
5" Oscilloscope Mod. 274	99.50
Square Wave Gen. Mod. 185A	105.00
CARDWELL Complete Line	
SHALLCROSS	
Wheatstone Bridge No. 630	\$ 75.00
Kelvin-Wheatstone Bridge No. 637	100.00

MASCO P. A EQUIPMENT

(all with tubes)

MA35RC	35 watt amp. with record changer	\$100.38
MA17	17 watt amplifier	34.42
MAS 17	17 watt port. system, with mike	80.35
MAF17	17 watt perm. system, with mike	77.32
MA25	25 watt amplifier	48.06
MAS25	25 watt port. system, with mike	99.36
MAF25	25 watt perm. system, with mike	96.21
MA35	35 watt amplifier	57.48
MAS35	35 watt port. system, with mike	108.78
MAF35	35 watt perm. system, with mike	105.48
MA17P	17 watt amp. with phono top	46.87
MAS17P	17 watt port. sys. phono top	92.77
MA25P	25 watt amp. with phono top	59.01
MAS25P	25 watt port. sys. phono top	110.31
MC25P	25 watt amplifier with phono top, for 6V DC and 115V AC	82.26
MAC25P	Complete port. system as above	133.68
MCO25P	Complete Outdoor system	139.86
MA50	50 watt amplifier	76.10
MAS50	50 watt port. sys. with mike	188.60
MAF50	50 watt perm. sys. with mike	160.70
MA75	75 watt amplifier	94.70
MAF75	Complete permanent system. (Amplifier, 4 12" speakers, 4 walnut baffles, 1 Shure mike, all cables and plugs)	232.70
MCO75	Complete outdoor system. (Amplifier, 4 25 watt PM driver units, 4 4 1/2-foot reflex projectors, mike cable, etc.)	305.75
MAP15	watt musical amplifier	51.59
Deduct 2% cash discount from all MASCO prices.		

CHANCELLOR 3-tube **RECORD PLAYER** in beautiful two-tone simulated alligator portable carrying case..... 27.75

AEROVOX Complete Line

NEW

PERMEABILITY TUNED Antenna and oscillator coil assembly. Eliminates variable condensers. Ideal for replacement of present ant. and osc. tuned circuits and for new construction. Complete with handsome dial and escutcheon, \$2.70.

With slide rule dial..... \$3.97

TUBES

SEND FOR LIST OF TYPES
NOW IN STOCK

E-L Varlo Tuner permeability tuned r.f. and osc. circuits; complete r.f. end of super-het..... \$2.65

Hi-Q Loop, for use with above..... 1.03

Meissner Choke Coil Kit, 10 assorted coils—Bargain..... .45

Sylvania IN34, diode rectifier..... 1.80

Vertrod all freq. ant. Kit No. 103..... 10.58

Vertrod all freq. ant. Kit No. 10..... 3.23

Flash-Heat Elec. Water Heater, Lots of 3, each..... 3.57

E-L Inverter Mod. 204, 115 DC to 115 AC 150 watts..... 22.64

E-L Inverter Mod. 261, 115 DC to 115 AC 75 watts..... 17.02

FTS Selenium Rectifier, Ea Lots of 12..... .93

CRYSTAL RECEIVERS

Carron Mod. 200..... \$2.95

Carron Mod. 100..... 2.40

Earphones for above..... 1.62

Antenna Kit for above..... .65

Revell with ant. kit and phones..... 6.35

METAL CASE OIL FILLED BATH TUB

600 Volt—Well-known Brand,	
125—1 mfd.....	12c
126—25 mfd.....	12c
129—5 mfd.....	12c
130—Dual .1-1 mfd.....	14c

ASTATIC CURVED ARM PICKUP

with **HI-OUTPUT CARTRIDGE**
Stock No. 300..... \$2.55
In lots of 3..... Each \$2.25

VOLUME CONTROLS

No.	Ohms	Dia.	Shaft	Price
220	10,000	1/4"	3/8"	29c
221	100,000	1/4"	3/8"	29c
222	300,000	1/2"	5/8"	29c
223	500,000	1/2"	1 1/4"	35c
224	500,000	1/4"	3/8"	29c
226	500,000	7/8"	1 1/4"	29c
227	1 meg	1 1/8"	3/4"	25c
228	1 meg	7/8"	3/8"	29c
229	1 meg	1 1/4"	1 1/4"	35c
195 100,000 Ohm VC less switch				35c

All Shaft Diameters 1/4".
*Insulated Shaft.
**Half Round Shaft.
***Tapped at 250,000 Ohms.

QUALITY RESISTOR KIT

50 assorted Insulated Carbon resistors; 1/4, 1/2 and 2 Watt 5 and 10% tolerance.
Entire Kit of 50, No. 178..... \$1.35

TRANSFORMER

2 1/2 Volt Power Transformer; 125 Mils—700 Volts high voltage—5 Volt Rectifier; for 12-14 Tubes No. 206..... \$2.95

UTILIPHONE

2 Station Intercom System, Complete..... \$14.50

COMMUNICATIONS RECEIVERS

National NC240D with speaker.....	\$241.44
National NC46 with speaker.....	107.40
National HRO-5TA less speaker.....	274.35
Speaker for above.....	12.00
Power supply for above.....	20.36
Hammarlund SPC400X with speaker.....	347.25
Hammarlund 129X with speaker.....	173.25
Galena Crystal in Ceramic Base.....	.45
Cat Whiskers , package of three.....	.09

MAIL TODAY

RADIONIC EQUIPMENT CO.
170 Nassau St., Dept. 52, New York 7, N. Y.
Please send me a FREE copy of your 1947 catalog.

Name.....
Address.....

IMPORTANT NOTE:—Terms in U. S. A.: 25% with order, balance C.O.D., other 50% deposit

It's RADIONIC for Everything ELECTRONIC

170 NASSAU STREET
RADIONIC
EQUIPMENT COMPANY
NEW YORK 7, N. Y.
Telephone WO 2-0421
Cable Address "CHANSLOR"

"TAB"

That's A Buy

Transformer cased "LANGEVIN" Pri 105 to 250V/60 cy Sec 2240 VCT/500 ma. 15V/4.5A. 15.2/2.5A. 2.5V/10A. @ \$11.50; two for... \$19.95
 1000 cycle hummer DC inpt-freq adjust-ble—KURMAN .97
 Transformer 50/800 cya/80 & 115 V. Sec 1000VCT-300V 110ma. 6.3V/4.5A. 5V/3A to 3V/6.5A. 6.3V/1.25A. & 2.5V/10A. H'cased chokes 10H/110ma & Two 15H/330VAC/1000WVDC oil Condens & 1641/RK80 Rect tube & socket 9.95
 Transformer 840VCT/110ma. 330VCT/21ma. 5V/3A. 5V/3A 6.3V/1A. 6.3V/6A. 115V/60 cy Pri & Two 10 hv/110 ma chokes & oil Condor 2/2.5 mid & 3 mid/600WVDC & Rack chassis 6.95
 H'mtelly cased chokes 10 Hy/125 ma/185 ohm. two for 2.50

IF YOU DON'T SEE IT—WRITE FOR IT
 ASK FOR CATALOGUE 99
 New Navy SP 37 Synchroscope Com-plate \$59.50

S.C. Remote control unit R-281 Complete New \$2.49
 S.C. Tuning Unit BC-746A & 2 crystals. 1.00
 Exit cord 16 foot hvy duty 53 with Male & Female plugs 1.00
 WE Dynamic Microphone D-17394A-B with 50' cable 9.95
 Kenyon dynamic mike to Grid transf. 1.95
 Collins choke 6Hy/1.2 amp/12500 V wkg. Cased 16.00
 Micro-Mu Switch leaf SPDT 15A/125V. two for 1.08
 Transf line 10 line 500 333 250 200, 125, 50 ohms ± 1DB. 1.95
 Westinghouse Rectox FW rectifier 12.8V/1.3 amp 3.40
 Headset HS16A-S.C. 8' S.C. insp with 8' cord 1.95
 W.E. 509 Headset & 8 ft. Cord & Plug. new \$12.495

G.R. VARIAC 2000/880W/0 to 130V 60 cy & Dial. Knob \$14.95
 G.R. VARIAC 200B/170W/0 to 130V/60 cy & Knob 9.95
 Sole LAB model Constant Voltage Trans 60 Watt/95-125V 15.00

Condor 10 mid/600 WVDC oil (2-2.5 mid & 5 mid) 1.25
 Condor 20 mid/600 WVDC oil (1-2.4-5-8 mid) 2.50
 Condor 2 mid/5000 WVDC oil (LP #45) @ \$4.75; two 12.00
 Condor Pyranol 3 mid/330 VAC/1000 WVDC. two for 2.50
 Condor Pyranol 15 mid/330 VAC/1000 WVDC Navy 2.95
 Condor RF 25 mmid/10000 V wkg new. 9 for 7.5
 Condor CD oil 6 mid/1500 WVDC 2 for 4.50
 Condor GE Pyranol 4 section 28 mid/860 VAC/2000 WAC 7.95
 WE ouncer min PP/P to PP/G input KS9929 WE PP inpt & PP driver trans 0V8/805. 6.95
 WTC ouncer dynamic mics to PP/G. 4.49
 Ouncer choke Hi-impedance Jefferson. .49

PRECISION WIRE WOUND 1% RESISTORS, I.R.C., SHALLCROSS, MEPCO, INST. RES. CO., OHMITE FOR METERS, BRIDGES, AMPLIFIERS *1%, **5%, 10%.

1500	2000*	4000	4300**
7500	7950*	10000	15300
17000	30000†	75000	100000
140000	147000	166750	201000
229000	250000†	950000†	Rest 1%

"TAB" SPECIAL 3 for \$1.00.
 (REST 1%).

250000 294000 314000 333500
 353500 400000 402000 422000
 458000 478000 THREE for \$1.50
 500000 700000 THREE for \$1.95
 1 Megohm 1% accy. THREE for \$2.45
 Dynamotors 12V input/275V/110ma 1.95
 Dynamotors 500V/50ma Conserv. rated and filter & 275V unit. 3.49
 Weston 476 SQ 5" B'C 15VAC (\$10) 4.23
 Weston GE-10 plus 6DE 500/600 ohm 3.95
 Weston 301 meter 10KV/1000 ohm 15.00
 Mult. 1.49
 WESTON 796 insulation tester & megohm-meter. 24.95
 Electronic VOM 1 meg sens 3-300V & 10meg SC A27 Phantom Antenna new with manual containing Milien 12315 Variable Condor 150mm/3000V & 2 WL. plaque 12ohm/40 Watt. 24.60
 Dynamic mics & min. trans. to G new. 1.95

CRYSTALS MTD "HP" CUT. Four for. \$3.00
 DC-15A Standards 200 KC ± 10cy. 5.95
 Cinch Mica B Dual crystal sockets. 8 for. 1.00
 WE Crystals boxed INQ1-22-23 3 for \$1.25
 WE Crystal boxed sealed 1N26 EUP/1cm ea. 1.54
 IRC Precision 1KV/1meg 1/2% H'mtelly sealed Navy (\$25) 1.69
 WESTGISE DUAL AN IND 200/1000 4.50
 GE Meter 2 1/2" B'C one amp RF 3.95
 GE Meter 2 1/2" B'C ave amp RF 3.50
 GE & DeJur 2 1/2" B'C one ma DC mir 2.95
 Socket Octal Amphenol 788 mica B (16c) 25 for 1.50
 Socket Octal MIF 88.8X (20c) 20 for 1.50
 Socket octal ceramic 49SS-8 (45c) 15 for 1.50
 Socket octal ceramic & saddle ring Cinch. 10 for 1.50
 Socket marginal ceramic 49-881il (\$1.25) 2 for .98

866A GE Comb. tubes, all transf. caps. sockets \$ 7.00
 872A Comb. tubes, all transf. caps. sock- sta 12.00
 80B RCA tubes new rtd S.C. BOXED. 5.00
 Two for .98
 Socket miniature bayonet Dial Co 93-4931 1.00 each \$ 0.15
 Socket Hubbel 15A/125V Twist 7588, 15V for 2.00
 OSCILLOSCOPE 3" Kit includes transformer. 115V/60 cy Pri. 375 VCT/110 ma. 1320V. 6V/3A. 2.5 V/3.25A. 6.3 V/7.5A.
 Cathode Ray tube. Rectifier tube. Condens. Chokes Low & H. V. Supply 16.95
 Pri transf inpt 230V/sec 117/112/103/93V at 7 amp 19.95
 Auto Trans GE 115V/160/170/180V/1.05 amp 2.95
 Listeluses 250 mca 3A.C. (D. F. 250); 48 for 1.00
 Condenser kit silvermica & mica condens. 50 for 2.00
 Resistor kit 5W 1/4 & 1 Watt 50 to 2 meg-ohm asstd resistors 2.50
 Control kit AB1; 50 to 2 megohm; ten for 2.50
 \$2 Min. order \$10 V.C. Add postage all orders and 25% deposit. Worth 2-7230. Send for catalog 300. Specialists in International Export, School, College & Industrial trade. Money Back Guarantee.

"TAB," DEPT. RN-2
 6 Church Street New York 6, N. Y.

same frequency, in the BBC's European Service. (Beck) The opening of this transmission at 7:30 a.m. is with *English* news. On 15.120, *Radio SEAC* is a good signal at 6 a.m. when relaying the BBC news from London, also has BBC news relay at 8, 9:30 p.m.; in some locations, suffers bad interference from HCJB, Quito, Ecuador, 15.115, from 7:30 p.m. daily sign-on of Colombo.

Chile—CE1180, 11.997, Santiago, usually has a good signal around 7:30-9 p.m. (Ferguson)

China—XTPA, 11.650, is now sending a better signal to the Eastern U.S.; peaks around 7 a.m. (Ferguson) This station uses mostly Oriental languages, but can be heard here in West Virginia most mornings as late as 9 a.m. when it relays *English* news from Chungking's XGOY, good level but usually is marred by CQWRM.

As usual, on November 18, XGOY left the "summer" frequency of 9.635 and is now heard mornings on approximately 6.143. For the first week after moving to the 49-m band, XGOY opened at 6:35 a.m. on about 6.154/5, closed that transmission at 7:45 a.m., and opened again at 7:50 a.m. on about 6.143. Later on, however, they have been using the 6.143 frequency during both transmissions; first one is heard, 6:35-7:45 a.m.; second one, 7:50-10:30 a.m.; moves to about 11.918 between 10:45-11:45 a.m.; *English* news is heard at the regular times, 7 a.m., 9 a.m., and 11 a.m. on the respective frequencies; *English* press dictation (for America) is at 9:30 a.m. (Dilg, Balbi) XGOY uses 7.152 in parallel with its other stations during the entire period from 6:35-11:45 a.m.

Here in the East, XGOY's 6.143 frequency usually is a good signal, in the clear, at 7 a.m. when a woman reads the *English* news; it generally fades out around 8 a.m. here in West Virginia. On the 11.918 frequency, most mornings has a good to excellent signal from around 5 to 6:28 a.m. sign-off, all this transmission now appears to be in Chinese.

XMTA, 12.215, opens at 6 a.m. with the Chinese National Anthem; leaves the air normally at 8 a.m.; apparently uses only Oriental languages; location is believed to be Shanghai. ("Radio Call")

XORA, 11.695/8, Shanghai, has *English* news daily at 5 a.m. ("Radio Call") This station has not been reported as heard in the Eastern U.S. lately.

XLRA, 6.054, Hangchow, (not XRRR, Peiping!), is scheduled, 5:30-9:45 a.m., and relays the XGOY (Chungking) news at 9 a.m. (URDXC)

Rex Gillett, Australia, informs me that XGOE, 9.820, heard in Australia around 8 a.m., is located at Kweilien; has been heard announcing as "broadcasting for the Chinese Army and their Allies." This station has been heard also by Paul Dilg, Monrovia, California.

The projected Nanking station will likely take to the air soon, and can be

Electric Heating Element

FLUX

Repair burned out electric elements of coffee urns, electric stoves, flat irons, toasters, and other electrical appliances. Simply apply Christy Electric Heating Element Flux to the break, turn on the current and PRESTO the job is done and your appliance is ready again for years of satisfactory service. Generous size package (enough to repair 50 elements) sent postpaid for only \$1.00.

ELECTRICAL APPLIANCE REPAIR PARTS

Renual Iron element. Guar. 1 year. Pack- age of 6.....\$3.12
 Toaster element forms. Clear Mica. Fits most toasters, 10 for..... 1.80
 Heating element wire. 10 ft. coiled 1/4" O.D. #20..... 2.55
 Heating element wire. 10 ft. coiled 3/16" O.D. #22..... 1.77
 Hot plate bricks, 5/8" diameter, 6 for... 1.62
 Appliance cord. Rubber covered. 20 ft. \$1.00; 100 ft..... 4.50
 Ribbon element heating wire. Std. size 100 ft..... .75
 Percolator elements. Universal. Flat type. 1 yr. guar. 2 for..... 1.20
 Element cement. Withstand 3000° F. 1 lb. pkg. \$1.00. 5 lb. pkg..... 3.50
 Lead wire. Asbestos covered heater hook- up wire. 10 ft..... 1.00
 Iron Cord Sets with complete plug attach- ments, 10 for..... 5.00
 Carbon brush set. Assorted. 104 brushes. 15 springs. Complete set..... 3.00

HOW TO FIX IT BOOKS

Modern Electric & Gas Refrigeration....\$5.00
 Practical Electricity & House Wiring... 1.50
 Armature & Magnet Winding..... 1.50
 Here is your opportunity to save on repairing your own appliances and to earn extra money repairing appliances for friends and neighbors.

CHRISTY SUPPLY COMPANY

2835 N. Central Ave., Dept. T-156, Chicago 34, Ill.

EASY TO LEARN CODE

It is easy to learn or increase speed with an Instructograph Code Teacher. Affords the quickest and most practical method yet developed. For beginners or advanced students. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM.



ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

INSTRUCTOGRAPH COMPANY

4711 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

UTICA TOOLS

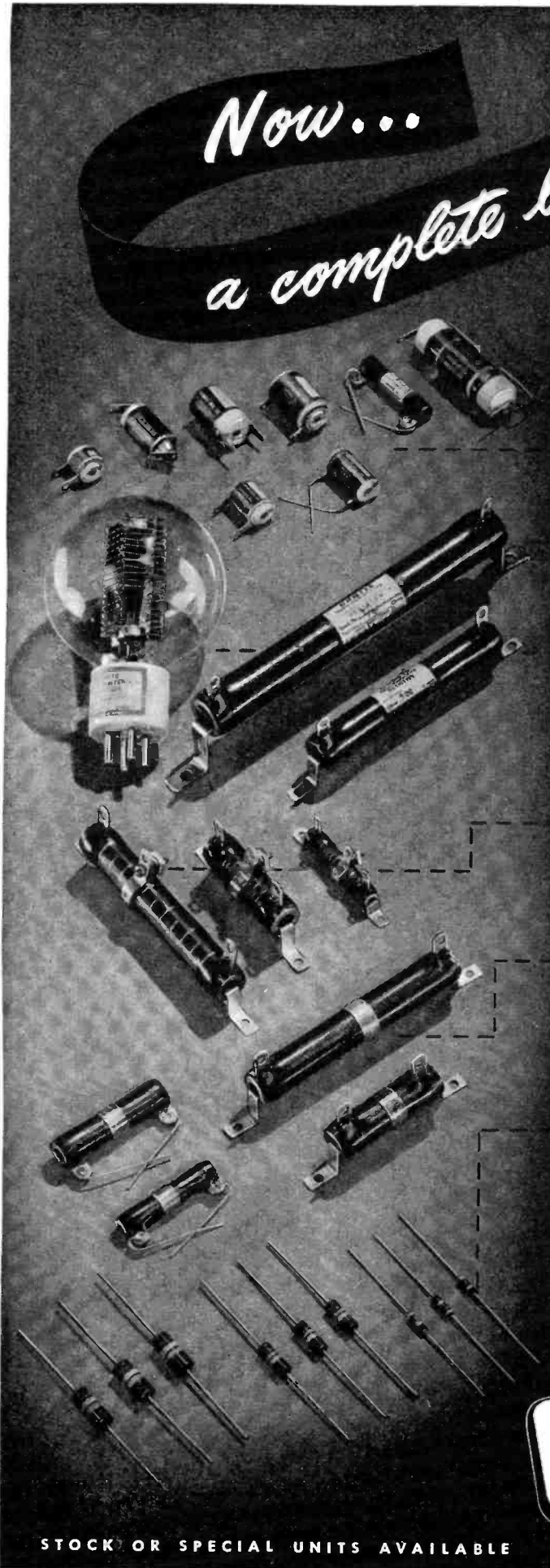
ALL TYPES FOR MORE TOOL MILEAGE
 Ask Your Dealer

UTICA DROP FORGE AND TOOL CORPORATION

UTICA 4, NEW YORK

*Now...
a complete line of dependable*

OHMITE RESISTORS



"RITEOHM" PRECISION RESISTORS
Six types—including non-inductive pie-wound vacuum-impregnated units, pie-wound hermetically sealed glass units, and single-layer vitreous-enameled units. Tolerance $\pm 1\%$. Five types available from stock in $\frac{1}{2}$ - and 1-watt units ranging from 0.10 to 2,000,000 ohms.

NON-INDUCTIVE RESISTORS
For use in radio frequency circuits where resistors of practically constant resistance and impedance are required. Available in the vitreous-enamel tubular type with special winding and in hermetically sealed-in glass type with special winding and vacuum tube base.

"DIVIDOHM" ADJUSTABLE VITREOUS ENAMELED RESISTORS
Use them for multi-tap resistors or voltage dividers, and for obtaining odd values of resistance quickly. Consist of vitreous-enameled resistors of the lug type with wire exposed along one side for contact with adjustable lugs.

"BROWN DEVIL" AND LUG-TYPE VITREOUS ENAMELED RESISTORS
Ohmite's dependable, general-purpose resistors. Available in ratings of 10 to 200 watts. Smaller sizes have tinned copper wire terminals; larger sizes have lug terminals.

"LITTLE DEVIL" INSULATED COMPOSITION RESISTORS
An extremely small, sturdy resistor. Three sizes— $\frac{1}{2}$, 1, and 2 watt, in 10 ohms to 22 megohms. Tolerance $\pm 10\%$. Light, compact, easy to install. Available only from Ohmite distributors.

Write for Catalog 18. Contains helpful information on rheostats, resistors, tap switches, chokes, and attenuators.



OHMITE MANUFACTURING CO.
4883 Flournoy St., Chicago 44, U.S.A.

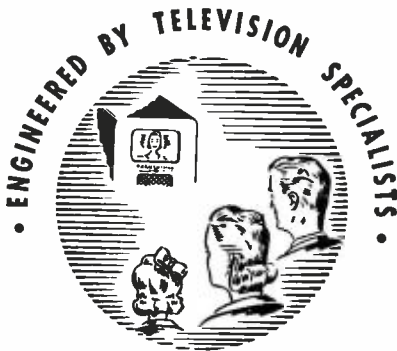
Be Right with ..

OHMITE

RHEOSTATS • RESISTORS • TAP SWITCHES

STOCK OR SPECIAL UNITS AVAILABLE

TRANSVISION



THIS NEW TELEVISION KIT

Offers you a High Quality TELEVISION RECEIVER

ready for Easy, Rapid Assembly



Easy-to-Assemble: No knowledge of television required. COMPLETE easy-to-follow INSTRUCTION SHEET gives you all the knowledge you need.

This Kit INCLUDES SOUND, all component parts, and the following:—

1. Specially designed Television Antenna.
2. A \$30.00 Lectrovision seven-inch Picture Tube . . . plus ALL other tubes.
3. Pre-tuned R-F unit.
4. Finished front panel.
5. All solder and wire . . . and sixty feet of low loss lead-in cable.

Operates on 110V.; 50-60 cycles A.C.

Price: complete with ALL tubes, \$159.50. Shipment will be made approximately 2 weeks after receipt of order. \$25.00 deposit required on all orders, balance C.O.D.

Trade Inquiries Invited

We believe that the comparative quality of this set is superior to other available sets. For full information write to:

TRANSVISION, INC.

108-4th Street

New Rochelle, N. Y.

expected to use several frequencies. *Watch for it!*

Czechoslovakia—Prague's *English* transmissions, aired from OLR4A, 11.840, 3:30 p.m. daily, consists of talks and news of topical interest, together
(Continued on page 153)

5-Tube Ham Super

(Continued from page 63)

is simple: the manual bias (r.f. gain) control R_{16} sets the initial bias desired, then with signal, the diode section of tube 6SF7 rectifies and passes, by means of the customary load resistance and filter circuits, a negative d.c. voltage in accordance with the strength of the received signal, which is applied to the grid of the i.f. tube. When S_2 is open, a.v.c. is applied and to use m.v.c. only, it is closed. The circuit has the desirable characteristic of allowing initial bias to be set at any convenient point by means of R_{16} and a.v.c. will have as a "take-off" point, this particular amount of initial bias, thus a.v.c. does not come in until signal input strength exceeds the initial bias, which all boiled down means your receiver does not, as is usual, lose sensitivity when on a.v.c.

The tuning gang shown in the photos is a re-vamped single section condenser, which has had the center plates of the stator deleted, leaving effectively a split stator condenser of about thirty-five $\mu\text{mfd.}$ per section, with a solid shaft for the rotor drive. When the isolantite end-plates are bolted firmly to the chassis, this allows a solid, well-insulated tuning gang to be obtained very cheaply; it gives smooth no-backlash tuning and is recommended, but if desired two separate thirty-five $\mu\text{mfd.}$ condensers can be ganged in its place, or a split-stator job can be purchased.

The power transformer used was a

80 METERS.

L_2 —20 t. closewound. C_{1b} tap 13 t. from gnd. Cathode tap 7 t. from gnd. C_2 is 75 $\mu\text{mfd.}$ in coil form.

L_1 —40 t. closewound. C_{1a} tap 26 t. from gnd. Ant. tap 10 t. from gnd. C_2 is 25 $\mu\text{mfd.}$ in coil form.

40 METERS.

L_2 —18 t; $1\frac{1}{2}$ " long. C_{1b} tap 6 t. from gnd. Cathode tap 5 t. from gnd. C_2 is 75 $\mu\text{mfd.}$ in coil form.

L_1 —23 t; $1\frac{1}{2}$ " long. C_{1a} tap 8 t. from gnd. Ant. tap 6 t. from gnd. C_2 is 25 $\mu\text{mfd.}$ in coil form.

20 METERS.

L_2 —9 t; $1\frac{1}{4}$ " long. C_{1b} tap 3 t. from gnd. Cathode tap $2\frac{1}{2}$ t. from gnd. C_2 is 75 $\mu\text{mfd.}$ in coil form.

L_1 —12 t; $1\frac{1}{2}$ " long. C_{1a} tap 3 t. from gnd. Ant. tap $2\frac{1}{2}$ t. from gnd. C_2 is 15 $\mu\text{mfd.}$ in coil form.

10 METERS

L_2 —3 t; $1\frac{1}{4}$ " long. C_{1b} tap 1 t. from gnd. Cathode tap $\frac{3}{4}$ t. from gnd. C_2 is 50 $\mu\text{mfd.}$ in coil form.

L_1 —6 t; $1\frac{1}{2}$ " long. C_{1a} tap $1\frac{3}{4}$ t. from gnd. Ant. tap 1 t. from gnd. C_2 is 15 $\mu\text{mfd.}$ in coil form.

Note: Mica compression padders may be used for C_2 , C_3 with results equal to the air padders shown.

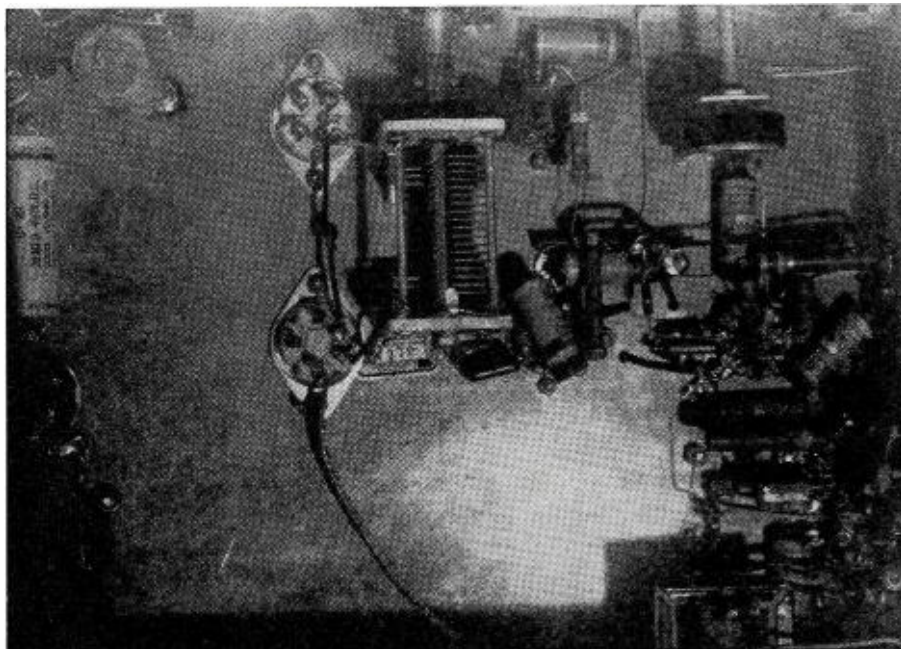
Winding specifications for coils covering 10, 20, 40, and 80 meter bands.

war surplus item, which accounts for the low H.V. secondary voltage. Most of the standard transformers available have either a 610 or 630 volt center tapped secondary. If it is necessary to use one of these, it would be advisable to place a resistor in series with the "B plus" lead to drop the output to 250 volts at the point indicated. A ten watt, 900 or 1000 watt resistor will be satisfactory in most cases.

Built as shown, it will be found the job is absolutely stone-quiet, with the r.f. and audio gain wide open, and antenna lead disconnected, a condition

(Continued on page 120)

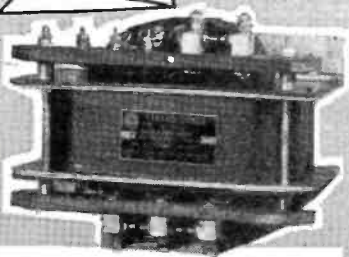
Under chassis view of home-built 5-tube superheterodyne short-wave receiver.



HERSHEL'S

MONEY SAVING VALUES

on Radio and Electronic Equipment



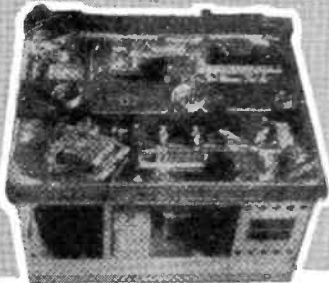
1 KW. MODULATION TRANS.

We have a real value in a modulation transformer. This item, made by RCA to broadcast specifications, is conservatively rated at 550 W audio to modulate that new KW rig. Primary impedance for class B tubes up to 10,000 ohms plate to plate, secondary rated at 450 MA. 1:1 Ratio. Third winding modulates screens up to 80 MA current.

Really rugged construction, with flash-over gaps on a Mycalex terminal board. Due to the fine lamination, this transformer will not talk back at 1 KW. Weight \$19.95 40 lbs.;



Tuning unit BC 375. Approx. 65 MMFD cond., coils, RF chokes, dials, ass'd. mica condensers 2500 WVDC, over \$50.00 in parts..... \$3.75



SCR 522-100-156 MC receiver and transmitter with 18 tubes.

Price New \$59.95 Price Used \$39.95



Dynamotor power supply—inputs 6 or 12 V, output 500 VDC at 160 MA, mounted on box with circuit breakers, relays, interference filter and two 10 ft. cables. \$9.95 U. S. Govt. surplus.....



30 MC IF transformer in square aluminum can, silver slugged tuned. 29c
Mica capacitor .002 MFD 3000 WVDC 89c



1000 V PLATE SUPPLY

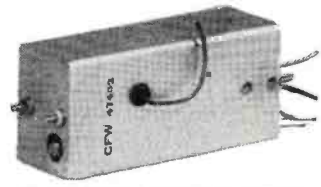
Thordarson plate transformer T47105. 1185 V each side of center at 300 MA. Tapped at 300 V each side of center, also 215 V at 55 MA bias. 6" x 5" x 7 1/2" in square gray, CHT type case. \$9.95



Thordarson T480032H-7H 550 MA swing choke, size 4 1/2" x 5 1/2" x 5 1/2", square black crackle case. \$5.95



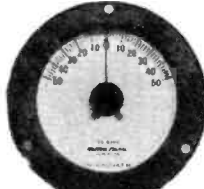
Hi-voltage condenser, 3 MFD, 4000 V, hermetically sealed in aluminum can. \$4.95



IF transformer, mounted in aluminum shield can, 1500 KC, with air trimmer, impedance coupled type..... 95c



Westinghouse meter, 0-1 MA movement, 2" round case, scale calibrated 0-140 and 0-500. Includes mounting hardware. \$2.95



Western Electric meter, 4" round, zero center, 0-1/2 MA each side. \$3.95



Westinghouse meter, 0-1 RF amps, 2" round case, internal thermocouple, in original box. Includes mounting hardware. \$2.95

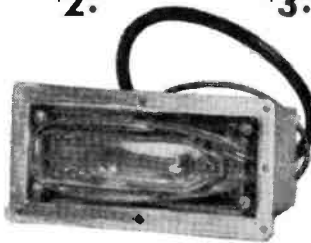


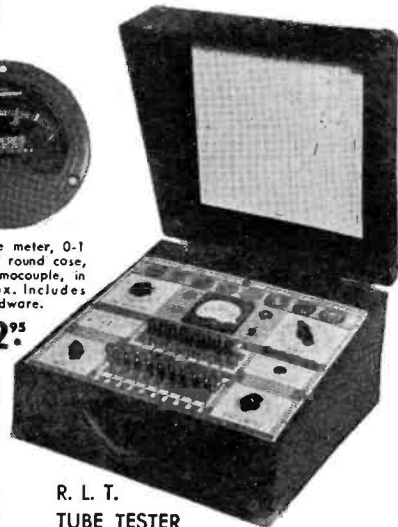
PHOTO FLASH TUBE

High speed photo flash tube, 12,000,000 lumens light output. Stops all action. Ignition coil included on back of bulb. 10,000 flashes. Diagrams furnished on request. Your cost only..... \$8.95

SELSYN MOTORS

The ideal way of indicating the position of rotary beams, wind indicator, etc. Line cord and instructions for 110 VAC operation furnished.

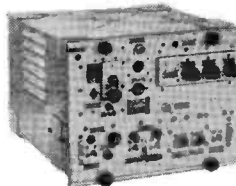
2 for \$3.95



R. L. T. TUBE TESTER

- Tests all tubes up to 117 V
- Tests shorts and leakages
- Tests individual sections
- Works on 90-125 V 60 cycle AC
- Comes in portable cabinet complete with all operating instructions.

PRICED AT ONLY \$49.95



Transmitter and Receiver. Has been widely used on the 144 MC band. Shipping wt. 100 lbs. U. S. Govt. surplus. Your price, less tubes and power transformer..... \$14.95

Hot Spot Specials

- Thordarson fil. trans., 110 V 60 cycle pri., two 10 V 10 A sec., CHT type case..... \$4.95
- Thordarson fil. trans., 110 V 60 cycle pri., sec. No. 1 2.5 V 10A CT, 3000 V 3 A; 6.3 V 1 A..... \$4.95
- Thordarson fil. trans., pri. 110 V 60 cycle; sec. 6.3 V 6 A, CT..... \$1.49
- 8-8 MFD 350 WVDC, 20 MFD 150 WVDC, round can..... 69c
- 75,000 ohm 200 W bleeder..... 49c
- 2500 ohm 100 W adj..... 49c
- 955-9004 tubes..... 65c
- Sockets for acorn tubes..... 24c
- 6J4..... \$1.50
- Lip mike and head band..... 95c
- No. 60 A—6F6-5 General Universal A & B battery, 7.5 V 9V 90 V B..... \$1.49



368AS-tube. A real buy in a VHF door knob tube that will take 30 W input on all frequencies up to 1500 MC. No socket required. Priced at small fraction of original cost..... \$4.95

Write for Free Bulletin

HERSHEL RADIO CO.

5249 GRAND RIVER

DETROIT 8, MICHIGAN

20% DEPOSIT REQUIRED ON ALL C. O. D. ORDERS

Build a Television



Instructor demonstrating rare Schmitt Optical System, used in big picture, projection type, television receivers. This famous television school's location in the heart of the television industry, helps it to get such scarce scientific equipment. At N.Y.T.I. of N.J. all types of television receivers are available for student study.

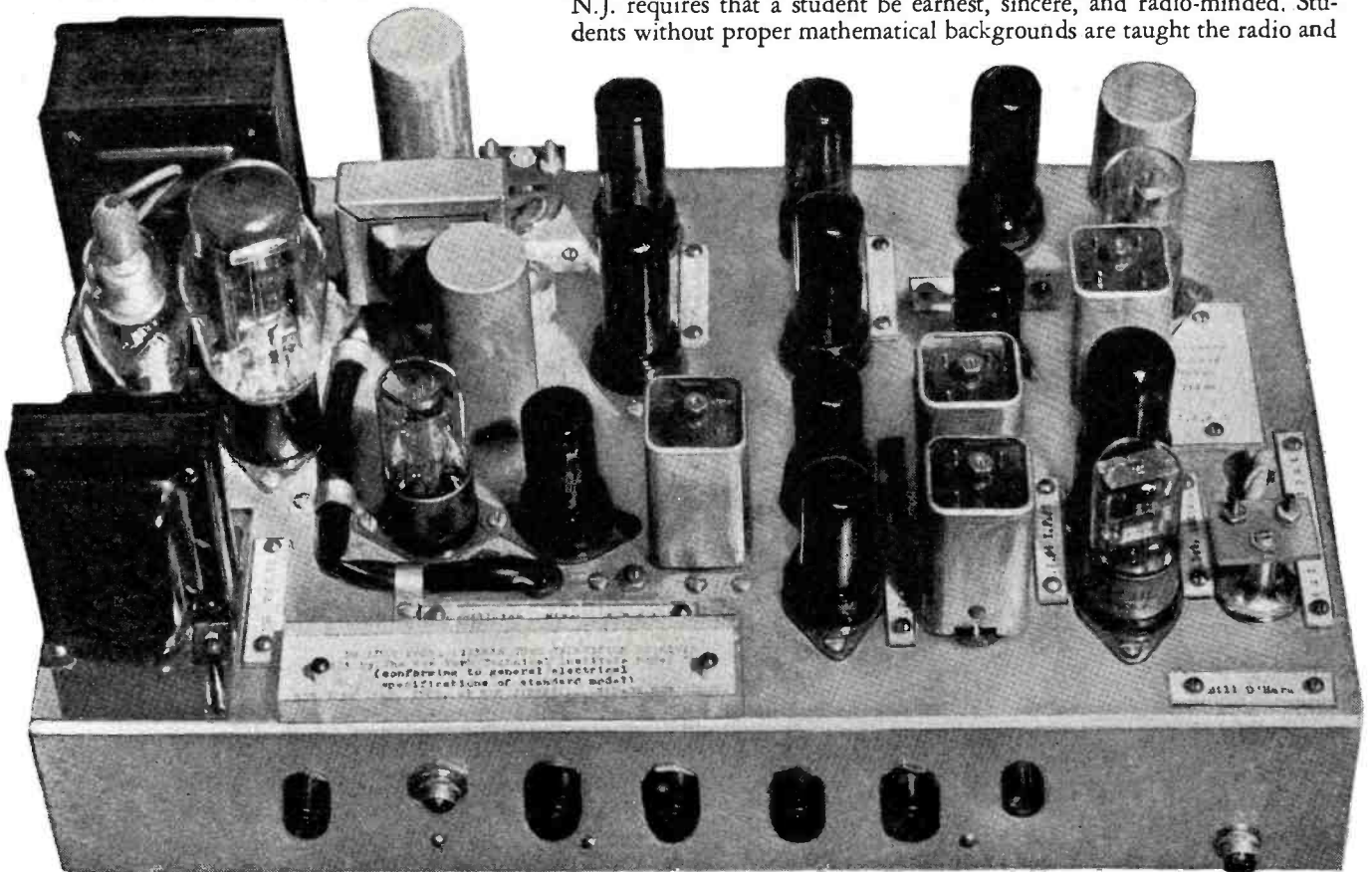
To stimulate its radio and television training programs, this famous resident radio and television school is offering men interested in television this unusual opportunity.

If you are unable to leave home to go to a resident school, N.Y.T.I. of N.J. can supply you with parts to build a television chassis in your own home. You will be supplied with the same instructions and directions with which the school's resident students are equipped, when they reach the stage in their training that calls for television set construction. If you already have a sound radio background, with experience in building radio receivers, you will be surprised to find how much you can learn about television by building this set.

N.Y.T.I. of N.J. is one of America's leading resident schools for men seeking dependable, thorough, up-to-the-minute training in the various fields of radio and television.

The schooling offered by N.Y.T.I. of N.J. is particularly useful to those who recognize the high-earning possibilities of technical training in radio and television and are willing to tackle the class and laboratory work offered, regardless of their previous education.

No high-school diplomas are needed for entrance. But N.Y.T.I. of N.J. requires that a student be earnest, sincere, and radio-minded. Students without proper mathematical backgrounds are taught the radio and



You can build a direct viewing television chassis similar to the one pictured above, either in your own home or in the magnificently equipped shops and laboratories of this famous television

school, located square in the HEART of America's television manufacturing and broadcasting industry. Mail the coupon at the right to get full details.

Set Right in Your Own Home!

television mathematics they need. Several students with only grammar school educations have successfully completed advanced technical television courses.

A considerable number of out-of-state students attend the school because of its excellent, practical type of radio and television courses, so difficult to get anywhere else in the world today. Living quarters are obtainable by single students.

You Put Into Practice Everything You Learn

Students at N.Y.T.I. of N.J. particularly like the way the school puts into practice what it teaches. You may actually build a 17-tube television chassis. You also help build as many as 7 radio receivers of different types, a total of 75 electronic educational devices. Class study, and laboratory study, in the proper combination, increase interest—and your hands get as smart as your head.

A 17-tube, experimental, television chassis may be built by all resident students of television, and may be kept as their own property, if they so choose.

Located in the Heart of the Electronic Industry

The New York Technical Institute of New Jersey is in Newark, N. J., just across the river from New York City (only 20 minutes from Broadway by subway or train). The school is located in the heart of America's great radio and electronics industry. Such leading television, radio and electronics manufacturers as R.C.A., Western Electric, Du Mont, Federal and Edison are nearby. This means that the school offers numerous advantages, as it is in touch with the most recent developments in radio and television.

Highly qualified television and radio instructors are here in abundance. Equipment is easier to get. Television students are offered exceptional advantages in this great electronic center.

**MAIL THE COUPON
TO GET FULL
INFORMATION . . . FREE**

The school issues a special Bulletin which illustrates and describes its truly exceptional facilities and equipment. This Bulletin also describes classes that may be attended, housing conditions, costs, hours, etc. If you are interested in Television—you will want to read this Bulletin. You can have it *free*, merely by mailing the coupon at right.

The school will also be happy to send you complete information about the television kits and directions which are now available to you if you desire to build your own television chassis at home.

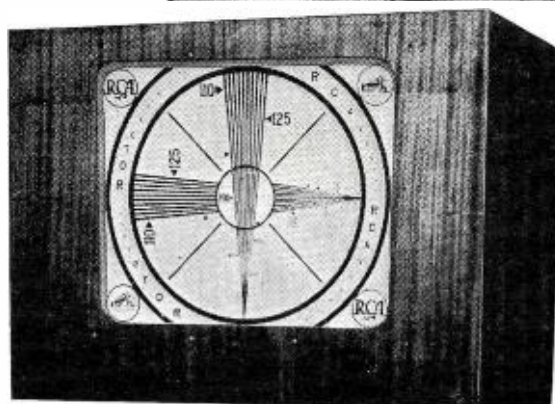
Just fill out the coupon at right and mail it NOW to:
New York Technical Institute of New Jersey, Dept. 12,
158 Market Street, Newark, N. J.



Instructor demonstrating theory of light in connection with study of optical systems used in projection type television receivers. This is just another one of the pieces of equipment which the New York Technical Institute of N.J. has available for resident student instruction.



Big picture television (16" x 21 1/4") in the flesh at N.Y.T.I. of N.J. When it comes to television receivers, N.Y.T.I. of N.J. has it! All types of television receivers are available for student use and instruction at the school.



Standard laboratory type test pattern used for determining picture perfection in all types of television transmitters and receivers. (You can see it at N.Y.T.I. of N.J.)

**New York Technical Institute of New Jersey, Dept. 12,
158 Market Street, Newark, New Jersey**

Check here if you wish to receive the Special FREE Bulletin describing the resident school of the New York Technical Institute of New Jersey located in Newark, N. J.—including its facilities, equipment, courses offered, costs, hours, etc.

Check here if you wish complete information about building a television chassis in your own home.

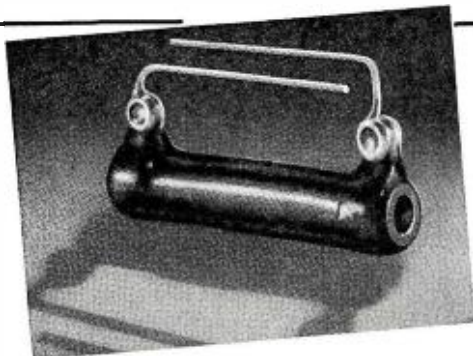
Check here if you are a War Veteran.

Name.....Age.....

Address.....

City.....Zone (if any).....State.....

RATED RESISTANCE INDEFINITELY



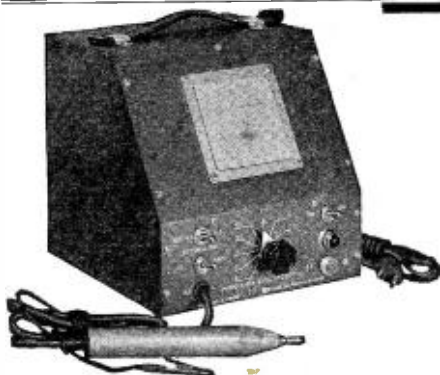
LECTROHM RESISTORS

Lectrohm's method of manufacture has established an enviable reputation as providing a most dependable, lasting performance at rated resistance of any resistors made. They're solid—consistent performance—no variance over long hard usage. Resistance wire is silver soldered to the solder lugs by special process (not by torch method of brazing) for perfect electrical bond always. Wire and lugs are completely embedded in high temperature vitreous enamel. Write for complete data.



5131 West 25th Street, Cicero 50, Illinois

Division of the
National Lock Washer Company, Newark, N. J.



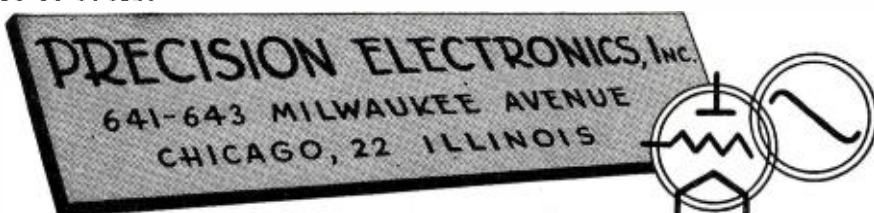
NEW! *faster, easier* servicing by "listening in" with PRECISION ELECTRONICS SIGNAL TRACER

Real versatility! The "number one" instrument in any Service Man's equipment. Probe with Polystyrene tip (operates on frequencies up to 300MC), top quality parts throughout and exclusive engineering features. Outstanding "on-the-job" superiority!

\$2995

COMPLETE
115 VOLTS
50-60 CYCLES

Checks signal stage by stage in R.F., I.F., and Audio sections. Speeds location of intermittents, opens, shorts, hums and noisy circuits with set hot or cold—checks coils, condensers, transformers, resistors, speakers, tubes! See your Jobber or write for descriptive literature. (Please address Dept. B)



CRITICAL RADIO TUBES

WE STOCK MANY CRITICAL TYPES
WRITE FOR LIST AND DISCOUNTS

BILL'S RADIO REPAIR SHOPS

DEPT. R12 2038 WASHINGTON STREET BOSTON 19, MASS.

very much to be desired in any receiver, and seldom to be found, especially in the cheaper products. Sensitivity is very good, especially if a 7V7 tube is used as a mixer; selectivity comes close to crystal filter; a.v.c. is adequate and simple, and does not impair weak signals; bandspread is more than adequate, and is adjustable; enough controls are provided to give complete control of the receiver; appearance is neat; the receiver is completely self-contained, excepting speaker only—no inconsiderable list of advantages for the builder's \$20-\$25 worth.

Reception, both fone and c.w., has been very gratifying on 80 meters. The b.f.o. gives a good beat note and the i.f. selectivity was found surprisingly good for this type of work. On fone the 5-tuber brings in house volume sigs, and most of the states have been copied on c.w. Alaska and Canada produced, in one evening's listening, good Q5/S7-8 sigs. There is no sense of flimsiness nor any annoying instability apparent when tuning the receiver, and all in all, it represents about as good a return for the time and money invested as can be imagined.

The author wishes to acknowledge, with thanks, the suggestions and advice on the a.v.c. circuit shown, made by Mr. Harold Harding, a veteran old-timer in receiver experimentation and construction.

-50-

New Synchronous Motor

(Continued from page 86)

encased in a light perforated can and is fan-cooled.

Embodying a number of new design principles, this new synchronous motor is exclusively different from any other type commercially available. For example, it is the smallest non-hunting synchronous motor for its power output and reliability at equivalent cost. Its high efficiency results in low temperature rise under continuous operation conditions (45° C. at 60 c.p.s., 55° C at 50 c.p.s.). Design-elimination of stator tunnel windage noise insures quiet operation. Finally, since the hysteresis rotor eliminates pulsations and is essentially in dynamic balance, it is actually the smoothest running motor that could be selected for driving record-changer equipment; and the inverted stator structure removes all tooth ripple.

In dimensions, its over-all length, including the can, is two inches, and its diameter approximately two and one-half inches. Total weight is slightly over one pound. Attached to the motor by flexible lead wires is a .55 μ f. condenser for 60 cycle operation, which may be mounted in a convenient chassis location. A solid hysteresis rotor, ground from special alloy steel to extremely close tolerance on diameter, is mounted on a ground stainless steel shaft, which rotates in self-aligning oilite bearings.

RADIO NEWS

The stator construction differs from conventional shaded pole record-changer motors in that four coils, each held within close resistance tolerance, are used.

Available in the near future to manufacturers and dealers in radio-phonograph combinations, the synchronous motor is now the only type that inherently operates at constant speed regardless of load and voltage changes, and with smoother torque of the hysteresis type rotor to insure low vibration noise level. A smooth-starting motor, it reaches synchronism immediately and, because it is synchronous, the speed of the turntable which it drives is not affected by changes in line voltages.

If we examine the way in which the introduction of this new motor allies itself with more discriminating consumer demand, we find several reasons. The average untrained human ear is critical to pitch changes caused by turntable speed variations of 1/2% or more. The demand for better quality equipment comes from a discerning public, who will no longer tolerate the more than 1% speed change found in induction motors now used to drive most automatic record changers and turntables.

Comparative tests show that this synchronous motor holds turntable speed constant at 78 r.p.m., whether one or ten records are loaded on the record-changer turntable. On the other hand, most induction motors show a 2 r.p.m. (more than 2%) drop in turntable speed as the corresponding record load increases. Fig. 1 shows actual curves obtained from these tests.

Other tests show that "flutter" and "wow" are held below the 1/2% tolerance in the Fairchild motor drive, a reduction of more than 50% below the induction drive. Further tests indicate that in this synchronous motor vibration noise level is more than 6 db. lower than the induction motor, measured on both the panel and turntable surface.

Engineers have found that when dynamic or magnetic pickups are desired in a record-changer, the type of motor drive used exerts a strong influence. With a synchronous motor, such improved pickups as the magnetic and dynamic types can be applied more readily than with the induction motor.

Up to now the crystal pickup has been widely used with induction motor drives, because it is inexpensive and offers generally satisfactory performance under ideal conditions. But recently the opinion has been expressed that the crystal type pickup is no longer as good as best quality records deserve, as it produces distortion and severe limitations of response. For use in climates where temperature and humidity are high, it has often been found unsatisfactory.

Through a combination of these factors, there has been a large demand recently for fine quality dynamic and magnetic types of pickups that can give

Just Out!

CONCORD

Bargain Catalog of

RADIO

Equipment

FOR

Immediate Shipment



Just off the press—48 exciting pages of radio parts, equipment, and supplies for dealers, servicemen, amateurs, maintenance, testing, building and experimenting—Thousands of items NOW IN STOCK and ready for IMMEDIATE SHIPMENT! Big feature sections of Radio Sets, Communication Receivers, Amplifiers, Ham Gear, Record Players and Portables, Record Changers and complete Sound Systems. Page after page of bargains and special values in top-quality standard-make radio and electronic parts.

Mail Coupon NOW for FREE COPY

Mail coupon below TODAY for your FREE COPY of this latest Concord Buying Guide and Bargain Catalog of Radio and Electronic needs you can order for SAME DAY SHIPMENT from complete stocks in Chicago and Atlanta.

CONCORD

RADIO CORPORATION
LAFAYETTE RADIO CORPORATION
CHICAGO 7, ILL. ATLANTA 3, GA.
901 W. Jackson Blvd. 265 Peachtree St.

CONCORD RADIO CORP., Dept. E-27
901 W. Jackson Blvd., Chicago 7, Ill.
Yes, rush FREE COPY of the new
Concord Bargain Catalog.

Name.....
Address.....
City..... State.....



COIL KIT

**100 RADIO FREQUENCY COILS ALL NEW!
ALL USABLE! TREMENDOUS VARIETY!
Thousands of Applications in Each Kit**

Frequency ranges from 2 meters to 25 kilocycles. Both iron core types and air types included. Many units have mica condensers which can be salvaged for other purposes.

- CHOKES ● WAVE TRAPS
- ANTENNA COILS
- OSCILLATOR COILS
- R.F. COILS ● TANK COILS
- I.F. TRANSFORMERS

and many other types in kit

With proper trimmers and associated parts every coil can be used. These KITS are perfect for amateurs, experimenters, servicemen, schools, laboratories, etc.

Priced at **\$2.98**

If these coils were to be purchased separately they would cost over \$75.00.

Almost any one of these coils is worth more than the price of the entire kit!

20% Deposit with Order. Balance C.O.D.

PHONO - KIT

**PORTABLE ELECTRIC PHONOGRAPH
A REAL QUALITY 110V AC PHONOGRAPH KIT**

- Handsome leatherette portable case
- High quality motor with 9" turntable
- Light weight crystal pickup
- 5" Alinco speaker with transformer
- Tone tested 2 tube amplifier with tubes
- Tone control and needle cup
- Nothing else to buy. Only 1 hour to assemble for play. Full instructions supplied.

SPECIAL YOUR COST **\$21.50**

LOTS OF TWO OR MORE **\$19.95**

WRITE FOR BARGAIN CATALOG
20% deposit with order. Balance C. O. D.
All materials sold on money back guarantee

BUYERS SYNDICATE
786 CAREW STREET, SPRINGFIELD, MASS.

more faithful and reliable results in playback operation.

How does this situation regarding pickups relate to the subject of motor drives? The answer lies in the motor design. The conventional induction motor's "open-type" construction permits a large magnetic leakage field to exist in space near the motor. This high leakage field, while not affecting a crystal pickup, does adversely affect a magnetic or dynamic pickup. A very audible 60-cycle hum is picked up and reproduced through amplifier and speaker when such a pickup is in proximity with the induction motor.

With the enclosed-type construction of the new synchronous motor, as compared to the open-type of the induction motor, there is a reduction of more than 10 db. in the magnetic leakage field hum reproduced by magnetic or dynamic pickups. It is for that reason that radio-phonograph manufacturers find it essential to use this new synchronous motor in equipment where other-than-crystal pickups are employed.

As for the replacement market, it is a simple matter for a radio serviceman to replace a damaged or unsatisfactory induction motor in a record-changer with a new synchronous motor. The discerning owner therefore is able to obtain improved performance from his present equipment until new consoles are on the market.

Thus, either as a replacement motor for existing radio-phonograph combinations with record-changer, or as a standard component in new equipment, the new synchronous motor is expected to eliminate several among the most annoying sources of dissatisfaction among critical listeners to fine quality records.

-50-

Charles R. Denny who was recently named chairman of the Federal Communications Commission takes time out to look over a new Hallicrafters Model SX-42 FM-AM amateur radio receiver. Prior to his new appointment Mr. Denny served as acting chairman of the Commission after Paul A. Porter resigned.



Service Associations (Continued from page 49)

this committee. These include complaints filed with us by OPA, the Better Business Bureau, any dealer against any member in the service field, any customer who may complain about a dealer and complaints of servicemen and distributors.

Broadcast and Publicity Committee
—The group looks after the Association's relations with the broadcasting stations and the press.

The broad programs for mutual help and training which have been charted as prime postwar projects of PRSMA are designed to assist radio servicemen to become better technicians and better businessmen. It's our firm belief that the public can be better served at less cost for essential radio service by an organization of qualified, independent service businessmen than by any other type of service set up. Specifically, we plan to raise the standards of radio service in our areas and to secure local recognition of the independent service dealer as a businessman on a par with any other merchant.

It is lamentable but true, that the average service dealer before the war had no recognized standing in his community. To the banker he was anathema. He was held on a cash basis with his suppliers, and, in most cases, looked upon by his fellow businessmen as some jerk who tinkered with radios. Yet this radio service dealer, if he was a good technician, had to have a technical background superior to that required of most of his fellow businessmen, including the banker, and an aptitude for constant study of a dynamic field of activity

which was erupting more new ideas per month than the average businessman had to cope with in a year.

In a tangible way, the PRSMA helps to channel a large volume of radio service business into the stores of members of the association. To accomplish this a radio service merchandising program has been developed. As a part of this program we are using 15 spot announcements, two fifteen minute programs and six FM spots on radio service per week over Station WFIL in Philadelphia. These spot announcements and programs encourage the listener to phone the PRSMA for radio service. Calls originating from these announcements are turned over to the member dealer whose place of business is nearest the point where service is required. This radio program will be broadened as time goes on and will be supported by suitable advertising in the leading local papers and other media.

Another project of PRSMA is a complete course in basic television installation and servicing, which is being given in cooperation with Radio Station WFIL in Philadelphia. Other courses in AM, FM and television are being mutually sponsored with various educational institutions in the Philadelphia area.

The service dealer has unjustly been the butt of many thoughtless charges. In our area, television and FM are now a reality. The service dealer has been wrongly criticized for not becoming an expert on television service and installation. Those who level this sort of charge against the independent service dealer are either wholly ignorant of the basic functions of radio servicing or are using it as a smoke screen to mask some selfish plan or ambition.

Radio service dealers are concerned only with adjusting and repairing equipment that has been designed, manufactured and delivered to a dealer or end user. While an understanding of radio theory and circuit application is important, the prime need of a dealer is for full and complete information about the particular piece of equipment he is called on to install or service. What manufacturer to date has revealed to anyone outside of his own organization circuit details or other pertinent information on either television or FM receivers which he plans to produce? It is obvious that until the manufacturers supply the technical data necessary for installing and repairing their equipment, there is little the independent service dealer can do to equip himself with the specific information absolutely necessary for intelligent installation and servicing of the manufacturer's equipment.

Perhaps one of the most important parts of the PRSMA program is the plan to help the individual dealer become a better merchandiser and businessman. It is the purpose of this program to encourage the dealer to

NEW SHURE CARTRIDGE "PACK" HANDLES REPLACEMENTS FOR 58 CARTRIDGES!



SERVICEMEN:

Solves your service problems with phonographs and record changers . . . builds new profits! 5 crystal cartridges have been "standardized" to replace 58 different popular types of all makes—a feature made possible by the new, post-war Shure Lever System. The "Pack" contains the 5 Shure Lever-Type Cartridges, including Model W57AN with the sapphire-point needle. Specific cross-reference chart for exact cartridge replacement is printed on carton. Your Shure Distributor has the "Packs" in stock. Write or call him now!

MODEL W50 . . . LIST PRICE \$25.75 . . . CODE: RUPAC

Manufactured under Shure Patents—Licensed under Patents of the Brush Development Company

SHURE BROTHERS, Inc.

Microphones and Acoustic Devices

225 West Huron Street, Chicago 10, Illinois

CABLE ADDRESS: SHUREMICRO



★ for replacement of worn pre-war changers
 ★ for constructing your own radio-phono combination
 it's

WEBSTER
 best known name in
 RECORD CHANGERS

When you replace your old, worn changer, or construct your own radio-phono combination — do as so many others have wisely done — choose Webster. Known for their high fidelity of reproduction, precision-made parts, and smooth, dependable performance, Webster Changers are truly "The Choice of Music Lovers."



Model 56

Shuts Itself Off after the last record has played! Plays "inside-out" or home recordings when in manual play position. Cushioned spindle protects records, Webster 4-pole, shaded pole motor, improved rim drive, feather-touch pickup, and simplified changer mechanism for long dependable service. All parts heavy gauge, copper or plated steel. Plays ten 12-inch or twelve 10-inch records. Dimensions: 14" x 14" x 9" overall (6 1/2" above main plate, 2 1/2" below.)



Model 50

Compact, Efficient, Model 50 is designed for use in smaller units where space is limited. It has the Webster two-tier banded construction of changer mechanism, cushioned spindle, manual play position, improved rim drive, and feather-touch pickup. All parts are heavy gauge, copper-plated steel, and built for long dependable service. Plays ten 12-inch or twelve 10-inch records. Dimensions: 12" x 12 1/4" x 9" overall (6 1/2" above main plate, 2 1/2" below.)



The choice of music lovers

WEBSTER CHICAGO
 5610 BLOOMINGDALE AVE.
 CHICAGO 39, ILLINOIS

operate his business as any successful business must be operated. Accurate records and accounting to enable him to pass up service jobs that lose money. Clean, efficient service shops and store layouts that have eye-appeal. Effective use of his window display space with the right kind of displays, changed frequently. These are all segments of a program for merchandising education which will bring material benefits to every active member of the Association.

Predicated on our own experiences in Philadelphia we believe good radio service organizations will receive enthusiastic support and tangible assistance from broadcasting stations and particularly wholesale radio suppliers which service the radio Association's area.

Broadcasting station operators know that the quality of their programs is no better than the efficiency of the receiver that reproduces it. Efficient, capable radio service, widely available, is a decided asset to the broadcaster as well as the set user. Since most broadcasting station managers recognize this need for improved radio service they are usually ready to cooperate wholeheartedly with a service dealer organization which will lift the quality of radio receiver performance. Engineering personnel from the broadcasting stations are usually available as instructors in association training programs in receiver servicing and installation.

The radio service association will usually find a staunch friend in the power and light company which serves its area. These organizations are constantly looking for new ways to give their customers more value for their electrical service expenditures and a cooperative service dealer program provides an excellent opportunity in this direction. Power and light companies usually have auditoriums or other meeting rooms which can be used for Association meetings and as classrooms for evening training programs.

PRISMA's staunchest friends have been the radio jobbers of Philadelphia who have consistently given us excellent support. The wholesalers have, in turn, benefited greatly from this cooperation. In a recent survey of buying preferences conducted among local radio servicemen the question was asked whether they bought their supplies locally through radio parts wholesalers, from outside suppliers or by mail. Ninety-nine per cent of the servicemen indicated they bought all of their supplies from local jobbers when the parts were available here.

In the final analysis it is the customer—the radio set user—who gains most from the activities of an active and alert radio service organization. Dealers cooperating to raise the horizons of radio service as a business can eliminate the chiselers, the racketeers and the fly-by-nights quicker and more effectively than could the individual dealer acting

PREPARED ASSORTMENTS
GUARANTEED FIRST QUALITY

Cat. No.	Quantity	Description	Price
1001	100	1/2 Watt Resistors, All Insulated	\$2.98
1002	100	1/2 Watt Resistors, All Insulated	3.98
1003	100	1 Watt Resistors, All Insulated	4.45
1004	50	2 Watt Resistors, All Insulated	3.98
1005	10	Wire Wound Resistors Ass'd	2.98
1006	50	200 Volt Paper Condensers	2.48
1007	50	400 Volt Paper Condensers	3.45
1008	50	600 Volt Paper Condensers	4.25
1009	50	Mica Condensers	2.98
1010	20	Dry Electrolytic Filter Condensers	6.75
1011	10	Resistance and Line Cords	3.98
1012	100	Wafer Sockets	4.50
1013	100	Plastic and Ceramic Sockets	8.50
1014	10	25 Ft. Rolls Hookup Wire—Ass't Colors	1.98
1015	10	50 Ft. Rolls Hookup Wire—Ass't Colors	3.25
1016	10	100 Ft. Rolls Hookup Wire—Ass't Colors	6.75
1017	10	Volume and Tone Controls—No Switches	1.98
1018	50	Large Bakelite Knobs Push On	6.50
1019	50	Large Bakelite Knobs Set Screw	7.85
1020	50	Small and Medium Knobs Push On	3.50
1021	50	Small and Medium Knobs Set Screw	3.75
1022	100	Small Bar Knobs	5.50
1023	100	Large Bar Knobs	6.75
1024	100 ft.	Spaghetti and Vinyl	.98
1025	50	Padders and Trimmers	3.45
1026	10	Collis I.F. R.F. Ant. and Osc.	3.98
1027	50	Pilot Lamps	2.49
1028	20	Toggle and Slide Switches	3.98
1029	20	Water and Ceramic Band Switches	3.98
1030	20	Auto Generator Condensers	2.98
1031	20	Auto Suppressors	2.98
1032	25	Electrical Wiring Devices, Plugs, Caps, Bases, Heater Plugs, etc.	2.75
1033	50	Electrical Wiring Devices, Plugs, Caps, Bases, Elements, Fuses, etc.	5.00

ELECTRICAL APPLIANCES AND PARTS

Description	Each
Fluorescent Kitchen Unit	\$4.75
Fluorescent Desk Lamp, Beautiful Finish, less bulb	5.75
Single Burner Electric Stove, less Switch	2.55
Single Burner Electric Stove, with Switch	2.90
Double Burner Electric Stove, with Switch	6.25
Non-Automatic Electric Iron	3.95
Non-Automatic Toaster	3.75
Radiant Bowl Heater	4.25
Cabinet Type Heater	9.00
Bakelite Caps	.05
Rubber Caps	.09
Electric Iron Elements	.55
Nichrome Electric Stove Element	.12
Bakelite Heater Plug	.10
3 Way Cube Tap	.11
Replacement Toaster Element	.75
6 ft. Appliance Cord with Plug	.21
Electric Iron Heater Cord with Bakelite Plug	.45
Electric Iron Heater Cord with Switch Plug	.79

SEND FOR TRUTONE COMPLETE RADIO AND ELECTRICAL LIST

Terms: 25% deposit required with order. Balance C.O.D.

TRUTONE PRODUCTS CO.

303 West 42nd Street, Dept. N, New York (18), N. Y.

**No Spreading
 Ourselves Out
 Too Thin!**

Certainly, we could expand our facilities and offer you a more complete line. But, then, we couldn't do as well on deliveries as we're now doing!

So to serve you best, we are continuing our present maximum production on a limited line—thus assuring you the usual prompt and efficient Kenyon service.

THE MARK OF EXCELLENCE



KENYON

TRANSFORMER CO., Inc.

840 BARRY ST., NEW YORK, N. Y.

alone. Further, the Association results in a pooling of practical knowledge and experience which is reflected in improved methods of operation in members' shops and more value to the customer for his radio service dollar.

In years past, attempts have been made to form national associations of servicemen. It is the opinion of those of us who have been associated with successful service organizations for a number of years that there is no particular need at the present time for a national association of service dealers. However, we do feel that strong state associations should be built up. These state associations should be cooperative groups of autonomous local radio service dealers' organizations who can combine their activities for solving their problems on a state-wide basis.

The intense interest which has been spreading among service dealers throughout the State of Pennsylvania on the subject of adequate and equitable radio service associations, crystallized recently in a meeting at Harrisburg for the purpose of forming a state association. The meeting brought together officers and representatives of dealers and associations in Pittsburgh, Harrisburg, Philadelphia, Lehigh Valley and Williamsport. Representatives of the radio parts wholesalers and the broadcasting stations also attended the meeting. From plans drafted at this and a subsequent meeting a *State Federation of Radio Servicemen's Associations* will soon become a reality. We believe that through the medium of this organization a state-wide program will be developed and carried out which will go far towards helping the individual service dealer and provide radio set users with an increasingly higher standard of radio service.

-30-

Dan Rober of New York acted as stand-in for Maurice Kraay, W9HEL, who was declared winner of the Hammarlund SP400-X Super-Pro when "Buck" Stretcher (the character seated on the receiver) presented the award. The contest to "name-the-pixy" was sponsored by Sun Radio & Electronics Co., Inc. of New York for all hams.



February, 1947

BA BARGAIN SPECIALS

FOR "GE" PORTABLES

2 volt Willard type 20-2 the exact replacement in Pre-War Model LB 530 "GE" Portable Radios. Also for other sets. Gangs nicely in multiples of 3 for 6 volts. In Plastic Case size 3 31/32 x 3 1/2 x 5 1/2" high. Shipped Dry. Uses standard battery electrolyte available everywhere. Regular List Value \$8.75 No. 5A142, Every One Brand New.



Each... \$3.95

CODE PRACTICE SET

Consist of a top quality key and a Signal high frequency adjustable buzzer mounted on a black bakelite base, equipped with binding posts, ready for quick and simple connections to the 4 1/2 volt battery included. Complete ready to use.



Stock No. 5A145
Each \$2.95
Only.....

Complete
Nothing
Else to Buy

The FINEST in HEADPHONES

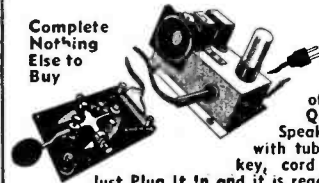


Type P23. The Choice of the Air Corps headphones, highly sensitive, 8000 ohm impedance, bipolar magnets. Extremely comfortable sponge rubber ear cushions — stainless steel leather covered headband — concealed terminals — Six Foot Cord with PL55 plug. EVERY ONE BRAND NEW in Original Factory Cartons.

Stock No. 5A134 \$13.50 value.
An Outstanding Buy, Only \$2.95

CODE PRACTICE OSCILLATOR

Complete
Nothing
Else to
Buy



Operates
from 110
volts AC
or DC. Plenty
of Volume from
Quality Midget
Speaker. Complete
with tube, high grade
key, cord and plug —
Just Plug It In and it is ready to operate.

Stock No. 5A146
A REAL BUY.

Each..... \$8.95



8000 OHM IMPEDENCE HEAD SET

Sturdy, hi-quality, built on the hearing aid principle. Ear fitting soft rubber cushions attached to receivers shuts out outside noise. Comfortable, light metal band easily shapes to contour of head. Comes complete as shown with 6-FOOT CORD and matching transformer. Cost to build many times the price we ask.

17A420, In Original
Cartons. Special Each... \$2.95

RESISTOR ASSORTMENT

Quality makes, insulated, RMA color coded assortment of 100 (50 one watt and 50 one-half watt) all popular capacities. Handy color code chart included
No. 18A74 Per assortment \$1.95

RF AMMETER



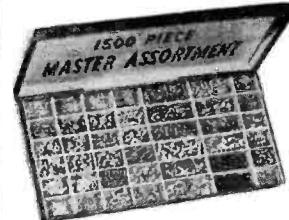
G.E. type D W 52. 4 Amperes, 2% accuracy. EXPANDED scale, 2.19" diam. body. Has internal thermocouple. List Price \$19.75
No. 20A840
Special Each... \$3.43



COMING SOON

A New Complete B-A Catalog containing the latest in radio and electronic parts and devices, newest ham gear, gadgets, war surplus items. If you haven't already requested one do so now

MASTER HARDWARE ASST.



Machine
Screws
Nuts
Washers
Soldering
Lugs
Grommets
Spacers
Rivets
Eyelets
Etc. Etc.

42 Individual Compartments, each containing a different type of most selected and often needed hardware. A total of over 1500 pieces. Including a wide variety of sizes, length and heads. This assortment will prove to be worth many times its small cost just to have it on hand when needed. Every Piece Clean, Bright and New.
No. 3A35. An Outstanding Value... \$2.45

KRAEUTER PLIERS

Round Nose. A handy plier for shaping wire, metal and all around radio work. Made of forged steel with polished head.
No. 11A15. Overall length 6" Each... 95c



WILLARD 2 VOLT



Compact Rechargeable Storage Battery in Spill-Proof Clear Plastic case. Only 2 3/8" square and 6" overall high — (About the size of the ordinary #6 Dry Cell) make it applicable for a wide range of uses where battery power is needed. Rating 24 AH. Gangs nicely for other voltages in multiples of 2 volts. Shipped Dry. Uses standard battery electrolyte available everywhere. Every One In Original Factory Carton

No. 5A133. While Our
Stock Lasts. Special Each... \$2.95

Order from this ad. Every Item Listed is GUARANTEED BRAND NEW, TOP QUALITY GOODS.

Terms—Cash with order or C. O. D with 20% deposit Add Postage.

BA BURSTEIN-APPLEBEE
EVERYTHING IN
RADIO AND ELECTRONIC DEVICES
1012-14 MCGEE STREET, KANSAS CITY 6, MISSOURI

WE SHIP ANYWHERE
IN THE WORLD
Internationally Famous

FLANAGAN RADIO CORP.

SEND FOR
COMPLETE
LIST OF
AVAILABLE
RADIO TUBES
AND PRICES



INTERESTED IN TELEVISION?
THEN YOU CAN'T AFFORD TO MISS



THE MOST IM-
PORTANT TELE-
VISION BOOK
OF 1947

Contains Latest
Television Data

Sent to you
Post Paid

PHILCO BOOK

\$2.25



COYNE
BOOK

\$1.95

Order Today From FLANAGAN

FREE CATALOG

Send for free
catalog and prices
of hard-to-get Radios, Ra-
dio Tubes, Radio Parts, Pickups,
Motors, Condensers, Tube Checkers, Volt and
Ohm Meters, Signal Generators, Signal Trac-
ers, etc. Please mention Radio News when
writing.

**FLANAGAN
RADIO CORP.**

Phila.'s Largest Stock of Radio Tubes
N. E. Cor. 7th & Chestnut Sts.
Phila. 6, Penna.—U. S. A.

Within the INDUSTRY

ROY BROWN UNGER has been appointed to the post of assistant sales manager of the jobber division of *The World Products Corporation* of Cleveland, manufacturers of home and automobile radio aerials.

Mr. Unger was graduated in 1943 from Cornell University. As a first lieutenant of the field artillery he served overseas with the 77th Division on Okinawa and the Philippines.

His new duties include developing and directing new advertising and merchandising plans, expediting shipments and supplying customers with a complete service of sales aids.

C. J. ANTHONY has been appointed merchandising manager of the *John Meck Industries*, radio manufacturers of Plymouth, Indiana.

Mr. Anthony has been associated with the company since 1943 and has held posts of assistant to the sales manager, personnel director and sales promotion manager.

Three years before his association with Meck he was employed in the wholesale marketing department of the *Pure Oil Company*.

AERO NEEDLE COMPANY of Chicago manufacturers of the *Aeropoint* phonograph needle, have recently announced the appointment of *The Sampson Company* of 3201 South Michigan Avenue, as exclusive distributor of the company's products in the Chicagoland area.

RICHARD MATTISON, who for many years has been associated with *Tung-Sol Lamp Works, Inc.*, as manager of their wholesale division, recently joined the *Minerva National Sales Corporation* as general manager.

In his new post Mr. Mattison will direct sales activities in connection with the merchandising of the *Minerva* line of radios, radio-phonograph combinations, FM and television receivers.

JEFFERSON-TRAVIS INCORPORATED has become a wholly-owned subsidiary of the *Emerson Radio and Phonograph Corporation* of New York.

Jefferson-Travis, manufacturers of marine radio and radiotelephone equipment, will operate as a separate

company and will have at its disposal the engineering, purchasing, production, promotion and management counsel of *Emerson* personnel.

Robert C. Berner, an official of *Emerson*, has been elected president of *Jefferson-Travis Incorporated* and Harold Lloyd, formerly with the parent company has been named general manager. Ray Friedman will remain in his post of sales manager while Joseph Mas will continue to serve as chief engineer.



GENERAL CEMENT MANUFACTURING COMPANY of Rockford, Illinois was recently admitted as a new member of the Radio Manufacturers' Association by the RMA Board of Directors.

The company manufactures a line of products for the radio serviceman, including cement, dial belts and kits, wire strippers, etc.

BRUCE R. LAFFERTY has been promoted to the post of general service manager for *The Hallicrafters Company* of Chicago.

Mr. Lafferty, a veteran of eighteen years in the radio field, was formerly assistant to the general service manager of the company. He has been associated with the CAA as a radio engineer in charge of field installations and with the Chicago Ordnance District.



RADIO EQUIPMENT DISTRIBUTORS, West Coast outlet for a complete line of service and amateur parts and equipment, has recently moved to their new modern store at 312 West Pico Boulevard, Los Angeles.

The new location comprises 5000 square feet of floor space with 1500 feet set aside as a "ham shack" containing a complete line of amateur radio supplies.

One of the features of the new store is a technician's lounge where the latest news and technical information on radio is available. The downtown store at 709 South Main Street will continue to operate under the guidance of Jack Robbins.

RADIO CRAFTSMEN, INC., has entered the loudspeaker business, according to the company's vice-president and general manager, Byron L. Friend.

The company will produce a complete line of 8", 10" and 12" speakers with deliveries being made currently on the "Standard," "Master" and "De Luxe" lines.



Designed to be used as replacement units in radio-phonograph combinations and public address systems, these speakers are being merchandised through local jobbers.

* * *

GORDON S. CARBONNEAU, president of the company bearing his name, has announced the entry of his organization into the loud-speaker field in both the jobber and equipment lines.



Mr. Carbonneau, who served as production engineer for *Utah Radio Products* of Chicago, has been active in the radio industry for the past 25 years.

Although processing and manufacturing operations of *Carbonneau Industries* will be centered in Grand Rapids, Michigan, advertising and jobber sales offices will be located in Chicago.

* * *

DAN D. HALPIN, a pioneer in the promotion of commercial television, has been named television receiver sales manager for *RCA Victor Division of Radio Corporation of America*.

Mr. Halpin who has been engaged in television activities since he joined the division in 1940, is a past president of the American Television Society, a member of the Sales Executives Club of New York and past president of the Notre Dame Club of New York. While at Notre Dame, Mr. Halpin managed the 1930 national championship football team.

* * *

MYRON J. MORRIS has recently been named manager of the service division for *Electronic Corporation of America*.



In his new position, Mr. Morris will be responsible for the company's Integrated Service Plan which coordinates technical information, parts and service facilities for dealers.

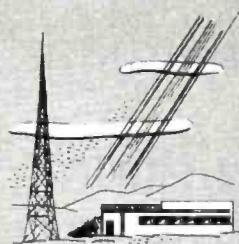
Prior to joining *ECA*, Mr. Morris was a radio and radar instructor for the Naval Signal Corps and a radar technician attached to the Naval Aviation Supply Office.

* * *

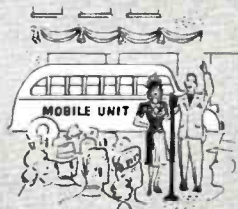
RADIO MANUFACTURERS ASSOCIATION and the National Association of Broadcasters have recently appointed a joint committee to provide closer cooperation on major radio problems, including the development of FM, television and other services in the public interest.

The liaison committee, made up of five members from each organization, includes, for *RMA*: W. R. G. Baker, *General Electric Company*, Walter Evans, *Westinghouse Electric Corporation*, Frank M. Folsom, *Radio Corporation of America*, Paul V. Galvin,

February, 1947



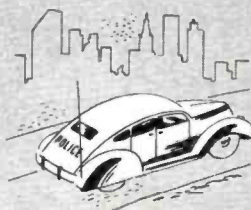
RADIO STATION STANDBY



MOBILE RADIO UNITS



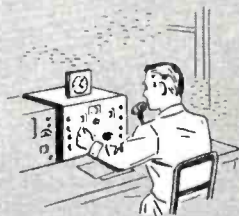
GEOPHYSICAL SURVEY



MUNICIPAL SIGNAL STANDBY



RAILROAD RADIO



AMATEUR RADIO

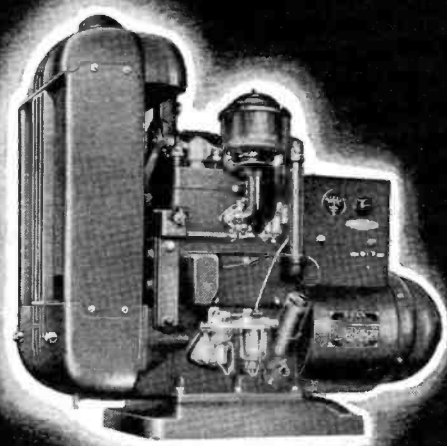


"SPOT" RECORDING

A.C. OR D.C.

POWER

PORTABLE, STANDBY
OR STATIONARY
for
Electronics Uses



Onan Electric Plants are completely self-contained, dependable power units built in a wide range of sizes and standard voltages.

Lightweight, one or two-cylinder, air-cooled models offer the maximum in portability for many applications. Portable A.C. models—350 to 3,000 watts; portable D.C. models—600 to 5,000 watts.

Although widely used for intermittent service as standby units, Onan two, four, and six-cylinder water-cooled plants are built for continuous heavy-duty operation . . . stationary or mobile. A.C. models—3 KW to 35 KW; D. C. models—3.5 KW to 10 KW.

WRITE FOR FOLDER

ONAN Electric Plants are available in many sizes and models. ALTERNATING CURRENT: 350 to 35,000 watts in all standard voltages and frequencies. DIRECT CURRENT: 600 to 10,000 watts, 115 and 230 volts. BATTERY CHARGERS: 500 to 3,500 watts; 6, 12, 24 and 32 volts.

D. W. ONAN & SONS INC.

2187 Royalston Ave.

Minneapolis 5, Minn.



FOUR REASONS
Why
RADIO SERVICEMEN PREFER
WRIGHT VERIFIED SPEAKERS

Brightens **Sturdy** **Cones**
Tone Quality **Construction** **Stay Centered**

★
The Verified Guarantee Protects Them
Against Any Loss

★
WRIGHT, Inc.
2233 UNIVERSITY AVE.

ST. PAUL 4

MINNESOTA

Galvin Manufacturing Corporation, and E. A. Nicholas, Farnsworth Television & Radio Corporation. NAB members include: T. A. M. Craven, Station WOL, Washington, D. C., William Fay, Station WHAM, Rochester, New York, Gordon Gray, Station WSJS, Winston-Salem, N. C., James Shouse, Station WLW, Cincinnati, Ohio, and Carleton D. Smith, Station WRC, Washington D. C.

HECTOR A. CASTELLUCCI was promoted recently to the post of assistant manager of the sales division of Farnsworth Television & Radio Corporation.



Mr. Castellucci, who has been associated with Farnsworth as a procurement specialist, is well-known in the radio and appliance industry, having been associated with Grigsby-Grunow Company, Universal Cooler Corporation, World Utilities, Inc., and Servel Incorporated.

His offices will be maintained at the Fort Wayne, Indiana, headquarters of the company.

LAND-C-AIR SALES, INC., is the corporate name of a new sales representatives' organization recently organized by Robert E. Sargent, Paul Nichols and Walter C. Hustis.

The three founders of the new company were all formerly employed by Jefferson-Travis Corporation. Mr. Sargent and Mr. Hustis served as Western and Eastern Sales managers respectively, while Mr. Nicholas was director of purchases for the company.

The new company is located at 14-16 Pearl Street, New York City.

B. V. K. FRENCH, well-known radio engineer, has recently joined the Howard W. Sams & Co., Inc., staff as director of field relations for the company.



In his new post Mr. French will act as liaison between the radio manufacturer and the servicing profession. He will assist in the expansion of the company's "Photofact" service to radio technicians.

Mr. French has served in various engineering capacities with Federal Telephone and Telegraph Co. of Buffalo, RCA License Division Laboratory and P. R. Mallory Company of Indianapolis. During the war he served on the Joint Army-Navy Standardization Board. He is a senior member of the I.R.E. and has served as chairman of the Connecticut and Indianapolis sections.

ILLINOIS CONDENSER COMPANY, INC., have moved into their new plant located at 1616 North Throop Street, Chicago, and are now in full operation at the new address.

RADIO NEWS



Sensational, Amazing

NO ELECTRICITY — NO TUBES
NO BATTERIES — NO TUNING

MYSTERY RADIO

Yes, this new MYSTERY RADIO provides instant reception from the nearest broadcasting station—just put little ear piece into your ear and attach wire clips to aerial and ground, presto—you have reception.

- So small, it will fit in the palm of your hand.
- Usually works swell by just attaching clip to aerial, bed spring, screen door or wire fence, etc.
- Nothing to wear out—no parts to replace.

Send check or money order for postpaid delivery. Dealer inquiries invited on quantity.

TAYBERN EQUIPMENT CO.

DEPT. RN-2

120 GREENWICH STREET NEW YORK 6, N. Y.



\$2.45

PRICE COMPLETE



Office



Sickroom



Youngsters

OUR KNOW HOW

IS THE ANSWER TO YOUR INSTRUMENT REPAIR PROBLEMS

INSTRUMENT SERVICE technicians are specialists in METER and TEST EQUIPMENT repairs.

You will get prompt and guaranteed repair service on all makes of METERS — MULTI-METERS — SIGNAL GENERATORS — VACUUM TUBE VOLTMETERS — TUBE CHECKERS.

ALL CALIBRATIONS CHECKED AGAINST PRECISION STANDARDS.

Inquiries solicited.



INSTRUMENT SERVICE CO.

2515 AMSTERDAM AVENUE
NEW YORK 15, N. Y.

WIRE! WIRE! WIRE!

U. S. Army Wire W-110-B

5500 ft. Double Strand..Per coil. \$33.00
Coil Deposit Returnable..... 6.00

RGU 8 Low Loss Cable—Radio Frequency about 1200' to a coil. \$.04½ ft.

Radio & Communication Wire 7/32" Copper Shielded—Brown rubber—Covering about 5000'—Coils\$3.50 1000'

AN14, AN16 Aircraft Wire...\$3.50 1000'
White and other colors

LYELL HARDWARE CO.
P.O. Box 5 Rochester, N. Y.

The manufacturing facilities of the company are now housed in a modern, air-conditioned, one-story structure which was specifically designed to meet the firm's production, laboratory and research requirements.

The dust-proof quarters are illuminated with fluorescent lighting and a plant broadcasting unit brings recordings and FM broadcasts to the works.

* * *

C. RUSSELL FELDMANN, formerly president of *National Union Radio Corporation*, was recently elevated to the post of chairman of the board of the company.

Succeeding Mr. Feldmann as president of the company is Kenneth C. Meinken, who has been associated with *National Union* since 1941 as assistant to the president.

Other corporation officers elected to fill new posts included: Winfield H. Carey, to the office of treasurer and Jerome V. Deevy who was named secretary of the company.

* * *

AMOS H. CAREY has been named the new director of manufacturing for the *John Meck Industries* of Plymouth, Indiana.



Mr. Carey, who was formerly in charge of manufacturing for the *Radio Corporation of America*, came to *John Meck Industries* from *Sprague Electric Company* of North Adams, Massachusetts where he was in charge of all operations including special tool design, machine shop and production.

The company manufactures a line of home receivers.

* * *

SCOTT RADIO LABORATORIES, INC., held a preview of their new *Scott Video*, for the benefit of their dealers and the press at the Knickerbocker Hotel in Chicago recently.

A telecast of the Chicago Blackhawks-New York Rangers hockey game was the "feature" attraction of the evening with a special message to *Scott* dealers preceding the regular program.

The new *Scott Video* has been engineered to provide a direct-view 8x10 inch black and white image from the 12 inch cathode-ray tube. The new television unit is housed in a separate cabinet which is designed to be connected to either the present *Scott* chassis or the "Phantom," "Philharmonic," "Laureate" or the instrument of *Scott* prewar manufacture.

All of the video controls are on the television unit while the audio controls are on the regular *Scott* receiver. Magnetic focusing is employed and operates automatically once the installation is made. A brightness control is provided in addition to a touch tuning meter with needle indication to facilitate precise station settings.

it's New...
it's **BIG**
it's **FREE**



LAFAYETTE'S
latest, greatest
RADIO CATALOG

Yes, here it is at last—the most complete catalog ever offered by Lafayette—the world's largest radio supply house. And what a catalog it is! Its pages are brimming with an amazing display of top-quality radio and electronic equipment—such items as radio parts, complete sets, build-it-yourself kits, amplifiers, microphones, automatic record changers, ham gear, test equipment—as well as hundreds of other items.

144 PAGES — HANDSOMELY ILLUSTRATED

All the tried-and-tested standard equipment is listed—also many items so recently developed that they're shown here for the first time. And everything is in stock—ready for super-speed delivery—economy priced. Be among the first to get your copy of *America's greatest radio catalog*—**FREE**.

mail coupon below

Lafayette Radio

RADIO WIRE TELEVISION INC.

100 SIXTH AVENUE • • NEW YORK 13, N. Y.
110 FEDERAL STREET • • BOSTON 10, MASS.
24 CENTRAL AVENUE • • NEWARK 2, N. J.

LAFAYETTE RADIO, Dept. RB-7
100 Sixth Avenue, New York 13, N. Y.


Please send **FREE CATALOG** at once to:

Name.....

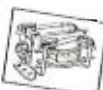
Address.....

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

typical Lafayette **BARGAINS**



Heavy-Duty Filament Transformer—Two secondary windings—10 volts at 13 amps CT and 7.5 volts at 2.5 amps CT. Size 3 3/4" x 5" x 7 1/4" H. Only a few available at this low price. Order NOW from this ad. HR 314—Filament Transformer—Your cost only \$2.95



Famous Leach Relay—Type 1177CPS—All-ceramic insulation—DPDT with separate SPDT contacts for break-in. Ideal for antenna changeover. 115-volt, 60-cycle coil. They're going fast—so order AT ONCE. HR 120—Leach Relay—Your cost only \$1.95

MAKE A BEE-LINE TO

KAYLINE!

* SURPLUS SPECIALS *

- OSCILLOSCOPES**—5 Inch 115V. 60 Cyc. BC 412. Complete with All Tubes\$44.95
Crating Charges \$8.50
- OIL FILLED CONDENSERS**—GE, CD. Aerovox & Westinghouse.
- 1 Mfd. 5000 V.\$5.95
 - 4 Mfd. 2500 V. 3.75
 - 8 Mfd. 1500 V. 2.50
 - 2 Mfd. 2000 V. 1.95
 - 2 Mfd. 600 V.75
 - 50 Mfd. 330 V.A.C. 3.50
- ELECTROLYTIC IN METAL CAN**—
- 20-20 Mfd. 250 Volts.\$0.60
 - 10 for 5.00
 - 40/30/10/10 @ 500-350-350 and 300 V 10 for 9.00
- ELECTROLYTIC PAPER COND.**—Aerovox and Micamold. 1 Mfd. 1000 V. 10 for\$1.50
- RESISTORS**—Carbon RMA Coded Popular Brands Kit of 100 Ass't ¼, ½, 1, and 2 Watt Tolerance 5% and 10%\$2.50
- RESISTORS BY THE DOZEN**—Your Choice of Large Stock—½ W. 35c. 1 W. 45c. 2 W.\$0.60
- TUBES**—All Brand New Jan.—
- 2X2—\$1.25, 2C26/Hy. 75\$2.95
 - 3E29/829B with Socket 4.95
 - 723 A Klystron 7.75
 - 717 A WE. Door Knob 1.95
 - 417 A Klystron 4.95
 - 2J32 Magnetron 29.95
- Other Tubes in Quantities
6AK5, 6AG5, 6Y6, 6SN7GT, 6V6, 6J5, 6C4, 6E5, 5U4G, & 9006
- POWER SUPPLIES**—Brand New—
- 200 V. @ 250 Ma., 300 V. @ 500 Ma., 700 V. @ 250 Ma., and 1200 V. @ 50 Ma. Less Tubes in Oversea Pack\$59.95
- INTER-COMM. SETS**—Master and One Sub. Mfg. Western Elec. More Subs Can Be Added.\$34.95
- CHOKES**—7 and 7.5 Henri @ 10 Mhl. 2 for\$1.00
- 10 H 110 Mhl. 92 Ohms. Res. Insulated for 500 V. 1.95
- POTENTIOMETERS**—Type J. AB. 2 Watt Variety. Each.\$0.35
- CATHODE RAY TUBE**—5 CP 1. New Original Carton\$4.95
- BATH TUB CONDENSERS**—Your Choice 400 & 600 V. 5 for\$1.00
- METERS**—Bendix 2" Tuning. 0-300 Ma. Meter Type MT 31C.\$3.95
- Westinghouse 2" 0-300 Ma. Navy NX-33 Type\$2.50
- VARIABLE CONDENSER**—4-Gang Silver Plated Min. Cap. 12 Mmf. to Max. Cap. 200 Mmf.\$5.95
- Z-O CHOKES**—Ohmite. 12 for\$1.00
- PERMACEL TAPE**—¼" Roll.\$0.20
- SPAGHETTI TUBING**—30"\$0.05
- HEADSET**—Miniature Earphones—HS 30 U. Complete.\$4.95
- SIGNAL CORPS HEADSETS**\$2.50
- TRANSFORMERS**—Kenyon High Voltage for Scope 6.3 V.—.6 A., 2.5 V.—1.75 A. & 2500 V. .015 A. Brand New\$9.95
- TOGGLE SWITCHES**—D.P.S.T.\$0.25
- PUSH BUTTON SWITCH**—N. Open...\$0.25
- MOTORS**—Small Blower Type—1/100 HP., 27½ Volts D.C., 7000 RPM. Cont. Duty\$3.50

We Carry a Large Stock of Relays, Sockets, Coaxial Cable & Connectors, Mica and Ceramic Condensers. Send for List. All Mail Orders Promptly Filled. Sorry No C.O.D. Orders. All Prices F.O.B. Baltimore.

KAYLINE DISTRIBUTING CO.
DEPT. N-2
3523 DOLFIELD AVENUE
BALTIMORE 15, MARYLAND

Technical BOOKS

"PRACTICAL ELECTRICAL MATHEMATICS" by W. E. Rasch. Published by *D. C. Heath and Company*, Boston. 355 pages. Price \$2.00.

While this text is designed primarily for the electrician, much of the material contained in the book is basic and applicable both to the radioman and those working entirely in the electrical field.

The author, an instructor in the Electrical Department of Washburne Trade School in Chicago, has not assumed a knowledge of mathematics on the part of the student over and above the study of arithmetic. From this point the author has proceeded with his exposé of "electrical mathematics" in easy progression, introducing only necessary mathematical techniques when they are needed.

In order to assist the students who use this text, presumably apprentice electricians and journeymen, the problems which appear at the end of each chapter deal with some phase of electrical work which the student may encounter on the job.

* * *

"RADIO OPERATING QUESTIONS AND ANSWERS" by Arthur R. Nilson & J. L. Hornung. Published by *McGraw-Hill Book Company*, New York. 409 pages. Price \$3.50.

The new and eighth edition of this practical handbook contains several innovations which should be of interest to those preparing to take FCC examinations for commercial or broadcast licenses.

This eighth edition has been revised to conform with new and altered FCC regulations and expanded to include newly added material. In addition, the new American Standards Association approved symbols for radio, telephone, telegraph and electronics circuits have been adopted and used.

Because of the particular makeup of the book, with the answers directly following the stated question, this text should prove to be invaluable to radio operators preparing for their license examinations. No attempt has been made to cover the over 1300 questions which might be asked on the licensing examination, but a sufficient cross-section is given to permit the student to determine just what sections might prove to be a stumbling block.

* * *

"PROFESSIONAL RADIO WRITING" by Albert R. Crews. Published by *Houghton Mifflin Company*, Boston. 463 pages. Price \$4.00.

Although most of our readers are not interested in the professional side of radio programming, we would like to call to their attention, from time to time, noteworthy books dealing with this phase of the broadcast industry.

In this book the author has presented a workable guide for the benefit of students and writers who wish to

Slanted FOR SERVICE!



THE NEW
MULTIPLEX
MODEL
458

Volts - Ohms - Mils - Output

Back of the bench, out of the way, but easily readable and always ready for instant use. Those are the features that have made the Multiplex Model 458 V.O.M. a shop and laboratory favorite.

All popular ranges of A.C. and D.C. volts, A.C. and D.C. mils, ohms and output are conveniently available. Readings are sharply visible on the big 5¼" meter.

D.C. Volts . . . 0 to 2,000 . . . in 6 ranges
A.C. Volts . . . 0 to 1,250 . . . in 5 ranges
D.C. Mils . . . 0 to 100 . . . in 3 ranges
A.C. Mils . . . 0 to 250 . . . in 3 ranges
Ohms . . . 0 to 2,000,000 in 6 ranges
Output 5 ranges

The Multiplex Model 458, built to high industrial standards, is priced remarkably low—only \$26.00 net. Write today for new circular.

CHICAGO INDUSTRIAL INSTRUMENT CO.
219 West Chicago Avenue
CHICAGO 10, ILLINOIS

HAM GEAR

The Best and Only the Best

COLLINS—NATIONAL
MILLEN—HALLICRAFTERS
HAMMARLUND

Receivers, Transmitters and Parts
Our Specialty

Also

Carried in Stock All Nationally
Recognized Lines of Ham Material

Send for Our Periodical Ham
Bulletins

Play Safe!

Buy Only the Best from the House
That Handles Only the Best

Radio Television Supply Co.
1509 S. Figueroa St.
Los Angeles 15, Calif.

Richmond 9131—Cable Address: RATELCO

enter the field of writing for the radio medium. Since this is a specialized work, requiring a new set of writing techniques, Mr. Crews' practical experience as Production Director, Central Division, NBC, qualifies him to speak with considerable authority on the subject.

This book should be of value to the writer who wishes to embrace radio as offering a vast audience for his talents.

-50-

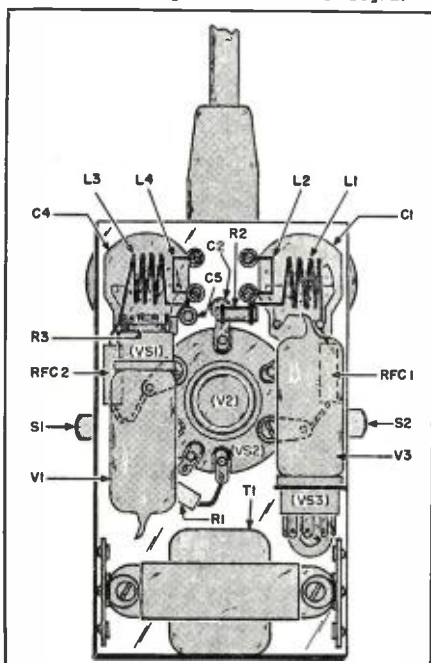
144 mc. Handie Talkie
(Continued from page 55)

proximately 8" long. The next section is telescoped down to its normal position and the remainder sticking out from the bottom section is cut off. The same is done with the third section. The modified antenna when fully extended should be approximately 21" long. A 1/4 wavelength antenna for the 144 mc. band would be close to 18". The other 3" are used inside the case for support.

A brass plug is turned down on a lathe to fit into the bottom section of the antenna. A shoulder on the plug provides a stop when the antenna is extended. A small groove is also turned on the plug providing a detent for the antenna contact spring. This spring contact is made from a piece of spring bronze and a small V is bent in one end. The vertex of the V rides in the plug groove and holds the antenna extended as well as providing the antenna connection.

The current drain from the filament circuit is 100 ma. in either transmit or receive. The "B" battery drain is approximately 6 ma. on receive and 15 on transmit. At a distance of 8 to 10 miles, two-way com-

Fig. 6. Mechanical layout shows front of chassis assembly of various component parts. Code numbers refer to the schematic diagram illustrated in Fig. 2.



February, 1947

THAT VERSATILE TYPE "K" SERIES



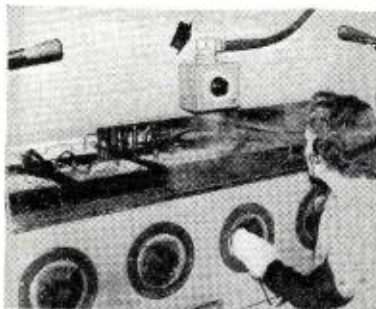
Cannon Electric type K-32SL Receptacle on Collins' "180K-1" Antenna Loading Unit.

TYPE
K-32SL



Mounting
Receptacle

Type "K" Receptacles are available in nine sizes & three styles. K-32SL Mounting Receptacle shown above has a wider flange than K-32S, and is adaptable for pin inserts only. Type RK-31SL carries socket insert assemblies only. Shell material is light-weight aluminum alloy.



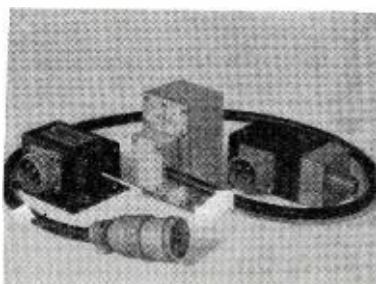
Cannon Electric Type K-23 Angle 90° Plug on testing equipment.

Type
K-23



Angle
90°
Plug

There are two angle 90° plug styles in the Type "K" Series: K-23 shown above and "RK-24" which carries pin insert assemblies only. K-23 carries socket insert assemblies only. Split shell construction makes possible easy inspection and soldering operations.



Cannon Electric K-22C; K-32SL. Statbam Laboratories' Dynamometer, Accelerometer and Pressure Transmitter.

Type
RK-22




Straight
Plug

Three types of straight plugs are available in the "K" series: "RK-22" shown above, having pin insert assembly; "K-21" with socket insert assembly, and K-22 which has no coupling nut and is used almost exclusively for extension cable use. Both Straight and Angle 90° styles are available with integral cable clamps and are designated by adding "C" to the number, as "K-21C".

Also available in the "K" and "RK" Series are Straight Junction Shells, Angle 90° Junction Shells, Dummy Receptacles and Dust Caps.

For complete information on this connector series, write for the Cannon Electric Type "K" Bulletin. Prices are quoted on specific assemblies by factory or representatives. No price list is available. Address Department B-228.



CANNON ELECTRIC DEVELOPMENT COMPANY

3209 Humboldt Street, Los Angeles 31, California

Canada & British Empire — Cannon Electric Co., Ltd., Toronto, Ontario • World Export Agents (excepting British Empire) Frazer & Hansen, 301 Clay St., San Francisco 11, Calif.

G&E COLUMN O'BUYS

Immediate Delivery
every item guaranteed!



"Mercury" Electric SOLDERING IRON

Best quality at bottom prices. 6 ft. (3,000 cycle) approved heater cord with rubber plug. AC/DC. Screw tip. Elements Cartridge Type. Rapid Heating Iron.

No. 4 80-watt 1/2" dia. tip. Special, ea. \$2.25
Lots of 6, ea. 1.58

No. 5 100-watt 1/2" dia. tip. Special, ea. 3.50
Lots of 6, ea. 2.85

No. 6 150-watt 1" dia. tip. Special, ea. 4.25
Lots of 6, ea. 3.60

Handy Radio Shop RATCHET SET

Compact, can be carried in pocket in its sturdy metal container. 1/4" drive tools. Set consists of 4 single hex, 4 double hex and 3 double square sockets, connector, heavy duty ratchet wrench, Spinitite nut driver with plastic handle and Universal driver with cross bar. A high grade set priced amazingly low!



No. 9273 17 pc. set only **\$5.50**



4-DAY CLOCK

Westlox Watchman's Clock, enclosed in metal case with 365 timing faces, has hour hand only, an accurate timing device which can be used for many timing purposes.

No. 1308 an amazing buy at..... **98c ea.**

APPLIANCE CORDS

Ideal for replacements; 6-ft. 2-wire No. 18 rubber cord with plug. No. 9285, lots of 10—20c ea.; lots of 50—18c ea.

FIBRE WASHER ASST.

Over 1000 pcs.; popular sizes used in elec. & radio work. No. 3202, per box. **79c**

AUTO RADIO CONDENSER

Sprague Vibrator. Sturdy, oil-impregnated unit. Ford Type. cap. .5 mfd. In dozen lots only. No. 1303 Lots of 12, special at **25c ea.**

RUBBER-HANDLE PLUGS

Heavy duty, top quality, handle grip plugs; fits all appliance cords. Fresh stock. No. 3210. Lots of 10, 12 1/2c ea.—lots of 50, 11 1/2c ea.—lots of 100, 10 1/2c ea.

RADIO SPAGHETTI TUBING

30" length, 2 popular sizes. Asst. in bundle of 25 pieces. No. 9277; per bundle, \$1.00.

AVAILABLE NOW! WHOLESOME ONLY!

Send check or money order—Terms net cash F.O.B. Chicago

Free! NEW G&E CATALOG

Illustrated. Value-packed with hundreds of other hard-to-get items for Servicemen, Repairmen & Dealers. Send for it now! Coupon brings it fast!

G & E EQUIPMENT SUPPLY CO.

Dept. RN-2, 400 N. Sangamon St., Chicago 22, Ill.

I want your new free Radio & Electrical Repair Parts Catalog.

Name

Address

City Zone State

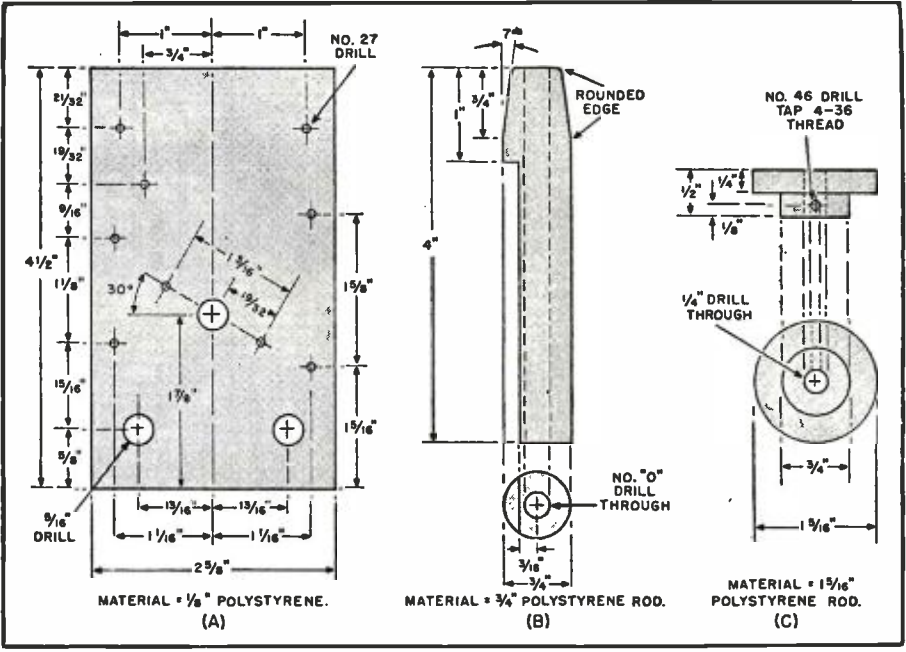
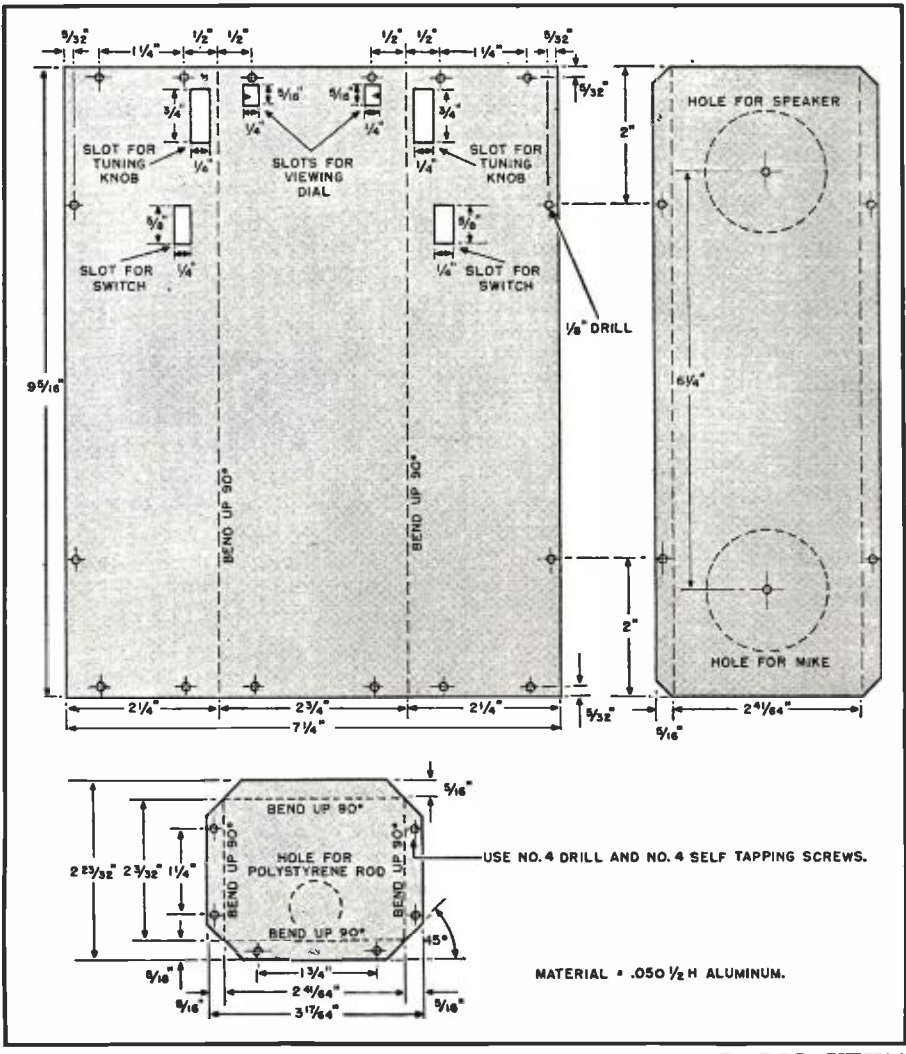


Fig. 7. Mechanical layout of chassis, antenna insulator, and knobs.

munication has been established with signal reports of R6 to 7. Intended use, of course, is for short range and best results are obtained when operated on the line of sight basis.

This set is approximately 2 1/4" deep and 2 3/4" wide by 9 1/2" high and weighs close to three pounds complete with batteries.

Fig. 8. Mechanical layout of case shows location of all punchings.



MATERIAL - .050 1/2 H ALUMINUM.

Frequency Converter

(Continued from page 39)

generated will appear every 50 kc. throughout the radio spectrum, several of which can suitably be used as *intermediate frequency*. This then would provide a harmonic in the vicinity of 550 kc. which would be the logical one to accept, inasmuch as it is the closest harmonic (within the b.c. band) to the fundamental frequency.

There are several advantages aside from economy to be gained by the use of a converter of this type. Selectivity, sensitivity, and signal to noise (hiss) ratio are improved; there are no "images" and both AM and FM signals can be received.

While the purpose of this article is to pass on to the hams, the idea in its simplest, basic form, where its intended use is for 144 mc. and higher frequencies, many worthwhile improvements are envisioned and being worked on (i.e. r.f. stage, separate quench osc., etc.) which will, it is expected, adapt the converter to use on *any* of the higher frequencies and provide good reception even in crowded communities, without the disadvantage of receiver radiation.

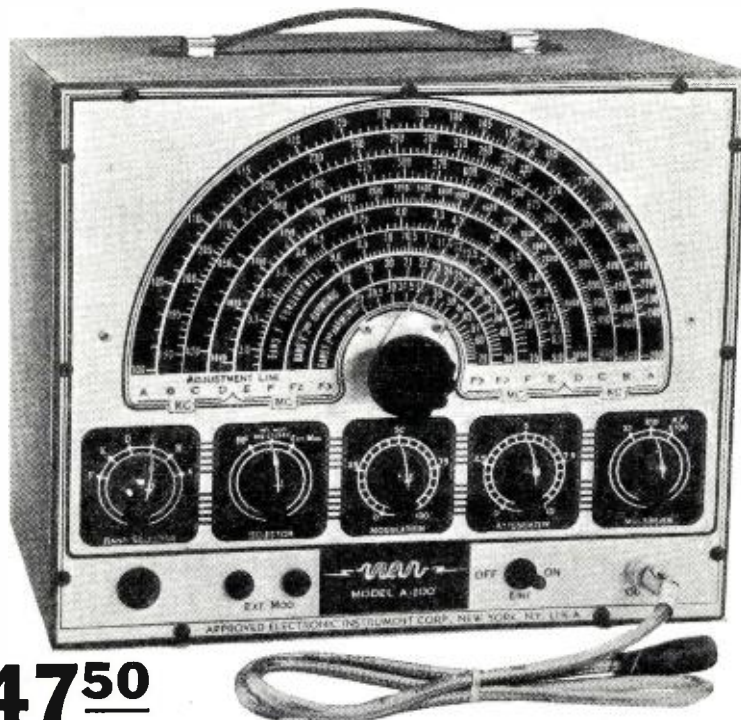
Construction

As can be seen in Fig. 2, the circuit is that of a conventional self-quench superregenerator, with several improvements to adapt it for use as a converter. The complete unit is housed in a metal box measuring 3" x 4" x 5". With the exception of the cable leads and shielded output lead which are mounted on the right hand side of the case, and the antenna pickup insulators which are mounted on the left hand side of the case, all parts are rigidly mounted on the panel itself. Due to the compact size of the unit, short leads are almost a necessity. The wiring itself is conventional and will not be elaborated on here, except for several details. The antenna coupling lead from the shielded cable inside the case should be a self-supporting solid wire (#14) which is not connected physically but is placed in close proximity to the coil near the plate end. This can be moved closer to or farther away from the coil to achieve the best possible coupling. One other thing which may be done to improve operation is to experiment with various values of C_2 and R_1 . Those values shown in the diagram were found to work best in the original set.

The receiver which is to be used with the converter can be equipped with a cable adaptor at the antenna lead to use the cable connector on the converter's output. Also the plug on the power supply cable can be whatever the builder desires to use. In the model unit an octal base was used. One other thing that deserves mention is the pilot light, which can be seen just below the small vernier dial, and which is a valuable addition, since it readily indicates when the converter

IMMEDIATE SHIPMENT

A. E. I. Model 200 SIGNAL GENERATOR



\$4750

Same Low Price As Always — We Guarantee No Increase

Frequency range: 100 KC to 25 MC in 6 bands of fundamentals and 18 to 75 MC in 2 bands of harmonics of the 9 to 25 MC band. Entirely new in circuit design, consists of four components: RF oscillator, cathode follower, audio oscillator, and power supply.

The RF oscillator is a multivibrator type, with tuning coil and condenser coupled to the output of the oscillator, and fed to grid of cathode follower. This method of tuning does not load the oscillator and provides extremely high frequency stability. AF oscillator is resistance-capacitance fixed frequency type giving 440 cycle/sec. note which is fed into grid of cathode follower, through modulation control and selector switch.

Output attenuator and multiplier is in cathode circuit of the cathode follower, and varying these controls has no effect on either the RF or AF oscillators, thus adding still higher frequency stability. Conventional power supply operating on 117 volts 60 cycles. Complete with tubes, instruction manual, and coaxial output cable. Order today for shipment tomorrow. Use convenient coupon below.

CONCORD RADIO CORP.

LAFAYETTE RADIO CORPORATION

CHICAGO 7
901 W. Jackson Blvd.

ATLANTA 3
265 Peachtree Street

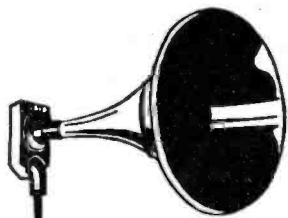
Concord Radio Corp., Dept. SG-12
901 W. Jackson Blvd., Chicago 7, Ill.
Please rush 1 A.E.I. Model 200 Signal Generator.

- I enclose \$47.50. Please ship express collect.
- I enclose \$12.50 deposit. Please ship C.O.D. for balance of \$25.00 plus express charges.

Name

Address

City State



Vocal-Aire The World's Loudest Loudspeaker

Air-column speakers are something really new in sound. The idea is so new that it may take a little thinking to grasp it, but it's really quite simple.

A diaphragm driver is actually a piston air compressor of variable speed. Its low efficiency is suitable for indoor use, but to cover large outdoor areas higher efficiency is required.

The logical means is an ordinary air compressor. We couldn't use this simple method of generating audio power until VOCAL-AIRE driver units were developed. In this system, steady air pressure is modulated by the Voice Valve just as your larynx modulates your breath to produce speech. Since generation of air pressure is not the function of the driver unit we don't need tremendous 500-watt amplifiers.

The compressed air supply comes from a motor or gas-engine unit or from any other available source. For portable use, the gas-engine compressor also supplies the 110-volt A.C. for the amplifier.

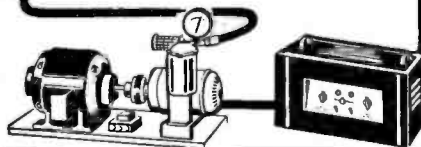
A special amplifier has been designed to match the VOCAL-AIRE driver unit. The impedance of the driver varies with the frequency of the signal and the VOCAL-AIRE amplifier matches this condition to achieve peak efficiency.

The coverage of these speakers may be hard to accept—but two drivers, each driving a pair of horns, cover the Yale Bowl which is 900' long, 500' wide and seats 75,000 persons. Two 20-watt amplifiers in cascade are all that is needed, one amplifier for each driver unit.

The compressor can be switched on and off remotely, from mike or amplifier... or a switch at the mike may be used to control plate voltage for stand-by.

Servicemen: If you haven't read up on air column speakers, we'll be glad to send you literature describing our system and if you have occasion to service our equipment, a request on your business stationery will bring you a free copy of our Service Manual.

Vocal-Aire Sound Systems are made by



DILKS, INC.
NORWALK, CONN.

REGENERATIVE FREQUENCY CONVERTER (Numerical Example)	
Strongest Harmonics	50 Kc. Fundamental Freq.
Spacing of Harmonics—50 Kc.	
	100 Kc.*
	150 Kc.*
	200 Kc.*
	250 Kc.*
	300 Kc.*
	350 Kc.*
	400 Kc.*
	450 Kc.*
	500 Kc.*
	550 Kc.*
	600 Kc.
	650 Kc.
	700 Kc.
	750 Kc.
	800 Kc., Etc.**

The fundamental frequency and the spacing between the harmonics is determined by the quench frequency.
* Can be used as Intermediate Frequency.
** Harmonics continue up thru the radio frequency spectrum.

Table 1. Numerical example of the various harmonics that are produced by superregenerative frequency converter.

is in use. This is connected in parallel with the tube's heater.

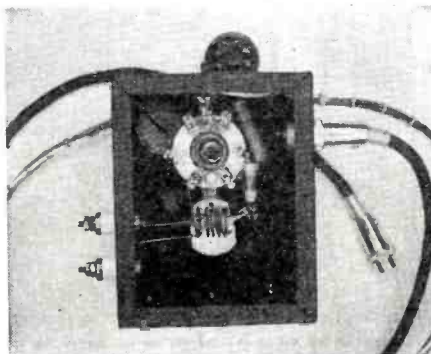
Operation

Operation of the unit is quite similar to a conventional superregen receiver with one exception: due to its exacting control over the plate voltage, the regeneration control will cause regeneration for only 4 or 5 points of the tuning dial at any one setting of the control; and as the tuning dial is adjusted, the regen control must also be adjusted simultaneously, for maximum results. When operating properly, the signals received will be of good clarity, free from the usual side band hisses, and of a quality not usually expected of the superregenerative receiver, whether the signals being received are AM or FM. Needless to say, the results that can be obtained far outweigh the nominal cost of the unit.

At the present time, a new unit, incorporating some of the improvements as suggested above, is in the construction stage, which it is hoped, will eliminate radiation, reduce the critical adjustment on the regen control, and otherwise improve the unit here described.

—50—

Fig. 3. Under chassis view of frequency converter shows simplicity of wiring.



2 & 3 Conductor Twisted Communication Type Wire

Made by Columbia for all inter-communication, transmission and various other purposes. Color coded twisted wires with Geon plastic insulation, insuring high resistance to dirt, oil, water, flame and many other normally destructive factors.

Per 1,000 feet
2 conductor \$11.07
3 conductor 16.71

SPECIAL OFFER!

22 Gauge twisted pair consisting of 2 stranded wires, tinned copper shield and waxed cotton braid overall.
250 ft. coil \$10.63 per coil
1,000 ft. spool 37.50 per spool

Single Conductor Shielded Wire

Stranded tinned copper conductor, high dielectric insulation, with closely woven tinned copper shield overall. Ideal for shielded lead-in or wherever electrostatic shield is necessary. Put up in 500 foot metal spools.

\$9.25 per spool

Same as above, but has additional cotton braid overall.

250 ft. spool \$ 7.50
1,000 ft. spool 28.10

See Your Local Jobber or Write Direct

Our Latest Catalog Will Be Available Shortly. Be Sure to Write for Your Copy.

Columbia Wire and Supply Company
5736 North Elston Avenue, Chicago 30, Illinois

U.S.R.S. MONTHLY SPECIAL

SERVICEMEN'S HANDY KITS CAPACITORS

PAPER TUBULARS

Assortment of 35 paper tubular condensers. Unconditional 1-year guarantee. Each unit plainly marked with capacity and voltage. Wax impregnated and filled at both ends. Kit consists of 5 each: .001, .002, .005, .01, .02, .05 and .1 mfd. 500 Volts.

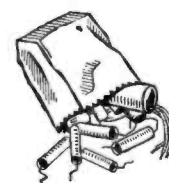


1-000 Kit Complete—Net..... \$2.20

ELECTROLYTICS

Assortment of 18 electrolytic condensers. Unconditional 1-year guarantee. Each unit plainly marked with capacity and voltage. Made of highest quality materials for low leakage and high surges. Kit consists of 2 each: 8, 16, 20, 30, 40, 16 x 16, 20 x 20, 30 x 20, and 30 x 30 mfd. 150 Volts.

1-005 Kit Complete—Net..... \$4.85



Write for Free Illustrated Flyer

U.S.R.S.

U. S. RADIO SUPPLY
5116 HARPER AVENUE
CHICAGO 15, ILLINOIS
DEPT. NE 2

Capacity Operated Relays

(Continued from page 51)

changes in the order of 1.5: 1 to 3: 1 are obtainable as *C* is tuned through resonance. In general the magnitude of current change is insufficient and the slope of the plate current-sensing capacitance curve is too low to provide optimum sensitivity and snappy action of the relay.

In Fig. 2B it is possible to visualize that portion of the circuit comprising the battery, relay and terminals *A* and *B*, as a series circuit in which the phantom resistance subtended across terminals *A* and *B* is a function of the

Handwritten calculations:

845
 1.18
 78
 98
 2.8
 .35
 2.40
 1.65
 36
 9.5
 2.65
 96
 04
 45
 08

 13.36

PURCHASE ORDER

Long Distance
PHONE
DANNI PH 6380

Low-Cost TELEVISION Is Here NOW!

VISION Research Laboratories announces its postwar plan for bringing low cost television within the reach of amateurs, experimenters, and servicemen. With this plan you can save \$100 or more for only \$2.00!



THE PLAN: Amateurs, experimenters, servicemen now have access to the secrets of post-war television. As a result of a long period of development Vision Labs now brings you complete plans for the construction of a five or seven inch receiver incorporating the very latest design features. A detailed parts list arranged to show you how you can easily obtainable components for those which may obtain.

ST: The design of this receiver requires nothing that is not readily available. No waiting for delivery! The cost is low! The plans show you how an expertly engineered receiver can be constructed at a cost between \$40.00 and \$60.00! Vision Labs lists you in obtaining needed parts at the lowest possible prices.

This design is so simple and straightforward (yet sound) that only a few days of spare time work is required for the construction of this modern television receiver. Alignment requires no special equipment and can be carried out in a few hours by following the simple instructions included in our

VISION: Servicemen Realizing the tremendous expense and practical test equipment for servicing receivers, Vision Labs has also prepared a booklet showing the details for the construction of a flexible and efficient generator. This unit is a must for the service bench and can be constructed at the cost of about 1/10th that of any unit commercially available. No waiting for delivery! Just a few hours of your spare time and you are ready to build!

VISION RECEIVER BOOKLET CONTAINS: Schematic diagrams, detailed sketches, photographs and many pages of technical information not only on how to build a 5 - 7 inch television receiver but on modern television receiver practice. The booklet is clearly printed and in an attractive binder.

SWEEP GENERATOR BOOKLET CONTAINS: Schematic diagrams, detailed sketches, photographs and complete detailed information on how to build a visual alignment sweep generator, covering 6 - 100 mc with variable band width from 100 kc -

RESEARCH LABORATORIES
 #52, Kew Gardens 15, N. Y.

\$.....(check or money order) for:
 \$5 Television Receiver Booklet @ \$2.00 ea.
 \$5 Sweep Generator Booklet @ \$2.00 ea.

.....

 Zone..... State.....



MILO

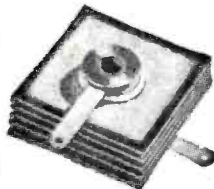
Your "Q" for Quality

New York's
NEWEST
AMATEUR SUPPLY HOUSE
NOW!

Immediate Delivery

Hammarlund HQ-129X complete.....	\$173.25
Hammarlund SP-400X complete.....	347.25
National HRO-5TA1.....	306.71
National NC-2-40-D, complete.....	241.44
National NC-46, complete.....	107.40
National 1-10A, less speaker..	89.93
National CRU Oscilloscope...	39.90
RME-45.....	198.70
RME-84.....	98.70
RME-DB-20.....	68.20
James Millen 90800 50 Watt Exciter.....	37.50
James Millen 90881 500 Watt Amplifier.....	89.50
James Millen 90281 Hi-Voltage Pwr. Supply.....	84.50
Abbott 2 Meter Trans-Receive. Gon-Set Converter 2-6-10-11-20 meters.....	52.00
Ranger Model 905 Trans-meter	39.95
Waterman Pocketscope, Model S-10-A.....	49.50
66.00	
Premax 10 Meter 3 element Beam.....	66.00
30.00	
S/C Labs. 10 Meter 3 element Beam.....	30.00
44.95	

FEDERAL
SELENIUM
RECTIFIER



quantities of 6 to 49...99c ea

Quantities of 1 to 5.....\$1.09 ea

Not content with our already "near perfect" service which countless Hams, Purchasing Agents, Experimenters, Engineers and Servicemen have enjoyed since our opening, Milo leaves no stone unturned—consequently, we take pride in announcing that we are forced to expand to meet the needs of our ever-increasing army of friends. Watch for the opening of our larger and most complete Ham and Sound Departments.

Contact Milo for nationally known: IRC, AEROVOX, B & W, NEWCOMB, THOR-DARSON, MEISSNER, TUNGSOL, WESTON, SUPREME, NATIONAL, SNC TRANSFORMERS, etc.

If not rated 20% with order balance C.O.D.

Write Department N

MILO

Radio and Electronics Corp.

200 Greenwich St., N. Y. 7, N. Y.

BEekman 3-2980-1

Cable Address: "MILOELECTRO, New York"

pedance is relatively high and the series circuit current is minimum. The voltage drop across the field coil of the relay is low and, hence, the grid bias on V_1 is minimum, resulting in maximum plate current flow through the 1 megohm resistor and a high grid bias on tube V_2 . Tube V_2 therefore exhibits a high plate resistance, such that the plate potential on oscillator tube V is approximately 50 volts. In the circuit shown, the oscillator plate current is approximately 2 milliamperes in this condition.

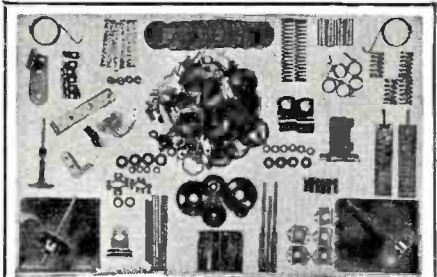
A suitable sensing element for link coupling to the capacity-operated relay may be constructed as shown in Fig. 2D. The coil and padding condenser are mounted inside a shield housing box, to which is attached the coaxial sensing condenser. The thin brass flange on the base of the condenser tube forms the "grounded" plate; and the thin brass disc on the supporting rod, which is electrically connected to the "hot" end of the coil and padding condenser stator, forms the "hot" plate of the sensing capacitor. The sensitivity of the sensing capacitor may be increased by increasing the diameter, and hence area, of the flange and disc.

When this apparatus is link coupled to the oscillator, adjustment of the padding condenser it will cause the relay to pull in. As an object approaches the sensing capacitor, detuning the sensing circuit, the relay will fall out. Link lines up to 50 feet in length have been successfully used.

As the sensing capacitor approaches resonance, the oscillator tank impedance begins to drop to a lower value, increasing the series circuit current. The voltage drop across the relay field coil and, hence, the bias on V_1 (Fig. 5) increases. This action, in reducing the plate current of V_1 and the bias on V_2 , results in a lowered V_2 plate resistance. The oscillator plate voltage and the series circuit current increase in a cumulative, or somewhat regenerative, fashion to a sharp maximum, resulting in snappy relay action. The oscillator plate current is approximately 20 milliamperes in this condition.

With the above-described capacity-operated relay several other types of sensing elements have been employed. For the lower frequencies where appreciable inductance is required for resonance, the types shown in Fig. 3A are feasible. The inside diameter of the outer tube should be enough greater than the coil diameter to reduce distributed capacitance, minimize resistance losses and permit reasonable circuit "Q." The illustrated coaxial type sensing elements were designed for experimental use in detecting the approach of a liquid, without physical contact, as it rose in a storage tank.

If higher operating frequencies are used, the coaxial types illustrated in Fig. 3B are applicable. These may be regarded as sections of coaxial line, somewhat shorter than an odd mul-



2 1/2 Pounds
GEARS · SHAFTS · BUSHINGS
SPACERS · SPRINGS · RIVETS
BRACKETS · CLAMPS · ETC.

COMPLETE
A-1 ASSORTMENT \$1.29
POSTPAID
Outside of U. S. A. Add 50c

GEORGE BROOKS & ASSOCIATES
220 SOUTH HALSTED STREET CHICAGO 6, ILLINOIS

ELECTRONIC VOLT-OHM-METER

\$1.85
110 VOLTS AC 20 RANGES
0.5/10/50/100/500/1000/5000 volts
DC and AC. 0-1,000,000,000 ohms
in six overlapping ranges. Sensitivity
over MILLION OHMS per VOLT on 5
volt range.
Complete kit includes all component parts, tubes,
punched and drilled chassis and beautifully enameled
panel. Easily assembled and wired.
Special slideback circuit developed during war by
scientist at the California Institute of Technology
gives amazing sensitivity and flexibility while com-
pletely eliminating necessity of batteries and expen-
sive meter. Each instrument is individually "tail
brated. Dial scale over nine inches long!
In addition to performing the usual volt-ohm func-
tions, this instrument easily measures these voltages:
SUPERHET OSCILLATOR, AVC, AFC, TRUE GRID
BIAS AT ADVANCED AG-D G MOTORS and EQUIP-
ment. Measures the exact leakage resistance of
INSULATION, TUBES, CONDENSERS. It can be used
with a signal generator for SIGNAL TRACING.
STERLING ELECTRONIC COMPANY
Dept. 3
166 N. Sierra Bonita Ave., Pasadena 4, California

RADIO COURSES

- RADIO OPERATING • CODE
- RADIO SERVICING — ELECTRONICS
- REFRIGERATION SERVICING

Personal Counselling Services for Veterans
Write for Latest Trade & Technical Catalog
Y.M.C.A. TRADE & TECHNICAL SCHOOLS
7 W. 64th Street New York City

150 DIAGRAMS and HOW TO READ THEM
150 DIAGRAM BOOK FREE
For Examining My New 7 Volume Set on
ELECTRICITY

HERE'S a valuable book of 150 Electrical and Radio wiring diagrams with charts and instructions. Practical information you need to win security and promotion. It's yours FREE merely for examining my 7-Volume Set on Applied Practical Electricity on 7-day's free trial. This 7-Volume Set COVERS EVERYTHING ELECTRICAL from HOUSE WIRING to ADVANCED AG-D G MOTORS and EQUIPMENT. Thousands of diagrams and photos—written so both "beginners" and "old-timers" can easily understand.

7-DAY'S FREE TRIAL I want to send you the 7-volume set AT MY RISK, postpaid, for 7-day's FREE examination. I'll also send you the FREE book of 150 Shop Prints which you are to keep as my gift regardless of whether or not you return the 7-book set. (No salesman will call.) Offer Limited—Send Coupon Now!



FREE COUPON NOT AN ORDER — JUST A REQUEST TO SEE BOOKS

B.W. Cooke, Dir., Coyne Electrical School, Dept. 27-3, 500 S. PAULINA STREET, CHICAGO 12, ILLINOIS

Send me the new 7-volume set "Practical Electricity." Also send the book of 150 Shop Prints which is a FREE gift to me regardless of whether or not I keep the 7-volume set. I'll either return the 7-book set in 7 days and keep the 150 Shop Prints book as a gift from you and owe you nothing or pay \$3 within 7 days and \$3 a month until \$21 is paid, or I'll send the cash price of \$19.75. One year FREE Consultation Service and Technical Bulletins included.

NAME _____ Age _____
ADDRESS _____
TOWN _____ Zone _____ STATE _____
 Check here if you want to save \$1.25 by paying the postman the cash price of \$19.75 on delivery. Same 7-day's examination and Money-Back Guarantee.

multiple of $\frac{1}{4}$ wavelengths and terminated in the coaxial sensing capacitor. Both types may be end-sealed with a low loss dielectric material if necessary.

It is well to bring out that capacity sensing circuits of the type specifically described may be termed "capacity sensing" not alone by virtue of their sensibility to variations in the spacing of capacitor plates, but also because of their sensibility to variations in the properties of the dielectric material surrounding them. As stated previously, the magnitude of the resistance which an LC sensing element reflects to the tank circuit of its exciting source is determined largely by the resistance of the coil plus the effective resistance of the capacitor dielectric.

As illustrated in Fig. 2A, the sensing capacitor may be represented by a perfect condenser C paralleled by a resistance R_p , representing the "leaky" dielectric. The power factor of the dielectric material is related to R_p according to the following notation: Power factor = cosine θ = sine (90 - θ)

For small angles:

Sine (90 - θ) = tangent (90 - θ)

Hence, p.f. (power factor) = tangent

$$(90 - \theta) = \frac{I_r}{I_c}$$

But $I_r = \frac{E}{R_p}$ and $I_c = \frac{E}{X_c}$

$$p.f. = \frac{X_c}{R_p} \quad R_p = \frac{X_c}{p.f.}$$

The resistance R_p combines with the resistance of the coil in the sensing unit to determine the magnitude of the resistance reflected to the tank circuit of the driving source at resonance. In the experimental work with the relay illustrated in Fig. 5 it was noted that, in certain cases, shunting the LC sensing circuit with a resistance increased the change in oscillator tank circuit impedance as indicated by the plate current of tube V.

REFERENCES

1. Batcher & Moulic, "The Electronic Control Handbook," 1946, page 171.
2. R. G. Rowe et al., "Coating Apparatus," U. S. Patent No. 2,402,183, June 18, 1946.
3. T. A. Cohen, "Automatic Liquid Level Controls," Electronics, April 1945, page 120.
4. "Two Practical Capacity-Operated Relays," Electronics Engineering Manual, 1938, page 62.
5. "Capacity-Operated A.C. Relay," Electronics Engineering Manual, 1938, page 77.
6. P. M. Hackett, "Application of Electronic Oscillator to Measurement and Control," March 1946, available from the American Institute of Electrical Engineers.
7. W. B. R. Agnew, "Laboratory Oven Temperature Control," Electronics, October 1944, page 108.
8. "Electronic Intrusion Detection Systems," Electronics Engineering Manual, Volume 3, page 35.
9. T. A. Cohen, "Electronic Devices for Process Control, Part II," Chemical and Metallurgical Engineering, April 1942, pages 103 & 104.
10. Batcher & Moulic, "The Electronic Control Handbook," 1946, page 169.

11. R. G. Rowe, "Electronic Amplifier & Modifier," U. S. Patent No. 2,406,565, issued August 27, 1946.

ADDITIONAL REFERENCES

- T. A. Cohen, "Electronic Devices for Process Control, Part I," Chemical & Metallurgical Engineering, March 1942, page 103.
H. C. Roberts, "Electric Gaging Methods," Instruments, April 1944, page 192.
Ross Gunn, "Device for Indicating Small Changes of Capacity," U. S. Patent No. 1,701,975, issued February 12, 1929.

-50-

Transmission Lines

(Continued from page 46)

Such a solution does exist in the form of a quarter-wave matching transformer. For if a cable is exactly a quarter of a wavelength long, and if its characteristic impedance is:

$$Z_0 = \sqrt{Z_r Z_i}$$

where:

Z_0 is the characteristic impedance of the matching cable

Z_r is the impedance at output end of matching cable

Z_i is the impedance at input end of matching cable,

then the input is perfectly matched to the output. For instance, in the example cited under antenna mismatching, where the antenna impedance was 100 ohms and the receiver input 300 ohms, if a quarter-wave line whose characteristic impedance is:

$$\sqrt{100 \times 300} = 170 \text{ ohms (approx.)}$$

is connected in the circuit as shown in Fig. 4, then the antenna will be matched to the receiver. Fig. 5 is a

PRACTICAL HOME-STUDY RADIO COURSE

These men used this course to get into good radio jobs



FINEST TRAINING COURSE USED IN MANY SCHOOLS

"The radio training course is the finest up to date easy to understand course. . . . This course outlines practical work. We are using this course in our Topeka High School. It is wonderful." *Henry Ward, Jr., 622 Filmore St., Topeka, Kans.*



WORTH MUCH MORE

"You should get more money for your course. The first week I studied it, I made \$10.00 repairing sets. I built my own test outfit from details given in this course. I have repaired 100 radios to date. . . ." Signed: *Robert C. Hammel, 120 W. 13th, Davenport, Iowa.*



COMPLETED IN 8 WEEKS

"I am very satisfied with the course. When I was at the twelfth lesson I started repairing radios. It took me two months to master your course." From a letter written by *Royer Lanzlois, 1679 Poupart, Montreal, Canada.*



MODERN, UP-TO-DATE

"I have found since taking your course how modern and up to date it really is. There is not one page in the whole course which anyone interested in radio can afford to miss. Your course started me on the road to a well paid job and has repaid me many times." *Charles Alapach, 433 Elm St., Reading, Pa.*

AMAZING BARGAIN OFFER

In this large course-manual of 22 practical lessons, you have all the topics covered by the best \$100.00 radio correspondence course. Learn important fundamentals. Speed-up radio servicing. Includes hundreds of circuits, thousands of repair hints, many servicing short-cuts.

RADIO TRAINING FOR HOME-STUDY

This practical home-study course will show you how to repair all types of sets faster and better, tell you how to open your own shop and run the business. The lessons are well illustrated, interesting to read, easy to understand and apply. No special previous knowledge is needed. The early lessons explain important principles. Other lessons cover test equipment, trouble-shooting, circuit tracing, television, and every other important topic of radio and electronics.

SERVICING METHODS SIMPLIFIED

Learn new speed-tricks for radio fault-finding, case histories, servicing short-cuts, extra profit ideas. Included are many large lessons on the use of regular test equipment, explanation of signal tracing, oscilloscope, transmitters, P.A., television, recorders. Let this information save for you enough time on a single job to pay the full price of \$2.50 for the complete course of 22 money-making lessons.

A PARTIAL LIST OF TOPICS COVERED

Circuits, Auto sets, P.A., Tube Characteristics, A.C., Fidelity, Using charts, Amplifiers, Tracking, I.F., Phase, Reactance, Impedance, Modulation, A.V.C., Photo-cell, Review questions, Crystals, Test equipment, Meters, Analyzers, Tube testers, Signal tracing, Oscilloscope, Ohm meters, Accuracy, Graphs, and hundreds of other topics.



IN MANUAL FORM

\$2.50
COMPLETE

SPECIAL OFFER
READ THE DETAILS

EASY TO UNDERSTAND AND APPLY

The practical lessons making up this course-book are easy to follow and apply to actual radio jobs. Hundreds of radio facts that puzzled you will be quickly cleared up. You will find yourself doing radio repairs in minutes instead of hours—quickly finding the faults or making needed adjustments. Every new radio development of importance and thousands of time-saving radio facts are packed into this complete course-manual.

SATISFACTION GUARANTEED

Use coupon to order the Course for 10-day examination in your own home. Look over the material, read a few lessons, apply some of the ideas. Then decide to keep the lessons at the bargain price of \$2.50 (full price), or return the material and get a cash refund.

NO RISK TRIAL COUPON

SUPREME PUBLICATIONS, 9 S. Kedzie Ave., Chicago 12, ILL.
Ship the complete Radio Course for 10 days use. I must be satisfied or you will refund my money.

- I am enclosing \$2.50, full price. Send postfree.
 Send C.O.D. I am enclosing \$..... deposit.

Name:

Address:

(Use Coupon or Write Order in a Separate Letter)

THE ABELL DISTRIBUTING COMPANY

WHOLESALE & RETAIL DISTRIBUTORS
OF GOVERNMENT SURPLUS
RADIO MATERIALS

BARGAIN ASSORTMENT OFFERS

- # 1—Kit of 25 Switches and knobs... @ \$2.45
- # 2—Kit of 15 Potentiometers @ 2.85
- # 3—Kit of 100 Resistors $\frac{1}{4}$, $\frac{1}{2}$ Watt sizes @ 1.65
- # 4—Kit of 50 condensers—all types... @ 2.90
- # 5—Kit of 12 rolls of Friction Tape 12 rubber tape $\frac{1}{2}$ lb. roll..... @ 3.95
- # 6—Kit of 12 Friction tape above..... @ 1.80
- # 7—Kit of 12 used army flashlights for resale @ 4.80
- # 8—Kit of 25 assorted sockets—all types @ 1.95
- # 9—Kit of 25 assorted plugs, clamp, amphenol sockets @ 1.95
- # 10—Kit of 12 connector and cable assy. @ 3.95

MISCELLANEOUS ITEMS

- 0 to 150 MA Meter Weston Model 506... @ \$3.00
- Relay INBJ coil 115V AC will carry 2 amp. @ 1.35
- Socket Stealite 4 prong..... @ .17
- Toggle switches SINGLE pull double throw @ .20
- Toggle switches SINGLE pull single throw @ .20
- Spark and distributor suppressors..... @ .07
- Jewel assembly—Large 40c; Small, 20c.
- Bulbs $\frac{1}{4}$ watt Neon screw base..... @ .15
- Bulbs, Panel #44, #47 in lots of ten boxes @ .40 box
- Condensers Variable National type SSU heavy duty 7 plates 50 MMF..... @ .79
- Condenser Variable 365 MMF..... @ 1.00
- Condenser 8 MFD at 1000 W.V.D.C. @ .50
- Shock mounts, all types; send description of type desired and we will forward price to you.
- Telephone Handsets TS13..... @ 3.95
- Tuning Unit BC375; each unit has three double special tuning condensers and approx. 65 MMFD coils, SV chokes, National Velvet dials, and assorted Mica Condensers; \$50 worth of parts. @ 4.95
- Tuning Unit TU55 or 54, Freq. range 8 to 12 MC; similar to TU47 Hallicrafters TPP51488 @ 2.50

CATHODE RAY TUBES

- 3 API @ \$3.50 3GPI @ \$ 3.50
- 5 BP4 @ 4.95 12DP7 @ 12.00

RECEIVING TUBES

- 2 x 2 @ \$0.90 3Q5 @ \$1.00 12SA7 @ \$0.75
- 5Y3 @ .80 6AC7 @ .70 6C5GT @ .75
- 6F6 @ .70 6F8 @ .75 9003 @ .90
- 6V6 @ .50 6SC7 @ .75 1299 @ 1.00
- 6AR5 @ .75 6Y20 @ 1.00 6X7 @ .60
- 1291 @ 1.00 VR105 @ 1.00 6SR7 @ .75

And Many Others

TRANSMITTING TUBES

- 250R @ \$ 7.00 304TL @ \$7.00
- 6C21 @ 10.00 807 @ 1.00
- 815 @ 3.50 VT127A @ 2.95

We also have in stock all kinds of test equipment including: Tube testers, Volt ohm MA Meters, Vacuum tube Volt meters, Volt meters AC and DC, Signal Generators, oscilloscopes, oscillators and many other items. Write for flyer.

SPECIAL HAM AND SERVICE MAN OFFER:

We have in stock all types of radio material in quantities too small to advertise nationally. To dispose of this material we have divided it into two boxes, #1 is the Ham Box, #2 is the Serviceman's Box. The price of each box is Twenty-five dollars (\$25.00) which we send to you on a deposit of Five dollars (\$5.00). The box is subject to your inspection. If you are not more than satisfied, return to us, freight collect, and your only loss would be freight one way. Please indicate Box number when ordering.

TRANSFORMERS

- INPT UTC PRI 200 ohm secondary 50,000 ohm ratio 16:1 single or double button microphone or line to single grid..... @ \$2.75
 - Transformer Vibrator Power Pri 3V—DC—W/CT—100V AC OUTPUT @ 2.50
 - Output transformer 8 ohm max. resistance Each Winding; Impedance ratio 3000 ohm to 72 ohm rating at 300V 10 MA Frequency range 2 MC..... @ 2.95
 - Filament Raytheon #UX600A; Pri. 115V; 60 cycle; 3 secondaries 6.3V, 0.6 amp.; 6.3V 0.6 amp.; 6.3V 2.35 amp.; Insulated Pri. 1780V RMS; Secondary 3500V RMS. @ 4.95
 - Power Plate and Filament Thordarson #T70R61 Pri—110V 60 cycle 385-0-385 at 70 MA. 5V—2A 6.3-2.5A CT..... @ 4.75
 - Filament transformer 115V 60 Cycle secondary (3,4) 6.4 V at 1 amp. 8.1 W Western Electric Co. #K8608..... @ 4.90
- We have special flyers on all our Equipment—write or wire for copies.

ADD POSTAGE TO ABOVE PRICES

THE ABELL DISTRIBUTING COMPANY
5 E. Biddle Street, Baltimore 2, Maryland

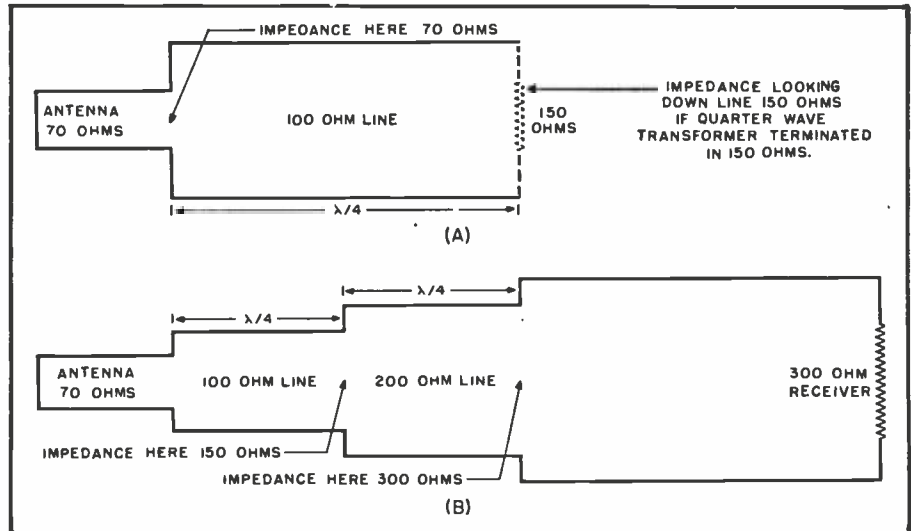


Fig. 6. (A). Stepping up antenna impedance to 150 ohms. (B). Matching a 70-ohm antenna to a 300-ohm receiver via two quarter-wave transformers.

nomograph whereby the characteristic impedance of the matching section can be calculated utilizing nothing more than a straight edge.

A quarter-wave transformer, however, has one serious disadvantage in that the line can be exactly a quarter of a wavelength long for only one frequency and not for any other. The receiver, on the other hand, must be capable of receiving all frequencies in the FM band (in the case of FM)—88 to 108 megacycles—whose quarter wavelengths then vary from 33 inches to 27 inches. The solution to this problem is usually in the form of a compromise. For instance if there are two stations of equal signal strength, one operating at 88 mc. and the other at 108 mc., a 30 inch quarter-wave line would be used. 30 inches is, of course, the mean value between 33 and 27 inches—the respective quarter wavelengths of the two frequencies involved.

If the matching ratio (ratio of output to input impedances) is not much over 2 then the fact that the line is 10 per-cent above or below a quarter of a wavelength is not too serious. Of course the line could be made more or less than 30 inches when it is desirable to favor certain stations or frequency bands.

When the matching ratio is higher, and the matching section must pass a wide band (88-108 mc.), then it is necessary to use two matching cables. In effect, the impedance is raised or lowered in steps. For example assume a 70 ohm antenna must be matched to a 300 ohm receiver. First we calculate, by use of the nomograph (Fig. 5), the characteristic im-

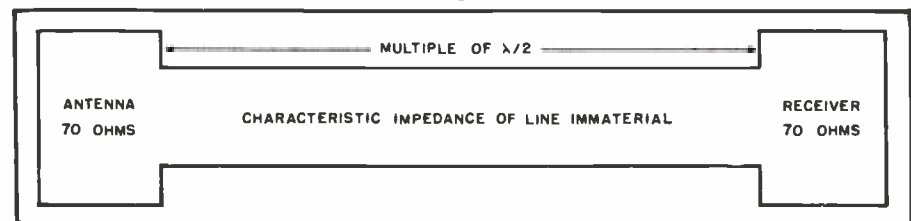
pedance of a quarter-wave transformer that will raise the antenna impedance to 150 ohms. Place a straight edge at Z_0 equal to 150 and run it through Z_1 equal to 70. Z_0 is seen to be equal to 102 ohms. With a 100 ohm quarter-wave cable connected up as shown on Fig. 6A, the receiver now "sees" the antenna as a 150 ohm impedance. Now run a straight edge between Z_0 equal to 300 and Z_1 equal to 150, and the characteristic impedance of the second quarter-wave transformer comes out about 200 ohms. The two matching sections are then hooked up as shown on Fig. 6B and as a result a good, wider band match is accomplished between antenna and receiver.

There are some important precautions that must be observed in making quarter-wave transformers. In the first place, the connector length should be taken into consideration when calculating the necessary cable length. If a 30 inch line is desired, and the connector is 1 inch long, then the cable should be only 29 inches. Secondly, as just indicated, the connector is a part of the transmission line system and therefore should have the right characteristic impedance. For this reason not any connector can be used but only one which has been designed for high frequency cables. In addition, great care should be exercised when soldering the connector to make sure that a good connection exists and that no excess solder is present; otherwise the circuit may be mistuned.

Half-Wave Matching Lines

The other source of mismatch is between transmission line and receiver

Fig. 7. Method of eliminating the necessity of matching to line via a half-wave line.



and this too can be corrected by means of a simple circuit. If the length of the cable between antenna and receiver is exactly a half a wavelength long or a multiple of half wavelengths long, as shown on Fig. 7, then it does not matter what the characteristic impedance of the line is. Here again the problem of passing a wide band of frequencies occurs though it is not too critical in the FM band. The serviceman can learn the exact limitations of these matching networks only via the trial and error method.

Installing an Antenna

One of the features of FM receiving equipment is the fact that beyond a certain threshold value of signal input, additional signal has virtually no effect on the output. In other words, if the threshold signal input voltage is 3 microvolts, it will make virtually no difference at all as far as the operation of the receiver is concerned, whether a 3 or 33 microvolt signal is received. For this reason it is just a waste of energy to develop a highly efficient transmission line system which gives a signal that is far above the threshold value. Actually the antenna should deliver just enough signal so that it will be safely above the threshold value at all times.

The first step is, therefore, to determine the threshold value of the receiver. This can be done with the help of a signal generator. Then using any transmission line setup that is handy and whose constants are known, measure the input signal of a reference station. (Each serviceman should have a reference station, that is, one station about which he can say, "When I obtain 5 microvolts signal from WXYZ then I know that all the other stations are being received all right.") Compare this measured signal with that of the desired signal in terms of db. For example, if the signal that is measured is 1 microvolt and you need 5 microvolts to assure good reception, you must improve the transmission line system by 13.8 db.

A good method of summarizing the facts presented in this article might be to work out a typical antenna installation problem. Let's assume these facts.

A signal of 1 microvolt is measured when a dipole antenna is connected to a receiver through 2 feet of cable. (Because of the short length of cable there is no power loss due to the attenuation of the cable. The receiver is in the room where it will be permanently located. A signal of 5 microvolts is necessary before the receiver can be considered to be operating properly. As previously shown this means the transmission line system must be improved by 13.8 db. The other pertinent characteristics are:

- Receiver input 150 ohms
- Antenna impedance 73 ohms
- Cable characteristic impedance 300 ohms
- Cable attenuation 6 db. 100 ft.

The first step is to locate a position for the antenna where the most sig-

Prepare NOW for a Better Job in RADIO ENGINEERING



Don't Delay—Write Today!

ADD TECHNICAL TRAINING TO YOUR PRACTICAL EXPERIENCE

Cleveland Institute Courses Offer Complete TECHNICAL TRAINING Ranging From Low-Level to College-Level

- A. Master Course in Radio Communication.**
Covers fundamentals of Radio and includes complete preparation for FCC Commercial License Examinations.
- B. Advanced Course in Radio Communication Engineering.**
A college-level Radio Engineering Course.
- C. Specialized Television Engineering.**
Including post-war Television Techniques.

All Courses Include

The Remarkable Workbooks of Instructional Aids, prepared by the instructing staff of Cleveland Institute.

Choose the course best suited to your needs—Start with the section you are qualified to enter—Use the economical CIRE "Pay-As-You-Go Plan."

You may enroll for individual sections for highly specialized training. Study any one or more of the following sections if you do not require a complete course—

- 1. Mathematics of Radio
- 2. Fundamentals of DC and AC Theory.
- 3. Essentials of Radio Communication.
- 4. Communication Networks.
- 5. Advanced Radio Telephony for the Broadcast Operator.
- 6. Audio and Radio Components and Systems (Design of Receiver and Transmitter Equipment)

Write for descriptive folder.

CLEVELAND INSTITUTE OF RADIO ELECTRONICS

Contractors to the Canadian Broadcasting Corporation

Successors to

NILSON RADIO SCHOOL
Founded 1939

SMITH PRACTICAL RADIO INSTITUTE
Founded 1934

RN-2 TERMINAL TOWER, CLEVELAND 13, OHIO

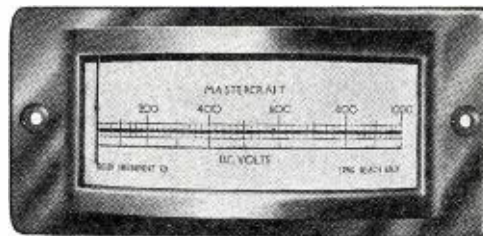
Approved for Veteran Training Under "G-I Bill of Rights"

(MAIL THIS COUPON)

Cleveland Institute of Radio Electronics, RN-2 Terminal Tower, Cleveland 13, Ohio.
Gentlemen: Please send information about your home study courses in Radio Electronics.

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

I desire training in.....
I have had experience in broadcasting
servicing operating mfg. CAA
Army-Navy amateur other.....
I am a High School Grad. College
Degree..... Check here for Veteran
Enrollment Information



MASTERCRAFT METERS

are manufactured in all popular sensitivities from voltmeters to special purpose instruments. A complete line stocked. Inquiries from manufacturers and jobbers especially invited.

Prices start at
\$16⁷⁷
F.O.B. Long Beach

The Shelby Instrument Company proudly presents two new and different lines of meters for both switchboard and standard operation. They're new, they're different, they're the best.

Write for Our Complete Catalog

SHELBY INSTRUMENT CO.

321 W. Seventh St.

Long Beach 2, Calif.

WAR SURPLUS

SALES
OF

RADIO—ELECTRICAL ELECTRONIC EQUIPMENT PARTS—SUPPLIES

GENERAL ELECTRIC RF METER, Model 8DW44, 0-1 amp. 2" scale, in bakelite case	\$2.50
GENERAL ELECTRIC 0-30 D.C. Milliammeter—3" bakelite case	3.50
WESTON Milliammeter, Model 506, 0-1.5 ma. DC 2" scale, in metal case	2.50
WESTON Milliammeter, Model 506, 0-15 ma. DC 2" scale, bakelite case	2.75
WESTINGHOUSE Voltmeter, Type NA-33, 0-10 Volts AC-DC, 2" scale, in bakelite case	2.50
WESTON Antenna Current Indicator, Model 507, complete with external thermocouple, 0-.75 amp. 2" scale, in metal case	3.25
MILLIAMMETER, 0-1 ma. DC 2" scale in bakelite case, Model 2001 made for Hallcrafters by The O. B. McCintock Co.	2.25
WESTON RF Meter, Model 425, 0-5 amp. 3" scale in bakelite case with external thermocouple and shielded leads, brand new	8.50
HAMMARLUND Model APC 210 variable condenser, 210 mmf. ....	.59
GE Pyranol Filter Condensers	
10 Mfd. 600 VDC	1.50
4 Mfd. 1500 VDC	2.75
4 Mfd. 3000 VDC	6.50
RCA Scope Tubes 2", Model 2AP1, brand new	2.95
GENERAL RADIO Variacs, Type 200-B, 115 volts, 1 amp. 50-60 cycles	9.95
SUPERIOR 2 KVA Powerstats; input 115 volts 50-60 cycles—output voltage range 0-135 volts; maximum rated output current 15 amp. available over entire range of output voltage; weighs approx. 20 lbs.	29.50
SUPERIOR 2 KVA Powerstats, 2 in tandem, each one 115 volts single phase. Same as above but twice the input and output voltage.	54.50
ZENITH, BENDIX or RAULAND Frequency meters, 125 to 20,000 KC, Type BC-221 with original crystals; complete with spare tubes and calibration book, each one is tested and guaranteed	54.50
LEACH 110-volt DC relays, DPST with 3 amp. contacts	1.49
ALLIED CONTROL 110-volt AC relays, TPDT, heavy contacts	1.95
PHILCO TANK WHIP ANTENNAS— all aluminum copper weld; dark grey finish; 12 ft. long in 3 sections; weighs 10 oz. Very special. ....	.98
STANDARD RACK CABINETS of heavy gauge steel with gray crackle finish; panel opening 19" wide, 27" high, 15 1/2" deep	12.95
WESTERN ELECTRIC or SYLVANIA Types 1N21 & 1N23 Crystals; 35c each or 3 for	1.00
HOLTZER-CABOT Handset receiver unit replacements .....	.25
HIPOWER Quartz Crystal Units, Type CF5, 5000 KC, complete with holder.	1.95
GENERAL ELECTRONIC INDUSTRIES UHF Cavity Wavemeter; 9375 ± 70 mc.	2.50
GENERAL ELECTRIC 100-0-100 microamperes DC 4 1/2" square bakelite case; 2 pilot lights for Dial illumination	5.50
GENERAL ELECTRIC 100-0-100 Microamperes DC—4 1/2" square mounted in angle metal cabinet; 2 pilot lights for dial illumination	7.00
P.M. SPEAKER, 5" remote control unit—3" dia. 1 1/2" high slug; complete in metal case with volume control, receiver, phone and transmitter on and off switches, phone & microphone jacks, output transformer; each	3.50

PROMPT DELIVERY

Many other interesting items.

Write for our catalogue.

25% deposit required on C.O.D. orders

All merchandise shipped F.O.B.

New York

Minimum Order \$2.00

MICHAEL STAHL, INC.

39 VESEY ST.

Tel. COrtland 7-5980, New York 7, N.Y.

nal exists. This can be done by the use of either a field strength meter, or by carrying the entire setup to different locations. The best location would probably be on the roof. When determining the best location for the antenna be sure to consider the length of the transmission line necessary to carry the signal into the receiver. For instance, a 2 db. advantage is obtained by moving the antenna 100 feet. But an additional 100 feet of cable results in an additional 6 db. loss due to the cable attenuation. Therefore we gain nothing by using this location—in fact we lose 4 db. of signal.

By locating the antenna on the roof we obtain, in this example, a 17 db. improvement in signal voltage. However the signal must now be transmitted through 100 feet of cable. The total attenuation of the cable is 6.5 db. per 100 feet due to the fact that there is a 2:1 standing wave ratio. The net gain is therefore only 10.5 db. This is not sufficient, so the next step is to obtain a better transmission line. A 4 db. per 100 feet—150 ohm line will increase the gain of the system to 13.0 db. The additional .8 db. necessary to give the desired signal voltage can be obtained by use of a 100 ohm quarter-wave transformer to correct the antenna mismatch. If more signal was necessary the serviceman might have to find a higher gain antenna or a lower loss cable.

The author hopes that with this article as a background the serviceman will be able to intelligently select the cables he requires by examining their characteristics. In general since dipoles are used for most FM and television home installations, the only type of transmission line that is used

is balanced lines. However, coaxial lines can be used as quarter-wave lines if desired.

There are two types of balanced lines—the less expensive unshielded, untwisted type and the more costly shielded or twisted line. Shielding or twisting the cable improves the signal-to-noise ratio only in areas where there is an abnormal amount of extraneous noises such as in automobiles, but otherwise it does not offer any other advantages.

—50—

Distortion Analyzer

(Continued from page 61)

than .25 volts, connect to the input binding posts and rotate the gain control for maximum. If the 10,000 ohm calibrating resistor fails to cause 100 microamperes deflection when 1 volt is applied to the grid of the 6SR7, it may become necessary to increase or decrease the value of the 82,000 ohm diode load resistor. Sufficient diode load resistance must be maintained to offset the internal resistance of the diode rectifier. When this is accomplished, the voltmeter scale will be linear. When the selector switch is placed in the 100 volt position voltage is read direct. When the switch is in the 10 volt position simply divide all readings by 10. When the selector switch is in the 1 volt position, divide all readings by 100. When the switch is placed in the .25 volt position, divide all readings by 4 and 100.

An error of 2% between scale readings will cause an error in distortion measurements of .2%, which is not serious. The values of inductance and

One of the features of the new Sylvania Lighting Center is the television receiver of unusual design which was engineered to provide video reception to any part of the living room. The special screen, which can be rotated from side to side, to a 180 degree angle or up and down to suit viewing conditions, was built around the 10-inch cathode-ray receiving tubes manufactured by the company. Although this receiver is not in production it illustrates a trend in modern design.

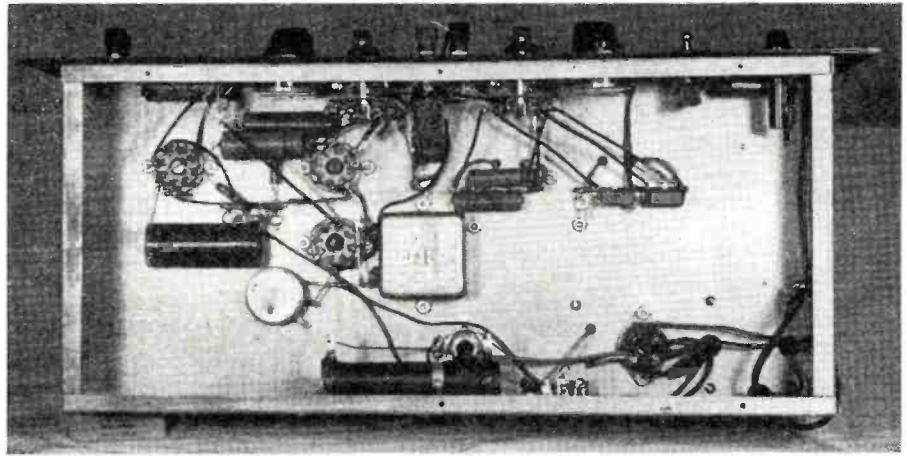


capacity for the filters can be determined quite easily with a reactance slide rule. The use of filter chokes is permissible for this application.

If it becomes desirable to use other than 400 or 1000 cycle filters or a different value of inductance, the following procedure is recommended. The value of inductance must be known. The design of the 1000 cycle filter is as follows. The reactance of 10 henries at 1000 cycles is approximately 65,000 ohms. A condenser reactance corresponding to this is .0025 μ fd. Therefore, connect two .005 condensers in series giving a shunting capacity of .0025 and a center tap. If other frequencies or additional frequencies are desired, use the above procedure and simply use additional switch contacts and filter components. This filter network is capable of 60 db. of attenuation which, for all practical purposes, cancels the fundamental.

Distortion Analyzer Operation

Connect the input terminals to the voltage source to be analyzed. Place the frequency selector switch in the 400 cycle position. Place the "in-out" switch to "in" position. Place the vacuum tube voltmeter switch in the 10 volt position. Adjust the input gain control for full scale deflection on the 100 microampere meter. An audio oscillator having less than 1% distortion is connected to the input of the amplifier to be analyzed. The output of this oscillator should be adjusted



Under chassis view of completed instrument shows simplicity of wiring.

for normal input voltages of the amplifier to be analyzed.

Next, throw the "in-out" switch to the "out" position. Adjust the audio frequency oscillator for a minimum reading indicated by the microampere meter, at the same time adjusting the 150,000 ohm variable filter resistor. Vary the frequency of the oscillator at the same time for minimum, making the final adjustment with the 10,000 ohm variable resistor in the filter network. If the distortion is less than one volt, which would be 10%, then rotate the vacuum tube voltmeter switch to the 1 volt position. This scale reading will indicate 10% full scale.

Final adjustment should be made on this scale, and the frequency adjustment of the oscillator and the filter resistor will become quite critical. Since the input was readjusted for 10 volts, any voltage reading in the output can be read as direct harmonic distortion. Next, rotate the frequency selector switch to 1000 cycles and repeat the above procedure, changing the frequency of the audio oscillator to approximately 1000 cycles. By checking the distortion of an amplifier at several levels, it is possible to indicate the overload point of the amplifier.

This equipment was checked against a commercial piece of equipment of

Here's the Latest

NO NEED TO WAIT!

SYLVANIA Polymer
Model 134 - - \$69.50

- AC - DC - RF voltages (to 300 MC).
- Midget thumb size probe utilizing type 1247 proximity fuse tube.
- ONE zero setting for all ranges.
- Unusual accuracy.
- DC ranges to 1000 volts - AC ranges to 300 volts - ohmmeter ranges to 1000 Megohms.

Latest, most complete vacuum tube voltmeter yet produced for service.

HICKOK ALL-PURPOSE TUBE AND SET TESTER
Model 534 - \$138.30

- DYNAMIC MUTUAL CONDUCTANCE TUBE TEST.
- Tests all types.
- Sensitive noise test - hot or cold short test - accurate and sensitive gas test.
- Measures AC and DC volts, ohms, and milliamperes, capacity, inductance, leakage and decibels.
- Portable black imitation leather-covered hardwood cabinet with detachable cover.

A truly all purpose tester for the serviceman. The choice of those who want the best.

JACKSON TUBE TESTER AND ANALYSER
Model 637 - - \$82.00

- Automatic push button selector
- Provisions for modernization
- Tests all types.
- Dynamic output tube test
- Ballast tube tester.
- Tests for shorted or leaky condensers.
- AC and DC volts, ohms and milliamperes.

In the shop or out on the job, here's the ideal tester for modern servicing.

JACKSON CONDENSER TESTER
Model 650-A - \$49.00

- Tests electrolytic, paper and mica condensers.
- Wide range - 10 micromike (.00001) to 1000 mfd. in four ranges.
- Test voltages - 20 to 500 volts.
- Special built-in amplifier to detect slightest leakage.

Capacity and leakage positively indicated. Operation fast and simple. Diagnosis sure.

We stock Hickok, Jackson, McMurdo-Silver, Preistson, Simpson, Supreme, Sylvania and other standard lines of test equipment. Write for list of all available test equipment.

All prices are net f.o.b. Dayton, Ohio.

SREPCO

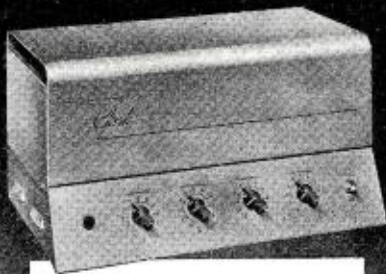
STANDARD RADIO & ELECTRONIC PRODUCTS CO.
135 East Second Street, Dayton 2, Ohio

Inquire about our time payment plan.

MAIL ORDERS SHIPPED WITHIN 24 HOURS 20% DEPOSIT REQUIRED

SERVICEMEN !!
Send for tube order form

Another Clark Achievement!



This is the 20-watt member of the Clark family of carefully engineered public address amplifiers. The PA-20 is generously rated to provide plenty of faithful volume for all except the very largest auditoriums. As in the latest radio equipment, small components are terminal strip mounted for instant accessibility.

Inputs: 2 microphones, 1 phono-graph.

Frequency response: 30-15,000 Flat within 2 db.

Distortion: Less than 5% over entire range.

Hum: At least 60 db below full output.

Output: 20 watts (24 watts maximum).

Output Impedance: Tapped for 4, 8, 16 and 500 ohms.

The PA-20 represents top quality engineering and performance at moderate cost. Ask your jobber or write direct for further information.

Clark Radio Equipment Corp.

4313 LINCOLN AVE., CHICAGO 18, ILL.

MATHEMATICS FOR RADIO AND COMMUNICATION

by GEORGE F. MAEDEL, A.B., E.E.

To master the technicalities of radio—to read engineering literature intelligently—you must have the mathematical groundwork covered by these absorbing books prepared for home study. Book I (314 pp.) covers the algebra, arithmetic, and geometry; Book II (329 pp.) covers the advanced algebra, trigonometry, and complex numbers necessary to read technical books and articles on radio.

MAEDEL PUBLISHING HOUSE Room 109
593 East 38 Street, Brooklyn, New York
Send me MATHEMATICS FOR RADIO AND COMMUNICATION as checked below. I enclose payment therefor with the understanding that I may return the book(s) within 5 days in good condition and my money will be refunded.

Name

Address

- Book I at \$4.00 plus 7c postage.
- Book II at \$4.25 plus 7c postage.
- Books I and II at \$8.25 postage prepaid.

Foreign and Canadian prices 25c per volume higher.

142

the same type. The error between the two pieces of equipment was .2%. At one level the commercial equipment read .2% less and at another level of distortion it read .2% plus. We were unable to indicate which instrument was in error since the percentage was so small.

Before making any distortion measurements, it is advisable to check the distortion content of the audio oscillator to be used. If distortion is indicated, this percentage of distortion should be subtracted from any distortion measurements made using this oscillator. Oscillators having a distortion content in excess of 1% will produce quantitative measurements rather than qualitative. If the operator is simply reducing the distortion content of an amplifier, having a small amount of distortion in the audio oscillator it creates no particular problem. If actual distortion measurements are required, such an oscillator would not be satisfactory.

Those not familiar with distortion measuring equipment are apt to consider such equipment complicated devices that only the best of laboratories would attempt to construct. The author finds that many engineers using distortion measuring equipment seldom take the time to understand how it operates. Consequently, few engineers consider building a simple piece of equipment which can become practically worth its weight in gold in analyzing certain problems that are encountered almost daily.

Actually, the construction and operation of such a piece of equipment is relatively simple. The parts used in the construction of this distortion analyzer can be found in many so-called "junk boxes" with, of course, the exception of the 100 microampere meter. After an engineer has used distortion measuring equipment, restricting him from its use would be like removing his right arm. The equipment can become useful without construction in its entirety if a sensitive vacuum tube voltmeter with several ranges is available. Then it only becomes necessary to construct the filters, which consist merely of two potentiometers, a filter choke and two condensers.

Such a filter can be "hay-wired" together in a matter of minutes and prove to be a very desirable unit to have in any laboratory or repair shop. During the war many such filters were constructed and used on production lines, releasing the precision distortion equipment for laboratory use. A few fast measurements soon prove the filter is operating satisfactorily. If a low "Q" inductance is used, a certain amount of attenuation takes place at the harmonic frequencies. By using filter chokes with at least a 50 mil rating, the chances are one hundred to one that the "Q" of the inductance is sufficiently high to cause no difficulty. Of course, if an inductance bridge is available, measuring the "Q" is recommended.

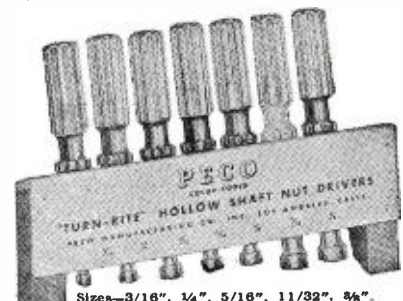
Anyone using this filter circuit soon

ELECTRONIC COMPONENTS

- New Army-Navy Preferred type 5CP1 Cathode-ray Precision tubes, with life expectancy approx. 2000 hrs. (8-lbs.) \$7.95
 - New 5CP1 Army-Navy pref. C.R. tubes (8-lbs.) 5.95
 - Sockets for above, with tube 45c; otherwise90
 - New 5CP1 shields with bracket & grommets, cad plated (3-lbs.) 1.25
 - New 9002 & 954, 955, 956, 957 Acorn tubes, not rejects, each89
 - New national ceramic acorn sockets, 35c each89
 - 4 for 1.00
 - Westinghouse 4 1/2" dia. 0-200 D.C. Microammeter 6.50
 - Westinghouse 4 1/2" dia. 0-150 D.C. Voltmeter 5.50
 - Westinghouse 4 1/2" dia. 0-20 D.C. Milliammeter 4.95
 - Miniature 1/4 wave selenium rect. 18v. 1/4-1ma., 5 for 1.00
 - Matched Pairs sel. rect. for meters 1/4-1ma., 2 for80
 - 100 ft. spaghetti 1/4 HV cambric, 1/2 plastic (1-lb.) 1.00
 - 12-18v electr. controlled carbon pile volt regulator65
 - 115/15v-3A, 1.4-2A & 230/30v-3A, 2.8v-2A, 60 cye. 50 watt herm. sealed xformer, black crinkle (4-lbs.) 1.25
 - New Dynamotors 24v DC to 240v DC 30 ma (6-lbs) 2.75
 - New Dynamotors 24v DC to 270v DC 120 ma (7-lbs) 3.25
 - New Dynamotors 24v DC to 450v DC 200 ma (11-lbs) 4.25
 - Relax 24v DC DPDT plus DT grounding, HV Insul89
 - Heavy duty Six. Corps tel. key, sil. cont. & sw. (1-lb.)89
 - Headset HI to low imp. xformer with jack & plug49
 - Wired Ampl. chassis 3"x7"x2", 2-3 sockets, pot. resistors, caps.75
 - Heavy punched Al. chassis 4 3/4"x8 1/2"x2 1/4" (3-lbs.) 3 for 1.00
 - Heavy punched Al. Chas. 2 3/4"x7 1/2"x1 1/2" (3-lbs.) 2 for 1.25
 - Heavy punched Cad. pla. 2 3/4"x7 1/2"x1 1/2" 11 soc. (5-lb.) 1.00
 - Octal ceramic rnk sockets 8ts above 2 chas. (1-lb.) 10 for 1.00
 - 200 squeeze-on term. lugs for 16-22ga. wire (1-lb.) 1.00
 - Squeeze-on terminal tool and cutter, (1-lb.) 1.65
 - 200 silver plated soldering posts for term. boards (1-lb.) 1.00
 - 7 lb. kit, ass. 1/4" linen bakelite 2"x10"; 4"x5" (8-lb.) 1.79
 - Cardwell 365 mfd. single section var. cond. (1-lb.) 1.65
 - 2 3/4" bearing, 365 mmfd. per section (1-lb.) 1.75
 - Master oscillator precision tuning dial 20-1 ratio, (5-lbs.) 2.65
- Please include sufficient shipping postage. 20% discount required on all C.O.D. orders. Write for FREE electronic bargain list.

OHMEYER ENGINEERING LABS.
Fairview Blvd. Dept. C. Hempstead, N. Y.

PLASTIC HANDLE NUT DRIVER KIT



- Sizes—3/16", 1/4", 5/16", 11/32", 3/8", 7/16", 1/2". With handsome tool holder \$4.95
- Hallcrafters—5MA—"S" Meter \$4.95
- Westinghouse 3.95
- 3 1/2"—0-1 Amp. D.C. Meter 3.95
- 3 1/2"—0-5 Amp. R.F. Meter 3.95
- G. E.—0-15 Volts A.C. Voltmeter 3.95
- G. E.—3 1/2"—0-2 Volts A.C. Voltmeter 3.95
- Western Electric 3" 0-200 Micro-Amp. Meter 4.95

Mail Orders Filled Promptly

ALMO Covers the Globe

Lombard 8-0512

509 Arch St. Philadelphia 6, Pa.

A TOOLSHOP IN YOUR HAND

JACK OF ALL TRADES AND MASTER OF PLENTY

Smooth, steady power at your fingertips for buffing scratched cabinets, metals, corroded tube and socket pins; removing burrs; sanding, etc. Grinds, drills, saws, engraves, etc. AC or DC. Wt. 12 oz 25,000 r.p.m. In steel case with 45 accessories postpaid, \$27.50. Handee only with 7 accessories \$20.50.

FREE! 52-Page Manual
CHICAGO WHEEL & MFG. CO.
1101 Monroe St., Dept. RE
Chicago 7, Ill.

HANDEE TOOL OF 1001 USES
RADIO NEWS

finds that measuring different output levels will cause the frequency of the filter network to change slightly. This shift does not occur in the equipment described in that the same level of voltage appears at the filters for each measurement since the input gain control is always set for full scale reading of 10 volts before making each measurement. Since the vacuum tube voltmeter is required, the expense of two binding posts makes it available for other type measurements. Some of the uses for the voltmeter are gain per stage measurements, fidelity measurements and all sorts of trouble shooting. The vacuum tube voltmeter circuit lacks frequency discrimination between 15 and 20,000 cycles. No effort was made to indicate the top frequency limits of the circuit. Such a range is satisfactory for all audio measurements.

Mechanical Construction

The panel layout at first glance will lead the reader to believe that operation of this equipment is quite complicated. Actually, distortion measurements are easily made in a matter of seconds. Precise adjustment is required but in no way difficult to make. The input binding posts are to the left of the panel. The input gain control is next with the vacuum tube voltmeter selector switch near the center. The "in-out" switch is located in the center connected in such a way that the toggle points toward the input binding posts when it is in the "in" position.

The filter selector switch is next followed by the coarse and fine adjustment controls. The power switch panel light and fuse complete the layout. The tube layout is such that all tubes are near their particular panel controls. The filter inductors are located in the immediate vicinity of the filter selector switch. The power supply is at the rear of the chassis to eliminate the possibility of hum pickup.

Selection of the chokes was determined by the availability of material. The filter choke should be at least 10 henries and the bridged-T inductors should be approximately 10 henries. If it becomes necessary to use more or less inductance for these filters, the condensers must be changed correspondingly.

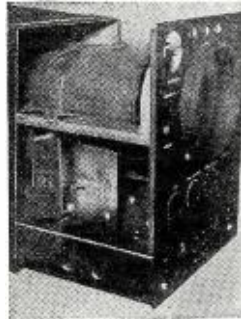
Point-to-point wiring is recommended rather than cabling, since such wiring reduces the possibility of stray pickup. The tube layout is such that individual shielding of parts is not necessary. A small receiver power transformer may be used, but the use of a voltage divider will undoubtedly be required, since the actual power consumption of this equipment is only a few mills. The voltage divider should be adjusted to approximately 200 volts. A 2 μ fd. condenser is used as coupling between the plate of the 6SR7 and the plates of the 6H6, since this is actually a power detector.

A phone jack is connected between the 6H6 plates and ground, and as it becomes desirable to use this circuit as

OSCILLOSCOPE FOUNDATION KIT

5-INCH

Consisting of Case, Chassis, two shelves (right & left), tube shield and bracket, front panel, screen window frame,



handle, plastic window socket, with 5CP1 Cathode Ray tube.

SPECIAL

\$15.50

2x2 Tube.....	\$1.00
Socket for 2x2 Tube.....	.25
H.V. Condenser .5 Mfd 2000 V.....	1.95
KIT, without Cathode Ray tube.....	11.95
Tube shield and bracket only.....	1.98

Mail Orders Promptly Filled

IMMEDIATE DELIVERY

All Prices FOB New York, N.Y.

ORDER TODAY!

All Prices FOB New York City, N.Y.

SURPLUS TUBES AT BARGAIN PRICES

All Tubes New & Sold Under New Tube Guarantee



5CP1.....	\$3.95	884.....	\$0.99	6L6G.....	\$1.20
5BP1.....	4.95	885.....	1.05	6L7.....	.99
5BP4.....	4.95	8012.....	1.25	6SD7.....	.65
5JP1.....	9.95	15E.....	1.25	6SH7.....	.65
3BP1.....	3.45	15R.....	1.25	6SL7.....	.89
954.....	.89	E-1148.....	.69	6SN7.....	.69
9002.....	.89	2C2B.....	1.30	12SN7.....	.80
1619.....	.70	EF-50.....	.79	6X4.....	.69
1625.....	.70	VR105.....	.99	6Y6G.....	.89
1629.....	.89	2050.....	1.30	12AS.....	.99
1631.....	.99	7193.....	.99	12C8.....	.79
1633.....	.89	UH50.....	3.95	12SN7.....	.79
1644.....	.99	10Y.....	.99	37.....	.49
2C40.....	2.30	5R4GY.....	.99	165.....	.87
2C43.....	4.25	864.....	.60	1J6.....	.87
3C45.....	1.40	6X5.....	.89	12SQ7.....	1.05
100TH.....	8.25	843.....	2.75	34.....	.80
2051.....	1.35	811.....	2.00	30.....	.80
801A.....	2.05	6F8.....	.92	83.....	.92
802.....	2.05	6SJ7.....	.74	6K7.....	.79
803.....	7.95	75.....	.75	104.....	.79
805.....	5.25	70L7.....	1.65	104.....	.79
813.....	7.50	1R5.....	.79	6BB6.....	.79
826.....	4.25	2X2A.....	1.05	6AC7.....	.99
6SQ7.....	.80	3A4.....	.79	6AG7.....	.84
1616.....	.99	304.....	.89	39/44.....	.60
717A.....	1.05	6AB7.....	.84	5Y4.....	.63
713A.....	.85	6AB5.....	1.05	5Y3.....	.63
371A.....	1.29	6AK5.....	1.30	5Y3.....	.63
1960.....	.75	6AL5.....	.89	6K6.....	.69
836.....	1.75	6C4.....	.64	6W7.....	.79
837.....	2.10	6C5.....	.59	12SF7.....	.69
866.....	1.25	6H6GT.....	.56	6SK7.....	.79
865.....	1.05	6J5GT.....	.51	6I7.....	.80

(Minimum Order on Tubes \$2.00)

Highbridge Radio-Television and Appliance Co.

340 CANAL STREET

NEW YORK 13, N. Y.



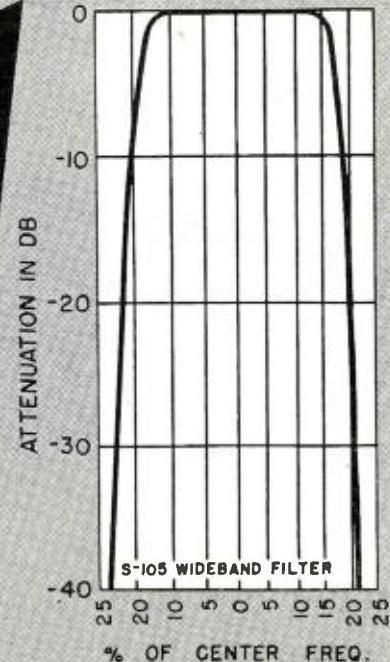
... are the answer to any network problem

- SHARP CUT-OFF
- LOW INSERTION LOSS
- HUM PROOF
- COMPACT
- HIGH STABILITY

Toroidal Coils

Inductance—1 MHY to 3 HYS
Frequency—300 cy. to 30,000 cy.
"Q"—55 at 1000 cy.; 150 at 3000 cy.

Ask to be put on mailing list for complete catalogue of coils and filters.



Actual measurements taken on Toroidal Coil Filter manufactured by Burnell & Co.

Burnell & Co.

Designers and Manufacturers of Electronic Products

10-12 VAN CORTLANDT AVE. EAST, BRONX 58, N. Y., SEdwick 3-1593

**SCARCE
TUBES**

WE HAVE 'EM!

Good Discounts on All Types of Tubes. 7B6, 7C6, 7C7, 58, 1D8, 2A6, 12K7, 14Q7, 1LB4, 1LC6, 5Z4, 7B8, 7C5, 84, 12Z3, 1LA6, 43, 47, 25Z5, 32L7, 57, 12A8, 6F5, 50Y6, 35Z3, 35, 6Q7, 0Z4, 117Z6, 7A8, 70L7, 7B7, 6A8, 50A5, 2A5, 59, 1LN5, 14R7, 7C6, etc.

All Tubes New and Guaranteed

FAMOUS MAKE RADIOS

Table Models, Superhet, 110 volts, AC-DC, 5 tube, 1-Band, 2-Gang Tuning Condenser, 5" Alnico PM Speaker, Auto. Vol. Control, Illuminated Circular Dial, Built-in Ant., Rich Mahogany Veneer Cab. List Price \$32.50. Dealers net price \$17.95.

All Merchandise Guaranteed—We ship anywhere.

Wire or Write for Catalog



COMMERCIAL RADIO

36 BRATTLE ST., BOSTON 8, MASS.

Department N

**Immediate Delivery
AUTOMATIC PLAYERS**



Model AEP-347

A complete automatic record player with built-in amplifier—ready to play. Attractive hand-rubbed walnut cabinet, Aero 46-A changer with the latest type push-button controls, powerful 3 tube amplifier and 5" Alnico (5) speaker, make this phonograph a remarkable value for those who appreciate fine tone quality and performance. Light weight crystal pick-up. Dimensions: 12 3/4" deep, 13 1/2" wide, 10 1/2" high overall. 110-120 Volt 60 cycle A.C.

Price only \$31.47 net. F.O.B. Chicago. (20% Deposit required on all orders)

Other models are available in portable and table types. Address orders and inquiries to Dept. N,

Autocrat Radio Co.

3855 N. Hamilton Ave., Chicago 18, Ill.

144

a voltage amplifier, simply plug high impedance headphones into this jack. The use of the headphones will cause the vacuum tube voltmeter to read in error. Headphones should not be connected when the equipment is used as a vacuum tube voltmeter or a distortion analyzer.

All resistors and condensers, with the exception of those indicated before, can be 20% tolerance. There is no particular reason why the filters should be on exact frequency; therefore 20% condensers can be used. If the application does require exact frequency, it is permissible to shunt additional smaller capacities across the filter condensers and thereby correct the frequency error.

—30—

Great Lakes Radar

(Continued from page 38)

an alternating current power supply of 115 volts and 60 cycles, principally. For vessels where primary power is d.c., a suitable motor-generator set is used. A detachable viewing hood is provided to aid in observing the scope under unfavorable light conditions.

One fundamental difference among the various sets is found in the operating frequencies. Four (*Radiomarine, Sperry, Westinghouse, and Western Electric*) are built to operate on the "X" band or three cm. wavelength. The *Raytheon* and *GE* models operate on the "S" band, with a 10 cm. wavelength.

Supporters of the "X" band contend it provides better definition, better azimuth discrimination and hence is better for piloting a ship in close quarters. They also claim it furnishes greater range for a given radar sensitivity. "S" band advocates claim more reliability in bad, rainy weather, and less interference from "sea return."

Determination of which band is superior for operation on the Great Lakes is one of the hoped-for results of the project, although at the time of this writing it has not been decided whether all regularly-installed radar sets on Great Lakes ships will be limited to one band or the other.

Other differences and similarities can be discovered in an examination of some of the different sets (see Table 1).

One of the 10 cm. sets, *Raytheon's "Mariners Pathfinder,"* was installed on the self-unloader bulk freighter *George F. Rand* in August. Operating frequency is 3070 megacycles ± 50 mc. Range scales are 1.5, 5, 15, and 50 miles. All exposed parts of the set are designed to withstand temperature from -40°C to 60°C. The indicator, housing a seven-inch CRT and mounted on a pedestal, is movable. It can be tilted 45 degrees in a vertical plane and rotated 45 degrees in a horizontal plane.

The transmitter, receiver, modulator and associated components are built in one unit. In the transmitter, pulse

LOOK WAR SURPLUS

Nationally known Brands
subject to prior sale

- CENTRALAB CONDENSERS—3000 VDC, 50 mmfd, type 850, silver ceramic. 10 for \$1.39
- SPRAGUE CONDENSERS—metal encased, oil impregnated, tubular, 600 VDC, .1 mfd. 25 for \$2.19 100 for \$8.49
- CRYSTALS—Sylvania type IN21. 2 for 98c 25 for \$11.98
- JACKS—Signal Corps type JK34A, short phone jack. 10 for 98c
- MICAMOLD CONDENSERS—molded-in-bakelite, 400 VDC, .01 mfd. 25 for \$1.09 100 for \$3.98
- IRC, Type A B RESISTORS—cement coated, 10,000 Ohm, 10 Watt. 25 for \$2.19 100 for \$8.49
- SILVER CERAMIC, Erie type, feed-thru Condensers, 1000 Volts, 50 mmfd 100 for \$1.49
- PILOT LIGHT ASSEMBLY—Very high grade, movable lens and shutter. 10 for \$1.39 100 for \$12.49
- BANANA PLUGS—Beryllium Copper, Signal Corps type, overall length 3/16" with 8-32 thread. 25 for 54c 100 for \$1.98
- WARD LEONARD RESISTORS—Adjustable, 10 Watt, 75 Ohms. 25 for \$2.19 100 for \$8.49
- SHAKEPROOF—tinned phosphor bronze soldering lugs, accommodates up to size 14 conductor. 500 for 98c 1000 for \$1.79
- JONES TERMINAL STRIP—high grade, 10 terminal. 25 for \$2.98 100 for \$11.49

Write for circular listing many other outstanding values. Special discount on quantities. SHIPPING EXTRA.

ERIE SUPPLY CO. 88 EXCHANGE ST. ROCHESTER, N. Y.

a GOLD MINE of
SURPLUS PARTS

for RADIO REPAIRMEN
AMATEURS AND EXPERIMENTERS

12 lbs. of RADIO PARTS only \$2

Relays — Condensers — Resistors
Transformers — Coils — Hardware
Wire, etc., etc.

Send \$2.00 cash, check or M.O. today!
(Pay small express charges on receipt.)

Write for Radio Parts Catalog.

ELECTRONIC PARTS, Inc.

622 W. Randolph St. Dept. A2 Chicago 6, Ill.

America's Biggest Little Radio Value!
Tele-tone "DYNA-MITE"



\$17.95

5 TUBE SET

So small in size, yet so BIG in performance and tone quality. Powerful superheterodyne (AC-DC). Has superbly styled, lightweight plastic cabinet, combination aluminum nickel magnet on permanent magnet speaker, slide-rule dial, velveteed drive for smoother tuning and RADIOPTIKON built-in aerial. TERMS: At least 25% with order. We will ship balance C. O. D. WRITE FOR OUR COMPLETE CATALOG. IT'S FREE.

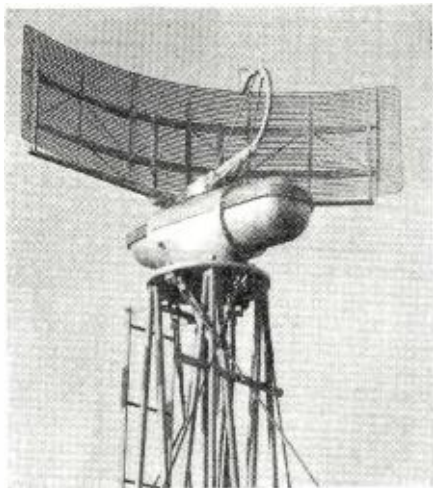
NATIONAL RADIO DISTRIBUTORS
899r Southern Blvd., New York 39, N. Y.

ELECTRONICS

Electronic Technician Training Course. Qualify for Radio Communication (Commercial Government License); Radio Repair Service; or be an Industrial Electronic Technician. Register now for new classes starting every four weeks. Approved under G. I. Bill of Rights. Residence day and evening school. Write to

ELECTRONICS INSTITUTE, INC.
21 HENRY, DETROIT, MICH.

RADIO NEWS



Antenna unit of the Radiomarine radar installed on top of the pilot house of the "A. H. Ferbert." The 18 inch high parabolic cylinder is constructed of spaced stainless steel rods and rotates at 10 r.p.m. Lower part of antenna assembly includes a driving motor, synchro generator, gearing and the wave guide rotary joint.

rate is 1000 cycles and pulse length is 0.4 microseconds. Peak power output is more than 15 kw. Source of radio frequency, of course, is the magnetron. In the receiver, a 30 megacycle i.f. is used; the r.f. band pass is 3 mc.

The truncated parabolic antenna, 7 feet wide and 18 inches high, is installed on top of the ship's "A" frame, necessitating a waveguide run of approximately 70 feet. Antenna rotation is 7 r.p.m., both clockwise and counter-clockwise. It gives a beam approximately 3.5 degrees at half power points in horizontal plane. In the vertical plane the beam width is about 15 degrees. While proceeding on Lake Erie, gas buoys were observed at ranges of four to five miles. Ships were observed from 20 to 25 miles. A rainstorm, about 10 by 30 miles in area, was picked up and plotted. When the *Rand* entered the storm area, vessels and other targets were accurately observed. In the Detroit River channel, buoys, piers, and even rowboats were detected at limited ranges.

The other 10 cm. set is the *General Electric* "Electronic Navigator" installed on the 8000 ton steamer *E. T. Weir*. It uses a 7-inch PPI, with fixed range scales of 2, 6 and 30 miles. A true or relative bearing can be obtained by direct reading from a movable bearing cursor with respect to a movable azimuth scale.

The 4½ foot high viewing console contains all the radio equipment. Peak power output is the 7 kw. minimum output from the magnetron. Pulse length is 0.5 microseconds maximum, and pulse repetition rate is 1500 cycles per second. This frequency is determined by a blocking oscillator which simultaneously keys the modulator (pliotron tube) and the gate for the sweep generator.

The reflector, a cast aluminum truncated parabola, makes about 11 r.p.m. and gives a beam width of five degrees to the half power points in the horizontal plane.

Latest Listing of Electronic Apparatus Up-to-date Catalog for Schools and Laboratories

BASIC MICRO-AMMETER

Sensitive Westinghouse, dual movement, aircraft meter, each movement 200µa., and independent. Either one of the two scales furnished may be pasted on the outside of the glass, (without opening the meter).



Westinghouse Dual Micro-ammeter—Type WE..... \$650
(for C.O.D., send \$1.00 deposit)

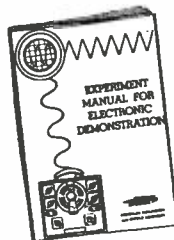
AND GALVANOMETER

Can be used in either of two ways: either
(1) as a zero-center galvanometer, 100-0-100 µa;
or
(2) as a regular micro-ammeter, 0-200 µa.

NEW CATALOG READY

No. 46E: *Electronic Instruments Especially Suitable for Schools and Laboratories.*

**SPECIAL MANUAL FOR SCHOOLS
60 PAGE EXPERIMENT MANUAL**



BY

SOL D. PRENSKY

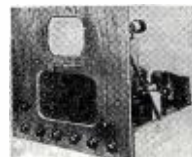
Send for Demonstration Experiment Manual, SEM-E: Enclose \$2.00, which is refunded when any test equipment is purchased.

To help you get the most out of your class-room demonstrations, these practical experiments are illustrated in complete detail. Available to school purchasers of electronic equipment at no extra cost.

Write for FREE CATALOG No. 46-E, listing Multimeters, Signal Generators, Oscilloscopes, Amplifier Systems and other electronic apparatus.

NEW "TRANSVISION" TELEVISION KIT

Complete kit for 7" Picture and FM Sound—Excellent engineering for practical assembly. Includes special antenna, tubes and all necessary data Transvision Television Kit TV-E.



Complete with tubes... \$149.50
Delivery in 10 wks. Send \$25.00 for C.O.D. Orders.



NEW STUDENT KIT 3-Tube AC-DC Set

A standard regenerative detector and one stage audio, AC-DC kit with complete instructions and plug-in coil, PLUS added safety of floating chassis and extra sensitivity. Model RK-E, less tubes... \$7.80
3 Tubes, one 6SJ7 and two 6C5's... \$3.15
(For C.O.D., send \$3.00 deposit)

RADIOLAB PUBLISHING & SUPPLY CO.
652 Montgomery Street • Brooklyn 25, N. Y.

Install an aerial the new way—

the **VERTROD** way

**EASIER!
FASTER!
BETTER!**



As MODERN as 4 wheel hydraulic brakes—compared to the old mechanical brakes.

VERTROD'S—20 model's cover all wave reception...
FM—AM and Television.

VERTROD—vertical models beautify buildings—eliminate poles—
insulators—filters—lightning arrester—climbing.

VERTROD—the most scientific antenna yet evolved.

The VERTROD way (with patented features) is the MODERN way. At most radio shops. Write for folder 417

VERTROD CORPORATION

60 EAST 42nd STREET • NEW YORK 17, N. Y.

ANNOUNCING—

The first volume in the long-awaited Massachusetts Institute of Technology Radiation Laboratory Series, bringing you—

the engineering data you need to design RADAR SYSTEMS



Ready Soon

Here is an important book which presents the general principles of the design of various radar systems. From the standpoint of the designer the book discusses the basic considerations which underlie and are particular to systems design.

RADAR SYSTEM ENGINEERING

Edited by Louis N. Ridenour, Editor-in-Chief, Radiation Laboratory Series; Associate Professor of Physics, University of Pennsylvania. • Over 900 pages, 6 x 9, \$7.50

AFTER a general approach to problems encountered, this authoritative book takes up the leading design considerations for the important components that make up a radar set. Detailed examples of actual systems are included. Two new and important auxiliary techniques—moving target indication and the transmission of radar displays to a remote indicator by radio means—are fully treated. Anyone interested in the varied applications of radar will find this new volume of immense value as a basic, useful reference.

10 DAYS' FREE EXAMINATION—MAIL COUPON

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. 18, N. Y. Send me M.I.T. Radiation Laboratory Series, Vol. 1—Radar System Engineering for 10 days' examination on approval. In 10 days I will send you \$7.50 plus few cents postage or return book postpaid. (We pay postage cash orders; same return privilege.)

Name

Address

City and State

Company

Position

Start Your Own Service Shop WITH LITTLE MONEY

NEW BOOK TELLS YOU HOW

Only \$1.75 Postpaid

ELECTRICAL or RADIO BUSINESS

10Days' FREE Trial

Get this sensational new book, "Starting and Operating a Profitable Electrical or Radio Shop" on 10 days' FREE TRIAL. Full facts about starting with small capital, full or part time. Tells how to finance a business, choosing a location, selecting a name, how and what to buy, advertising, salesmanship, legal angles, record keeping. **Brand new—nothing like it.** Recommended for servicemen, or anyone seeking information on starting a good paying shop. Only \$1.75 postpaid. Order your copy of "Starting and Operating a Profitable Electrical or Radio Shop" today.

RUSH THIS 10 DAY FREE TRIAL COUPON

TECHNICAL BOOK DIVISION
COYNE ELECTRICAL SCHOOL, Dept. 27-T4
500 S. PAULINA ST., CHICAGO 12, ILL.

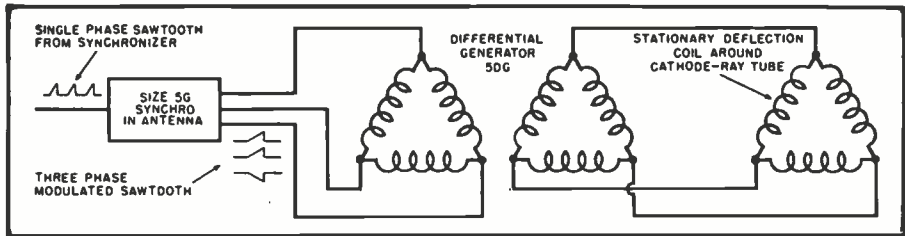
O.K.—rush my copy of "Starting and Operating a Profitable Electrical or Radio Shop." I am enclosing \$1.75 remittance (Coyne pays postage). I understand I may return book in 10 days for full refund if I'm not entirely pleased.

NAME AGE

ADDRESS ZONE

CITY STATE

Check here if you prefer to have book sent C. O. D. Pay postman \$1.75 plus small C. O. D. fee upon delivery. Same 10 DAY SATISFACTION GUARANTEE.



Cathode-ray tube deflection system of Radiomarine's radar set.

zontal and 17 degrees to the half power points in the vertical.

The *Radiomarine* 3 cm. installation made in September on the *A. H. Ferbert*, operates on a frequency of 9320-9430 megacycles. It consists of three major units: oscilloscope indicator, antenna assembly and transmitter-receiver. A four-foot high indicator cabinet houses a 12-inch cathode ray tube, associated circuits and power supply.

Rotating the CRT's electron beam in synchronism with the rotation of the antenna, for accurate bearing data, is achieved electronically without use of a moving coil. Single phase saw-tooth energy from synchronizer circuits is fed through coaxial cable to a size 5 G Synchro generator located in the antenna assembly, and three-phase modulated saw-tooth waves are produced. This energy then is sent through a 5 DG (differential generator) to a stationary deflection coil around the neck of the CRT, and this coil controls beam rotation. A 5 DG is not required on a ship without gyro compass. Since the differential generator is driven from the gyro compass, a stabilized picture always is obtained, so that "UP" position on the scope always points to North. A true or relative bearing can be obtained by merely flipping a switch, without recalibration.

A gyro repeater scale is mounted at the head of the PPI, to indicate ship's course at all times, whether radar is on or off. Range can be varied from 1½, to 5, 15 and 50 miles.

The transmitter and receiver are built into a rectangular cabinet about five feet high, installed in the wheelhouse. Capable of delivering a peak power output of approximately 30 kw., the transmitter has two sets of pulse rates. For short distance operation, the pulse length is 0.25 microseconds and pulse rate is 3000 cycles. For longer ranges, the pulse length becomes 1 microsecond and the pulse rate 750 cycles.

An 18-inch high parabolic cylinder antenna is constructed of curved, spaced stainless steel rods and rotates at 10 r.p.m. It uses a horn-type feed. Mounted on a standard 16½ inch Navy flange, the lower section of the antenna assembly includes a driving motor, synchro generator, gearing and the wave guide rotary joint.

The *Westinghouse* "X" band set was installed in July aboard the *William G. Mather* while the ship was underway. It gives readings for areas with radii of 2, 8 and 32 miles. On the wheelhouse roof a cut paraboloidal antenna is mounted, in a round plastic

dome on a 5½ foot pedestal. This pedestal also houses the driving a.c. motor, related drive gears and a so-called synchro-tie system to coordinate the circular movement of antenna with rotation of electron beam.

In the weather proof base of the pedestal are the modulator, high voltage power supply, preamplifier and the r.f. head, which includes magnetron oscillator, the synthetic type crystal detector and local oscillator. The r.f. components are mounted in the antenna pedestal to cut possible power attenuation between transmitter and antenna.

The 7-inch PPI scope is mounted on a four-foot high cabinet, on the ship's bridge, called the indicator console. Within this cabinet are the low voltage power supply, the i.f. and video amplifiers and related PPI circuit.

The magnetron is triggered 2000 times a second by the action of a sine wave oscillator, blocking oscillator and thyatron tube, and emits a 0.4 microsecond pulse. Peak power output is more than 15 kw. Conducted by a horn-type wave guide to the radiator, the signal is sent out in a vertical fan pattern, two degrees wide horizontally and about 15° vertically. The radiator rotates at 12 r.p.m.

In the receiver, a constant i.f. signal of 60 megacycles is provided by action of a klystron local oscillator.

The *Sperry* 3 cm. set was installed on the *Frank Armstrong* in August, on a trip from Cleveland. It consists of an antenna assembly, viewing binnacle and transceiver unit which contains transmitter and receiver. Three internally-adjustable ranges can be set up on the 12-inch PPI; the first, from 100 yards to 2-5 miles, second, 500 yards to 6-12 miles, third, 1 mile to 20-40 miles.

Fixed electronic range markers, appearing at regular intervals, are provided for each scale; in addition there is a variable marker. Range at this marker can be read to the nearest 100 yards directly from a counter. To permit clearer definition of close targets, the ship's own position indicator at the center of the scope can be expanded.

This set can also be used in conjunction with the Coast Guard radar beacons, or racons, originally designed for aircraft navigation. By turning a control switch, the operator can bring in only signals from a beacon. These appear now as a series of short lines, coded to indicate the particular beacon. Provision is made so that the set will be able to operate with the new beacons designed for marine use.

Pulse width is 0.25 microseconds and 1000 cycles a second for radar; 2 microseconds and 400 cycles per second for beacon operation. Peak power output is 35 kw. The parabolic cylinder reflector, four feet wide and 18 inches high emits a beam 2 degrees or less in the horizontal plane, and more than 15 degrees in the vertical plane. It rotates at 15 r.p.m.

Last of the 3 cm. sets is the *Western Electric* radar which actually was the first of the six to be installed. Just before it went into operation aboard the *John T. Hutchinon* a "Miss Radar of the Great Lakes" christened the antenna with a bottle containing water from all of the Lakes.

The installation consists of three basic units: the antenna on the pilot house, the indicator cabinet inside the pilot house, and the transmitter-receiver and synchronizer cabinets in the chart room.

Pulse length of the transmitted signal is of 0.5 microsecond duration and a frequency of 1000 cycles per second. The truncated parabolic antenna, made of laminated aluminum, turns at 12 r.p.m. It emits a beam pattern 15 degrees in the vertical plane and two degrees in the horizontal. The range scale is variable and can be adjusted to cover an area with a radius from one to 40 miles.

Because of delays in installation of some of the sets the operational phase of the research project will extend into the early part of the 1947 ship-

ping season, according to C. M. Jansky, the electronics engineer who heads the project committee. For this reason recommended standards for future sets will not be issued until later this year.

General reports have indicated that the sets have worked well. Ship personnel have caught on to radar quickly and are enthusiastic about its effectiveness. In one period when traffic approaching the St. Mary's River below the Sault locks was stalemated because of fog, two of the six radar-equipped ships were able to proceed straight to the locks and continue on their way. A performance like that is the best salesman radar can have.

To simplify the task of observing the PPI picture in coincidence with navigation charts, two methods have been developed and are under consideration for future addition to the equipment. One will be to project a microfilm of a radar-piloting chart on the PPI screen; the other is to superimpose the scope picture directly on a navigation chart by means of a reflectoscope or similar device.

In addition to its value for close range navigation, radar's ability to gather long-range information is expected to be helpful in expediting ship movements under the rapidly-changing weather conditions found on the Lakes.

Ship operators predict a brilliant career for radar in one of its first and biggest peacetime assignments.

In the words of Captain C. O. Rydholm, marine superintendent of the Cleveland-Cliffs Iron Company, which is a member of the Lake Carriers Association: "We believe radar will enable us to move cargoes with maximum speed, and, although our captains have set an enviable record of safe operations over the years, we believe radar will afford us an extra measure of safety for crews, cargo, and ships."

-30-

Crystal Diode Probe

(Continued from page 52)

High hum level and "hot" chassis make a.c./d.c. amplifiers unsatisfactory. Amplifiers feeding the output of a 6SQ7 tube into a 6F6 are usually satisfactory except when there is low signal generator output or low percentage of modulation. With less than 10% modulation an extra amplifier stage may be necessary.

A means of checking gain at the plate of the amplifier output tube may be provided by connecting a variable range a.c. voltmeter in series with a .25 μ fd. condenser. Waveforms in any part of the receiver may also be measured and observed if a scope is connected through a .25 μ fd. condenser between the power tube plate and the input to the scope's vertical amplifier.

-30-



FREE

Gift - of - the - Month Club

Do you want the MOST for your money? Do you insist on getting GOOD radio parts? Then the Olson Gift-of-the-Month Club is your dish!

HERE'S HOW YOU JOIN: Just fill out the Application below, mail it, and you're a member. NO DUES — WE PAY THE GIFT-BILL!

Paste This Application on a Postcard and Mail Today!

OLSON RADIO WAREHOUSE

73 E. MILL ST., DEPT. 65, AKRON, OHIO

Application: Please enroll me in Olson's Gift-of-the-Month Club. I am interested in getting more value for my money. Membership will cost me nothing.

NAME _____

ADDRESS _____

CITY _____ STATE _____

HERE'S HOW IT WORKS: (1) Each month you will get a list of Olson Radio Bargains, with a coupon good for the Gift-of-the-Month. (2) Enclose the gift coupon with your order for a low minimum or more, and we will send you the gift FREE. (3) No obligation. You can order or not, as you please, any time.

Join Now

AND GET THIS MONTH'S GIFT!

100 CIGARETTES FREE!



The smokes are on Olson this month! Your choice of Lucky Strikes, Camels, Chesterfields. Smoke 'em or give 'em away. MAIL THE APPLICATION TODAY and you'll get the Olson Gift Coupon!

The WORLD'S RADIO TUBES



U. S., British,
French, Czech,
German, Italian,
Russian, etc., etc.

240 pages of complete characteristics with explanations
Up to date
1946 edition just out

ELECTRONICS says, "Here at last is the radio tube handbook radio engineers have dreamed of . . . in seven carefully prepared tables and charts."

"Probably the most complete and authoritative set of tube-data in existence," says *RADIO CRAFT*.

BUY IT AT YOUR FAVORITE RADIO PARTS DEALER or direct by mail from us.

\$2.50 per copy; add 15c postage outside U.S.A.

Exclusive North American Distributors:
EDITORS & ENGINEERS, Ltd.
1302 Kenwood Road
Santa Barbara, Calif.
(Minimum trade order: 3 copies)

Consumers Are Sore

(Continued from page 53)

"We don't expect a strike from similar causes after this war. But, if today's explosive undercurrent of customer resentment is similarly ignored, retailers have no assurance that they will not suffer another consumers' strike—this time expressing a revolt against the shortsightedness of management and the high-riding arrogance of their employees."

It is not that they don't want that new radio, refrigerator, washing machine or range, but don't forget they've been making the old one "do" for some time and they may figure it will last a bit longer until they have a chance to "look around" and make comparisons. You're going to find a mighty small minority who are forced to buy a new unit and beware of arrogance in dealing with these few. They resent the fact they simply can't wait any longer and if you're smart you'll use every selling guile to please them. The consumer who must have a new unit immediately can make or break a sale you'll be hoping for in the days to come. Treat them as though they could walk right next door and buy an equally good product, as though your very success depended on pleasing them at this time.

As Walter Morrow, president of the American Retail federation aptly puts it: "Soon there won't be any more sass from the lass behind the counter. The boss is fed up with her (or him), too. Just as you are." He says, along with electric irons and inner spring mattresses, courtesy will be back in the nation's stores.

There will be more than courtesy too. You can expect an early return to extensive advertising, special wrapping, frequent deliveries, easy credit and other consumer lures.

Of course if you care to, you can continue the "take it or leave it" attitude now, during the early days of reconversion. Don't forget that this sales brutality will react against you, however, in the not too distant future.

You have a great opportunity right now to practice all the arts of good selling without the pressures which will enforce them later on. If you can learn to humble yourself to the point of average decency in your sales relationships today, when the cards are stacked in your favor, you will reap rich rewards when merchandise starts pouring into the market and competition again becomes bitter.

It is probable that all who read this have had their skin rubbed raw in some wartime encounters with insolent merchants and sales people. Remember every person who enters your store has had similar experiences and they're on the touchy side until they find out how you are going to handle them. They know that for the moment some types of merchandise are scarce. They know you can lounge back and read a newspaper while they

VPD



DRAMATIZES YOUR SALES STORY

VPD

VISIBLE PROTECTIVE DISPLAY

Our 24 page Catalogue illustrates many ways to dramatize, glamorize and add prestige to your sales story. See the photos, prices and varied sizes of V. P. D. Transparent Envelopes, Multi-O-Ring Presentations or Spiral Portfolios. For Better Sales Presentations use V.P.D. Transparent Plastic Containers.

WRITE NOW FOR CATALOGUE AND NAME OF NEAREST V.P.D. DEALER

JOSHUA MEIER COMPANY

DEPT. 36

P. O. BOX 242, STATION D - N. Y. 3, N. Y.

The BUY of a LIFETIME!

U. S. SIGNAL CORPS

only

5 Meter SHORT WAVE TRANSMITTERS
(72.2 Mc.)

\$3.49

Xmtr & Tube only
Less mike, batteries
and antenna.

One 1½ volt dry cell and 67½ volts of B operates it. Just attach di-pole, key or mike, connect the batteries and it's ready to use. Signal Corps spec wired with silver wire, silver-mica condensers, and precision resistors. Highly stable circuit with Lo-Loss silver inductance (Adjustable paddler.) Schematic supplied.

- Converts to walkie-talkie and Ham bands.
- Weighs less than a pound.
- Shipped by express only. No C.O.D.s.
- No Parcel Post.
- A sacrifice at only \$3.49. Postal or express money order or certified check.

NEWARK SURPLUS MATERIALS CO.

324 Piano St. Dept. N. Newark 2, N. J.
Send stamp for our giant Catalog

JOBBERS! QUANTITY BUYERS!

SAVE MONEY

with MID-AMERICA'S Sensational Values!

FREE MONTHLY BULLETINS

You can't beat Mid-America's rock-bottom prices for top-quality radio parts and electronic equipment! MID-AMERICA has 70,000 square feet of warehouse space jam-packed with relays, chokes, tubes, condensers, resistors, meters, plugs, jacks, wire, cable, sockets, switches, generators, dynamotors, volume controls, knobs—all new, unused and in perfect condition—AND ALL AT THE LOWEST PRICES YOU'VE EVER SEEN! And every month, month after month, we keep adding to our tremendous stock. Write today for MID-AMERICA'S big, complete catalog—and get your name on the list to receive our FREE MONTHLY

BULLETINS which list the latest, greatest buys in radio parts and electronic equipment that will make you more money. Mail requests to MID-AMERICA'S store address, attention Dept. E-27

MID-AMERICA CO. Inc.

STORE 2412 S. MICHIGAN AVE. CHICAGO 16, ILL.
WAREHOUSE 2307 S. ARCHER AVE. CHICAGO 16, ILL.

BUFFALO'S LEADING SUPPLY HOUSE

In the BUFFALO Area see **DYMAC INC.** for your radio and electronic parts and equipment

Dymac INC.

2329-31 Main Street, Buffalo 14, N. Y.

SERVICE MEN!

Red hot values in tubes and parts. Write for our latest list of test equipment.

RCA • Hickok • Triplett • Simpson

CHIEF ELECTRONICS

104 Main Street

Poughkeepsie, N. Y.

examine the merchandise, and for that reason these first forced customers are particularly sensitive to your treatment of them.

Your cue is to lean over backwards to please them, put them at their ease, make them feel they are important. The merchant who administers the sedative of good selling to "war nerved" consumers will find his reputation growing by leaps and bounds. This is a condition where the soft word not only turneth away wrath but buildeth a future business. Consumers properly handled today will be so astounded to find their ego built, they will not only spread the news far and wide to their friends, but will defend the justification of their purchase by praising the advantages of the unit they buy.

Don't be deceived by a rush of curious people who come to see the first of this, that, or the other piece of equipment which reaches your store. Turning curiosity into a signature on a purchase contract requires good old-fashioned salesmanship. Use these early postwar demonstrations to garner names of prospects—you're going to need them not too many months from now. A distributor tells us the story of a dealer who simply had to have nine deluxe floor lamps the minute the factory could ship. His customers were demanding them. He finally received the shipment and much to his dismay he found the demand had melted away. Now that he had the lamps, the customers who were ready to lay the cash on the line had other obligations at the moment, they thought they'd wait for some new kind of lamp they'd just heard about or some other excuse.

Of course, you're going into the greatest land of sales opportunity our country has ever known but you're not going to just drift into it on a downy cloud. You're going to have to sell your way into every foot of it. If you don't, your competitor will.

Woe unto the retailer who doesn't face the facts. Lure the customers in, start at once to put on your best company manners, your smoothest sales approach. Sell them on the fact that you *want* their business, you sympathize with the kicking around they've received during the war years. Be free to admit you've taken some pretty shabby treatment from the other merchants yourself. Consumers are sore. Salve them to sell them.

-50-



"Pa tried washing his feet in the automatic dishwasher!"

RADIO NEWS

February, 1947

We Cut Open an Electone

to Show you
the **EXPENSIVE REFINEMENTS**
unique in a low priced
table model

IMMEDIATE DELIVERY IN QUANTITY!

\$29⁹⁵
LIST PRICE **ZONE 1**

Write for Attractive Discounts

TUBES—TUBES—TUBES

All critical types including 7A8, 12A8, 50L6, 35Z5, 32L7, etc. 40% off the list.

We reserve the right to limit the quantity of any one type. No order for less than 25 tubes accepted.
Sealed cartons—standard brands.

STANDARD BRAND VOLUME CONTROLS

1/2 Meg., Tapped, 2 3/4" Shaft	\$.79
.35 Meg., Tapped	.79
1 Meg., all with switches	.79
10 for \$7.50	

Phono Pick-up Arms with L70A Crystal, \$2.25 Each

TERMS: 20% Deposit C.O.D. or 1% Discount Cash in Advance. Write for List.

WARREN DISTRIBUTORS

3145 Washington St., Jamaica Plains 30, Mass.

Sigmon's - WEST VIRGINIA'S
LARGEST RADIO SUPPLY HOUSE!

**AMPLIFIER for
GUITAR
OR
PHONO**



- ★ TUBES: 6SJ5, 6J5, 6L6, 5V4G
- ★ 4 Tubes—HI Gain
- ★ Two Microphone or Instrument Inputs
- ★ Phone Input
- ★ 6½ Watts—Beam Power
- ★ Solid Wood Cabinet
- ★ Aeroplane Cloth Covered
- ★ Tone Control
- ★ Heavy Duty 8" Speaker
- ★ Complete with Tubes

Complete with Tubes—List \$59.50 **Your Cost \$37.00**

VMI BRUSH CONTROL MIKE—Net \$10.40
MM TURNER CONTACT MIKE—Net \$ 9.45

**PHONO
AMPLIFIER**

3 Tube AC-DC
Uses: 50L6, 35Z5, 12SR7,
and 450 ohm speaker
Net \$5.97



FOR LATEST CATALOG WRITE TO..

Sigmon's
RADIO
SUPPLY
CHARLESTON, W. VA.

*Supplying Every
Electronic Need*

- For the—
- Radio Service Man
 - Amateur
 - Student
 - Experimenter
 - Industrial

Write For Illustrated Price List

CRABREE'S
WHOLESALE RADIO
DALLAS 2608 ROSS AVE. TEXAS

Radio Technician and Announcers

A Practical nine-month course in First Class Radiotelephone Operation and Announcing is offered by Don Martin School of Radio Arts. Most stations these days require combination men. We specialize in this type of training and maintain a placement bureau for our graduates. Serving the industry for nine years, the School of Radio Arts can train you. Write for our catalogue outlining the courses offered. Classes can be arranged so you can do part time work on the side.

APPROVED FOR VETERANS

DON MARTIN SCHOOL OF RADIO ARTS
1655 North Cherokee St. Hollywood 28, Calif.

ROTA-BASE

NEW HANDY LAB. DIAL. Simply turn the movable dial to the tube number desired on the ROTA-BASE and complete, correct connections are instantly indicated on the "prong" diagram. Filament, grid, plate, cathode, etc., to more than 300 tube types are given. No more valuable time lost on lengthy reading or "humbing" of pages. ROTA-BASE actually gives a "prong" picture of the connections. **PRICE NOW ONLY \$1.00.** Postage prepaid or sent C.O.D. plus postage. Money back if not delightfully pleased.

REED MFG. CO. 124 W. 4th St. Los Angeles 13, Calif.

LETTERS from our readers

READER FROM NIGERIA

BEING a regular local subscriber to RADIO NEWS I thought I would write you a few lines to congratulate you on your new feature 'RN Circuit Page' which is very helpful to the serviceman, it is something I have been looking for—it is swell.

"Being a radio serviceman, I follow all the articles on servicing with interest and await each copy with expectation of new articles.

"Keep it up."

Rufus Allen
Lagos, Nigeria

Thanks, Mr. Allen. It is always nice to hear from our readers.

THE CATHODE FOLLOWER

PLEASE allow me a word on the cathode follower situation. Mr. Gaines is very correct in stating that the 6A5G is an indirectly heated type. In fact, I use them in my personal amplifier, which consequently has absolutely inaudible hum, a thing difficult to achieve with 2A3's. However, the facts must also include this drawback. The cathode on the 6A5 is connected to the heater internally. The purpose in using 6L6s was, to interpret Stevens more correctly, to avoid the necessity of separate filament windings. Please slip this information in as soon as possible as I fear some incautious persons may purchase 6A5Gs in ignorance and they cost quite a bit. There would also be wasted time and money on other parts of the system.

"Now regarding cathode followers. I am rather interested in high quality reproduction, but am also skeptical of the claims made.

"To be specific, I set up a push-pull 6L6 cathode follower system which disappointed me. Perhaps you can spot my error. I used fixed bias (in the range from 22.5 to 45 volts) employing a good battery. The plate voltages ran up to 350 and 400 volts. Transformer coupling was used. The plate load was that recommended by Stevens yet my results differ.

"The maximum undistorted power output (checked on a large scope) was in no case much larger (10%-20%) than the normal connection. That is, about 3.5 watts undistorted. Stevens claims 8. However, I measured into a resistance load, with the first obvious deviation from sine being the m.u.p.o. point. The frequency was varied to assure that driver and output transformers were not at fault. Both were oversized.

"Worse, from my point of view, was the large amount of noise produced by oscillations of the heater cathode system. These mechanical vibrations, resulting from a.c. voltage from heater

to cathode is distressing. These vibrations are audible at my own threshold of 19.5 kc. Could this be tolerated in a high quality system? I think not.

"More power to Stevens, anyway. I am getting at my objections in this fashion.

"I have acquired a low capacity filament transformer which will cause small loss of high frequencies using such tubes as 6B4s or 6A3s. (Unfortunately, I have not had time for measurements, but it is theoretical fact that a capacitive load is bad for linearity of cathode followers). Immediately I should have large powers available with better highs and no noise. Also the matter of bias on the output tubes is deserving of investigation. Doubling the bias on 6L6s did not alter the maximum undistorted power output more than 10%, while 'B' drain is obviously lessened. Intermodulation will be the limiting factor, no doubt, but savings in power seem possible.

"Also the business of widening the response of transformers can be gone about in a different way. Neutralization is rare in audio amplifiers, but it is possible and worthwhile where high response is poor, under certain common conditions.

"I am all in favor of damping and economy, but I like to see them achieved in the simplest, cheapest way (specially the economy)."

Charles McCleskey

Thanks to Reader McCleskey for his comments. Any more pro's or con's on the cathode follower?

BOUQUET FOR THE "LITTLE GUYS"

THE story of the 'Spindle Eye' and her role in the Bikini Atomic Bomb experiment, appearing in the December issue of RADIO NEWS, was read with deep interest. My interest comes of having been closely associated with the project from the day the first incomplete sketch was made in Manila until the day the ship sailed for the Orient from Seattle. Lt. Col. 'Marty' Luichinger has written a fine description of the equipment that went into the 'Spindle Eye' and his story is the only firsthand account I have read of her use during 'Operation Crossroads.'

"To the generals go the laurels when the battle is won. But the little guys, the privates, the non-coms, the junior officers—they are the men who slug it out to make victory possible. So it was in the case of the 'Spindle Eye.' It is with the thought that a footnote might be of interest to your readers that I am writing to tell you of the work done by the 'little guys,' especially the dozen or more hams, who

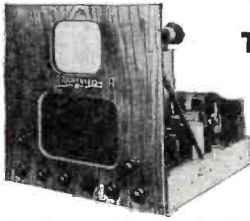
RADIO NEWS

SOUND PRODUCTS CO. now AUTHORIZED DISTRIBUTORS for

TRANSVISION

TELEVISION KIT

Offers you a high quality



TELEVISION RECEIVER
ready for easy, rapid assembly

Easy-to-assemble: No knowledge of television required. COMPLETE easy-to-follow INSTRUCTION SHEET gives you all the knowledge you need. This Kit INCLUDES SOUND, all component parts, and the following:

1. Specially designed Television Antenna.
2. A \$30.00 Lectrovision seven-inch Picture Tube . . . plus ALL other tubes.
3. Pre-tuned R-F unit.
4. Finished front panel.
5. All solder and wire . . . and sixty feet of low loss lead-in cable.

Price: complete **\$159.50**
with ALL tubes

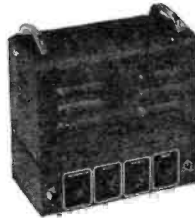
\$25.00 deposit required with all orders.
Balance C.O.D.

SOUNDMASTER

An Audio Achievement!

Presenting the first of the 1947

SOUND MASTER
line
SM-10
lightweight



HIGH FIDELITY AUDIO AMPLIFIER
THE SOUNDMASTER GIVES YOU MORE GOOD AUDIO WATTS PER POUND PER DOLLAR!

MODEL SM-10 SPECIFICATIONS

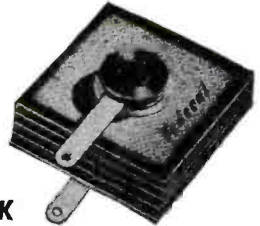
DIMENSIONS: Only 10x9 1/4x5 1/2. POWER OUTPUT: 10 Watts undistorted (less than 5%); 15 Watts peak. INPUT CIRCUITS: Two; One Microphone and One Record. INPUT IMPEDANCE: Both channels High Impedance 500,000 ohms. OUTPUT CIRCUIT: Terminal strip and Impedance Selector Switch. OUTPUT IMPEDANCE: 4, 8, 15, 250 and 500 ohms. FREQUENCY RESPONSE: 40 to 12000 cycles + or - 1.5 DB. TONE CONTROLS: Separate Bass and Treble controls. TUBES: 1-6SJ7, 2-6SN7, 2-6V6. POWER: 117 V., A.C. 50-60 Cycles, 50 Watts.

Prices on request

FEDERAL'S MINIATURE 5-PLATE

100 Ma. Selenium Rectifier
Replaces 29 Types of Rectifier Tubes

For AC-DC
Portable,
Table,
Console Radios



DELIVERY FROM STOCK

Boosts Performance to New High Instant Reception—No "Warm-up"
Runs Cool—Won't Overheat Set
Delivers Greater Output Voltage
Increases Sensitivity of Set
Steps-up Undistorted Audio Output Easily and Quickly Installed in Set
Metal Throughout—Can't Break
Nothing to Deteriorate or Burn Out
Takes Heavy Overloads
No More Rectifier Failure
Made to Last the Life of the Set

FREE—eight page service bulletin telling how to install this rectifier in AC-DC radio sets. Miniature Selenium Rectifiers now available in standard packages of 12, with window poster and mailing pieces. Send check or money order for \$12.00 for 12 rectifiers in display carton and complete sales accessories.

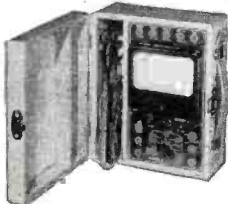
Send all orders direct to

SOUND PRODUCTS COMPANY

80 Main Street

WHITE PLAINS, N. Y.

Available for Immediate Delivery!



ELECTRONIC MEASUREMENT VOLTMETER

The fact that resistances between 1/20 OHM and 20 MEGS and AC voltages between 25 CYCLES and 1 MEG-CYCLE in frequency can be measured with this unit, makes it a handy and very valuable instrument.

Matched-pair multiplier resistors accurate within 1%. Meter accurate within 2%.
Price \$24.95
Size: 7 1/8" x 8 5/8" x 3 3/4". Complete with test leads.



GUARANTEED TUBULAR CONDENSERS

8 MFD—450V—	
10 or more	25c ea.
Less than 10	27c ea.
20 MFD—150V—	
10 or more	26c ea.
Less than 10	28c ea.
20X20 MFD—150V—	
10 or more	45c ea.
Less than 10	49c ea.

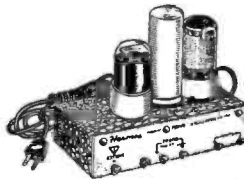
All fresh stock



NEW 60-WATT RADIO TRANSMITTER

MECK Model T60-1. Efficient performance on any amateur band 10 to 80 meters phone or C. W. Metal cabinet, 12"x11"x8". Plug-in coils for Band selection. 1 set of coils covering 10 and 11 meter bands furnished. Coils for other bands available at additional cost. Combined Plate and Screen modulation. Two complete built-in 60-cycle power supplies. 1 for final RF and 1 for Modulator. Speech Amplifier and Oscillator. Complete with tubes.

\$150.00



WIRELESS PHONOGRAPH OSCILLATORS

2 tube A.C.-D.C. Special value. Complete wired with tubes ready to operate.

\$5.98



SOMETHING NEW IN TEST SPEAKERS

No need to carry the speaker to your shop in servicing any radio from the small midget to the most elaborate console. Any output tube or tubes can be matched simply by rotating input switch to tube listed on front panel and rotate field switch for proper impedance and proceed with testing. External voice coil connection permits testing of set speaker to determine if output-transformer is open or shorted.
FIELD IMPEDANCE: 500, 1,000, 1500 and 2500 OHMS.

\$19.95



R. T. L. TUBE CHECKER

MODEL 130. Slide switch operation. For all standard 4, 5, 6, 7, octal miniature series with two spare positions. Filament selective. D.C. voltmeter range 0 - 10 - 100 - 1000. Portable model—leatherette covered wood case with cover.

\$51.00

TUBES Complete line of all "Hard-to-get critical tubes." Send us your order and we will surprise you with delivery!

PORTABLE PHONO-RECORD CHANGER LEATHERETTE CABINET . . . \$8.95
5" ALNICO 5 P.M. SPEAKER HEAVY SLUG 20 to a carton 1.59
6' A.C. PARALLEL RUBBER CORD SETS WITH MOLDED PLUG. 10 for 1.80
ANTENNA KITS—25 feet of lead-in wire, 50 feet of antenna wire, ground straps, glass insulators and nail knobs79

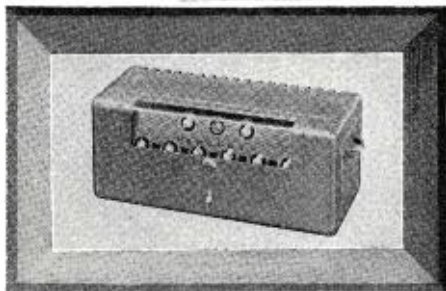
Ask for Our New FREE Catalog!



The Radio Shack Inc. CHICAGO

630 W. RANDOLPH STREET CHICAGO 6, ILL.

**AMERICA'S
TOP QUALITY
AMPLIFIER**



Deluxe K Series

A reputation for quality is our most priceless asset. The performance and operation of the Newcomb Deluxe K-Series of amplifiers form outstanding proof of the reason for that reputation.

Incorporated in every K-Series model is a combination of features never before offered in any amplifier . . . features that spell top quality in sound reproduction.

A glance at Newcomb specifications will convince the man who knows—and cares.

Write for literature

Newcomb
AUDIO PRODUCTS CO.
Dept. F, 6824 Lexington Avenue
Hollywood 38, California

R-L SPECIALS
for IMMEDIATE delivery

Wireless Phonograph with Automatic Record Changer



No wires to connect. Just plug in and play through radio. 45 minutes of uninterrupted plays of 10 or 12 inch records without reloading. For 110V, 60 cycle operation. Complete with open type walnut veneer cabinet. Shipping weight 14 1/2 lbs.
B6200— \$27⁰⁰
Net. each.

Radio-Phonograph Combination

Includes 5 tube Superbet Radio, Single Post Automatic Record Changer which will play either ten 12" records or twelve 10" records, continual action. Forty-five minutes of solid entertainment housed in choice of Hardwood Walnut finish Cabinet or beautiful light Swedish Modern Wheat color.



B6204 Walnut Finish—Net each \$54⁵⁰
B6203 Wheat Finish—Net each \$55⁵⁰

Write for FREE Parts Catalog



731 West Washington Boulevard
Dept. N CHICAGO 6, ILLINOIS

combined their efforts to make the "Spindle Eye" the great ship that she is.

"A young public relations officer, Major Donald G. Weiss, New York City, formerly Radio Officer on General MacArthur's Public Relations staff, was the driving force behind the birth of the "Eye." It was he who continued to press the need of a ship to back up the "Apache" at a time when many high ranking GHQ officers felt that the latter vessel was adequate to meet the press and broadcast needs of all the Allied countries. He eventually convinced the brass that the "Apache" simply did not have the facilities necessary to carry the volume of press and radio traffic that would come out of a full scale invasion of the Japanese home islands. Major Weiss called upon his wealth of press/radio relations experience extending from the Solomons to Luzon to dream up the many innovations that went into the "Spindle Eye."

"The undersigned, then in the radio engineering section of General MacArthur's signal office, was detailed by the Chief Signal Officer to plan the Signal Corps equipment that would be needed to meet the recommendations of the Public Relations Office.

"To the civilian technicians of the Army Signal Corps' Alaska Communications Systems, Seattle, go the credit for the superb radio and telephone installation. These boys, most of them hams, burned the midnight oil for weeks in order that the ship might sail on schedule. Richard C. Young, W7BDQ, showing all the ingenuity inherent in a ham, solved many knotty technical problems. He could be seen daily in conference with Howard W. Johnson, W7NU, and Myron Scott, shop foreman, as they worked out the design of some special piece of gear needed for this unusual radio ship.

"Bert K. Field, W7CHG, Carl Minister, W9JDT, Garry Lewis, W6TSM, Matt Gormley, W7ETN, and Robert Jefferson, W7DSY, assembled the 7.5 kw. RCA transmitter with nothing to guide them but a small schematic diagram.

"Roy Stanton, heading a telephone crew consisting of Joe Busey and Frank Davis, wired the radio control switchboards, and installed the 100 subscriber common battery switchboard and the carrier terminal bays. William M. Bruner, ex-W7FPU, supervised the installation of audio and recording equipment in the two control rooms. Other hams who spent long hours on installation and testing were: S/Sgt. Darrell Taylor, W7EBH, Albert Mowery, W7BCS, Del Rutledge, W7DC/K6SYM and Norbert Bouchard, W7IMF.

"Surprisingly few bugs developed, attesting to the first class job done by those ACS hams.

Sanford T. Terry, Jr., W4AGH,
ex-W3AGH
Capt. Signal Corps (inactive)

Engineers

Broadcast Radio receiver
Project Engineers, Television
receiver Project Engineers and
Mechanical Engineers exper-
ienced in broadcast receiver
engineering methods. Excel-
lent opportunity for advance-
ment in a growing engineering
department.

Reply giving full details to

**Personnel Manager
BENDIX RADIO
Division of Bendix
Aviation Corporation
Baltimore 4, Maryland**

LOOK!

D: C. POWER SUPPLIES!

FOR OPERATING DYNAMOTORS, testing auto radios, charging batteries, etc. Input 115 v. @ 50/60 cy. A.C. Output 6 v. @ 5 amp. or 12 v. @ 2.5 amp. filtered D.C. Uses Thordarson transformer, long life selenium rectifier, etc. Assembled complete \$12.50
(Specify whether 12 v. or 6 v. model.)

OTHER ELECTRONIC VALUES

THORDARSON power transformer (T-32). Primary 110-115-120 v. 50/60 cy. A.C. Secondary #1: 440 v.c.t. @ 150 ma.; sec. #2: 5 v. @ 3 amp. Conservatively rated. \$3.25
THORDARSON filament transformer (T-11). 105 v. 50/60 cy. primary, three secondaries. #1: 6.3 v. @ 3.9 amp.; #2: 6.3 v. @ 4.5 amp.; #3: 9.7 v. @ 0.5 amp. \$2.45
SPECIAL kit of T-11 and T-32. \$4.75
G.E. FILTER CHOKES. T-17: 10 Hy. @ 250 ma., 120 ohm D.C. res. \$2.50
T-18: 10 Hy. @ 75 ma., 330 ohm res. \$1.15
5BPI. U.S. Navy accepted. Special. \$5.50
G.E. pyranol cond. 23F47. 2 mfd. 4000 v. \$4.50 ea. Two for \$8.00. Not new but perfect.

All Merchandise Brand New and Guaranteed
**ALL GOODS SHIPPED PREPAID IN U.S.A.
NO C.O.D.'s**

WEBER RADIO LABORATORIES
3124 Avenue I Brooklyn 10, N. Y.

FREE BOOK

SHOWS SHORT CUT



**ENDORSED
BY CHAMPIONS**

For Amateur
or Commercial
Radio

Qualify at home, in spare time, by easy, simplified system. You can learn code or gain greater speed and skill in sending and receiving by the same system that has made code champions and radio telegraph experts. FREE BOOK OF FACTS explains Course. It's absolutely free. Rush your name for it today.

CANDLER SYSTEM CO.
Dept. 2-B, P.O. Box 928 Denver, Colo.

International Short-Wave

(Continued from page 116)

with an interlude of music. ("Radio Call") is heard weak to fair here in the Eastern U.S.

Denmark—A Danish correspondent to "Radio Call" magazine (Australia) reports that the new 50-kw. Danish short-wave transmitter is scheduled to take the air early in 1947; it will cover Australia and New Zealand as well as South America; it is believed frequencies in the 19-, 25-, and 31-m. bands will be used. Address for reports on transmissions from this country is Statsradiofonien, Rosenstrøms Allé, Copenhagen, Denmark (Danmark). Should be heard well in North America.

Ecuador—HC4EB, 6.870, Radio Manta, is heard evenings to 11 p.m. sign-off; this is correct call, not HC4AB. (Legge) Complete schedule is 7:30-11 p.m. (Smith)

HC5HC, "O das del Chimborazo," located at Riobamba, is a new station heard between 9-11 p.m. on 4.960. (Legge)

HCJB's frequency in the 19-m. band has been changed from 15.095 to 15.115, probably to escape QRM from HOXA, 15.100; on at 7 a.m. (Sutton)

Ethiopia—Radio Addis Ababa, listed as 15.103, but actually operating on about 15.065/15.070, was heard afternoons the last week of November, 1-3 p.m.; played badly worn, old recordings, some of them ("The Last Round-Up" and "Harbor Lights," for example) two or three times during a transmission; pauses between recordings, probably changed discs by hand. Had frequent announcements in English. Was good level here in West Virginia; have airmailed the station for schedules. Grady Ferguson, North Carolina, reported hearing this station opening at 8:16 p.m. with a recording, and with English announcement; second English announcement was not until 30 or more minutes later; faded out around 9:10-9:30 p.m. These may have been tests.

Finland—OIX2, 9.505, Peri, is being heard on East Coast at 7:15-7:25 a.m. with English news. (Ferguson) OIX1, 6.120, Helsinki, is reported to be scheduled 12 midnight-2 a.m., 4-7 a.m., and 10:30 a.m.-3:30 p.m., according to a recent DX broadcast from Radio Australia. (Ferguson) OIX2, 9.505, is heard well in England with English news around 7:15 p.m. (Harrison) The 15.190 frequency parallels (Bromley)

OIX4, 15.190, Peri, is being heard irregularly around 7:15-7:35 p.m. with English news; chimes usually precede the news. (Grivakis)

France—August Balbi, Los Angeles, recently received word from Radio Paris that they expect to have two 100-kw. transmitters in operation by April.

French Morocco—CNR3, 9.082 (varying), Rabat, is good signal in the



Vy 73 to you, OM, for a Joyous Christmas and a Productive New Year!



Bil Harrison, W2AVA

HARRISON SELECT SURPLUS

Your assurance of good, usable, guaranteed, surplus material at sensationally low prices—TOP VALUE ALWAYS! Come in and browse through our large HSS Department

COMPACT VIBRATOR PACK

FB for transceivers, portable receivers, etc. Delivers: 135 volts at 30 ma; 67½ volts at 8 ma; 1.5 filament or 6.3 heater, bias, and microphone voltages.

Completely filtered—neon tube voltage regulator—remote load-start relay—ruggedly made for dependable Navy use. 1¼" x 3¾" x 4". Weighs only 2 lbs. Works on any 6 volt DC source.

Complete vibrator pack, less only battery (use it on four flashlight cells, your car battery, etc.) **\$3.95**

With a clip-in RECHARGEABLE Willard Storage Battery Unbreakable NON-SPILL plastic case (110 V AC, 2 Amp Trickle charger) **\$5.50**

With TWO clip-in Willard Primary batteries. (See our Jan. R.N. ad) **\$5.75**

HSS EQUIPMENT BARGAINS

Brand new, with diagrams and instructions:

R 45/ARR-7—Airborne version of the Hallicrafters SX-28A Super Skyrider receiver. With crystal filter and tubes, less power supply **\$137.50**

RAK-7. Navy long wave TRF receiver. 15 to 600 KC. With AC power supply. 9 tubes. **\$59.50**

BC-406—15 tube UHF RECEIVER. Slightly used. **\$19.95**

(BC-406A—\$29.75) Easily converted to a hot superhet ham receiver. See our previous ads.

Code Practice Oscillator AN/GSC-T1. Works on 110 Volt AC, etc. In carrying case. **\$14.95**

Dynamotor. Runs on 6 or 12 volts. Delivers 500 volt at 160 MA. From PE103 Power Pack. **\$9.95**

TELESCOPING ANTENNA

Signal Corps AN29-C. Sturdy, lightweight, brass antenna extends to 12' 10", telescopes to 15'. ¼" diameter. Weighs only 30 oz. FB for mobile, or rotary beam elements. **\$1.95 each. Six at \$1.74**

ALL STANDARD LINES

We are **Factory Authorized Distributors** for the top quality manufacturers and we now have in stock lots more new, latest improved production-Ham gear! Visit our stores today, for everything you need. We promise you fresh, clean material—quicker—at the lowest current prices—and, above all, our sincere desire to be of friendly, helpful service. As one of the world's largest distributors of Communications Equipment we are delivering plenty of

RECEIVERS

Right Now! ALL MAKES—practically all models. If you want your new set in the quickest possible time send your order to HARRISON! For example:

HALLICRAFTERS—
S-38.....\$39.50 S-40.....\$79.50
S-36A, FM-AM-CW—27.8 to 143 Mc.....\$07.50
S-37—130 to 210 Mc.....\$51.75
SX-42—New FM-AM—54 to 110 Mc.....\$50.00

HAMMARLUND—New "Super-Pro"
SPC-400-X—55 to 30 Mc.....\$34.05
Speaker in Cabinet—\$13.20
HQ129X, complete with speaker in cabinet...\$173.25

NATIONAL—
NC-240-D—Complete with speaker.....\$40.00
HRO-5TA-1—Complete with pack and speaker \$03.00
RME-45—Complete with speaker.....\$98.70
RME-84—Complete with speaker.....\$98.70

LITERATURE ON ANY RECEIVER GLADLY SENT UPON REQUEST

TEMCO 500 GA

A conservative 750 watts output on all bands—phone and CW! Rock stable VFO—simplified tuning—FB value in a post-war rig! **\$1800**
Temco 75 GA.....\$495

We have a limited quantity available for immediate delivery

PANORAMIC

Add "eyes" to your receiver with a Hallicrafters Panoramic adaptor and increase your operating efficiency and QSO score. Complete with ten tubes and instruction **\$99.50**

TWO METERS IS FUN!

New RTL compact Handy-Talkie. Pull out the antenna and you're on the air! **\$31.50**
(Complete with tubes and batteries—\$35.95)

Abbott TR-4B. New, post-war model. FB for mobile or fixed station! **\$52.00**
(Complete mobile station, less only antenna—\$81.61)

MAIL ORDERS? Certainly! Just list everything you want (items in this ad, or any ad, magazine, or catalog) and include remittance.

Vy 73 de

Bil Harrison, W2AVA



HARRISON RADIO CORPORATION

10 WEST BROADWAY • NEW YORK CITY 7

PHONE—BArclay 7-9854 • EXPORT DEPT.—CABLE—"HARRISORAD"

[JAMAICA BRANCH—172-31 Hillside Ave.—REpublic 9-4102]

PRE-EXAM TESTS FOR Commercial Radio Operator FCC LICENSE EXAMINATIONS



DON'T TAKE A CHANCE—AVOID FAILURE ON FCC COMMERCIAL RADIO OPERATOR LICENSE EXAMINATIONS!
USE NILSON'S COMPLETE PRE-EXAMINATION TESTS AND COACHING SERVICE
Enables You To

Rehearse the FCC license examinations Practice the procedure Practice the multiple-choice examination methods used by FCC Check your knowledge Locate your weak points Correct your weak points before taking the actual examination

Prepared by Arthur R. Nilson, Famous Co-author of Nilson and Hornung's RADIO OPERATING QUESTIONS AND ANSWERS

Cleveland Institute of Radio Electronics, RN-2 Terminal Tower, Cleveland 13, Ohio

Cleveland Institute of Radio Electronics
RN-2 Terminal Tower, Cleveland 13, Ohio
Please send information about Pre-Exam Tests.

Name.....

Address.....

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

SCENIC RADIO

... headquarters for
SERVICE SHOP EQUIPMENT
INSTANT DELIVERY from STOCK!



TUBE TESTERS

RADIO CITY 322 dynoptimum counter type...	41.50
RADIO CITY 322F notable model...	48.50
SUPREME 599A tube and set tester...	62.50
SUPREME 504B tube and set tester...	89.50
RADIO CITY 502-N tube and set tester...	59.50
SIMPSON 305 portable model...	46.25
TRIPLETT 2413 notable model...	49.50
TRIPLETT 3212 counter model—roll chart...	63.50

SIGNAL GENERATORS

APPROVED A-200—100 Kc.—75 Mc.	49.50
RADIO CITY 703—95 Kc.—100 Mc.	49.50
SUPREME 576—85 Kc.—82 Mc.	68.95
SIMPSON 315—75 Kc.—30 Mc.	67.25
TRIPLETT 2432—75 Kc.—50 Mc.	86.50

OSCILLOSCOPES

DUMONT 274—New 5" oscilloscope...	99.50
DUMONT 164-E—3" oscilloscope...	105.00
DUMONT 208-B—5" oscilloscope...	235.00
WATERMAN 510—pocket 2" scope...	66.00

VACUUM TUBE VOLTMETERS

McMURDO-SILVER "Vomas"	59.85
SUPREME 565—with probe...	63.50
ELECTRONIC DESIGNS "Provac"—with probe	59.50

SIGNAL TRACERS

McMURDO-SILVER "Snark"	39.90
SPECO—with detector probe...	44.95

COMPLETE SET ANALYZERS

SUPREME 562 Analyzer...	127.00
RCA Chanalyst...	164.50

CONDENSER TESTERS

McMURDO-SILVER 004 Cap-resistance bridge	49.90
SPRAGUE "Telemite"...	52.25

VOLT-OHM-MILLIAMMETERS

TRIPLETT 668-H pocket type...	20.00
TRIPLETT 625-N—20,000 ohms per volt...	45.00
TRIPLETT 2405—25,000 ohms per volt...	56.75
SIMPSON 215—5,000 ohms per volt...	32.50
SIMPSON 230—handy pocket type...	24.75
SIMPSON 240—the famous "Hammer"...	26.50
SIMPSON 260—20,000 ohms per volt...	38.95
METERS, Inc.—Model 32—5000 ohms per volt	22.50
RADIO CITY 447—small pocket meter...	17.95
RADIO CITY 461AP—portable 20,000 ohms	43.50
D.V. SUPREME 542-B—5,000 ohms per volt...	23.65

SEND FOR FREE NEW CATALOG!
— JUST OFF THE PRESS —

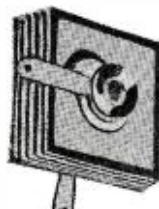
Also, TUBES • SPEAKERS • AMPLIFIERS

Please Send 25% Deposit With C.O.D. Orders
— WHOLESALE DISTRIBUTORS —

Scenic Radio & Electronics Co.

53 PARK PLACE • Dept. E • NEW YORK 7, N. Y.

REAL BONAFIDE VALUES



**SHURE
CRYSTAL
MIKE**



Federal **92c** With Base & Cable
Setinium Rectifier Replaces
All Rectifier Tubes Reg. \$6.95
Lots of 12.—Sample \$1.09 \$18.50

Home Recorder & Playback with Mike. Regular \$99.95	\$79.50
Detrola Changers	\$17.50
Government Surplus Special 5 1/2 foot Ear-phone Ext.	49c
Permoflux Nylon Comb. 3" Heavy Slug PM Speaker	\$1.98
100 Resistors Ass't Sizes & Watts. IRC, etc.	\$2.49
3525-50L6-12SG7-12SK7-12SQ7 Standard. Tube Kits \$4.49—3 Tube Kit \$7.45	
HS 38A Phonos Rubber Cushions	\$1.98
Pocket Volt-Ohmmeter	\$14.95
Crystal Pickup \$1.98 2" PM Speaker	\$1.39

TERMS. 25% Deposit Required with Order.
Balance C.O.D. Plus Mailing Charges.

BONAFIDE

RADIO & ELECTRONICS CO.

89 1/2 CORTLANDT ST. NEW YORK 7, N. Y.

Eastern U.S. afternoons; heard with French programs around 4-4:30 p.m. and later. (Sutton)

Germany—BFN, 7.290, Hamburg, is heard on West Coast at 2 a.m. with local (*English*) news and weather reports. (Balbi)

Greece—Radio Athens, 7.295, comes on the air at 2:58 p.m.; has brief *English* announcement, then is all in Greek to 3:45 p.m. sign-off with martial tune. (Bromley)

Guadeloupe—Radio Guadeloupe, 5.985, Pointe-a-Pitre, is now reported heard well in the East, in French and Spanish, 5:15-7 p.m., and irregularly to after 8:05 p.m. (URDXC)

Guatemala—TGWA, 15.170, is being heard with excellent signals, usually with fine marimba music, afternoons here in the East. TGRA, 6.255, "La Voz de la Guardia Civil," is heard evenings to 10 p.m. sign-off; replaces TGNA and relays TGR (1350 kcs.). (URDXC)

Haiti—HH2H, 5.948, Port-au-Prince, was heard recently between 9:45-10 p.m. relaying New York (in French); signs off at 10 p.m. (Norris)

Holland—PCJ, 15.220, Hilversum, was tuned recently at 7:10 a.m. with chime signal; at 7:15 a.m. opened program in Dutch to the Netherlands East Indies. (Ferguson) A feature story on PCJ will appear shortly in this Department.

Honduras—HRP1, 6.350, San Pedro Sula, "El Eco de Honduras," is heard from around 7:30 p.m. in North Carolina with good signal; at 9 p.m. relays the BBC news in Spanish from London. (Ferguson)

Hong Kong—"This is ZBW, Hong Kong. We are now taking you over to London for the news," is announced at 6 a.m. on 9.538; this announcement is made on completion of a recorded session; the BBC news is followed by a weather forecast; then there is more recorded music, compared in *English*; at 6:30 a.m., after station identification again, the program continues in Chinese. ("Radio Call") Hong Kong is just audible around 6-6:30 a.m. here in West Virginia; signal should be improving.

India—Madras, 4.920, and Delhi, 4.960, parallel Bombay, 7.24, and other AIR stations now in the 7:30 a.m. *English* news. (Dilg) The 41-m. AIR transmitters are coming through with fair to good signals at that time here in the East; Bombay, 7.24, usually identifies in *English* around 7:15 a.m.

VUD7, 15.160, Delhi, is heard at 9:30 a.m. with *English* news, off at 9:45 a.m. VUD10, 11.830, Delhi, was heard a recent evening opening at 10:15 p.m., gave schedules for the day, and said was operating to Africa on 21.51, 17.83, 15.29, 15.19, 15.16, and 11.83. (Ferguson)

The 15.19 transmitter continues to be heard widely in the Eastern U.S. with a good signal in the evening, with *English* newscasts at 9:30, 10:30 p.m.

VUD10, 17.830, Delhi, has been heard in Ohio between 7:30-8:50 a.m.; has BBC news relay at 7:45 a.m. (Sutton)

AMSCO 1947 SPECIAL SERVICE KIT

Kit includes assortment of:

- 100 Resistors, 1/2 and 1-watt.
- 50 Condensers, paper, mica and can.
- 10 Switches, toggle and gang.
- 100 ft. Spaghetti, various sizes.
- 12 Knobs, round and bar.
- 2 lbs. Hookup wire.
- 20 Fuses.
- 6 Volume Controls.
- 1 lb. Hardware (screws, nuts, lugs, etc.)
- 10 Tube Sockets.
- 25 Connectors.
- 10 Jacks.
- 12 Padder Condensers.
- 12 Terminal Boards with Resistors.
- 25 Ceramic Insulators.
- 1 Screw Driver.
- 1 Tube Puller.
- 2 Allen Wrenches.
- 1 Panel Fuse Holder.
- 2 Binding Post Strips, and many other valuable items.

YOUR COST ONLY \$9.95 COMPLETE
AMERICAN SALES COMPANY
1811 WEST 47th STREET, CHICAGO

REPAIRMEN AND MANUFACTURERS GUARANTEED! RADIO TUBES!

Miniature 3 Way Portable Kits 1R5, 1T4, 1S5, 3Q4, 117Z3.

Miniature 12 Volt Kits
12BE6 Replacing 12SA7
12BA6 Replacing 12SK7
12AT6 Replacing 12SQ7
35W4 Replacing 35Z5
50B5 Replacing 50L6

G.T. 12 Volt Kits
12SA7 12SK7 12SF7 12A6 35Z5
LARGE QUANTITY OF FOLLOWING TYPES
3Q5 6SK7 6K6 6F6 6G6 6P5 6SJ7 3ZL7

Send list of requirements of tubes not listed

LE-HI ELECTRICAL COMPANY
660 Broadway Newark 4, N. J.
HUMBOLDT Dept. RN-100 HUMBOLDT
5-3530 5-3531

Now for EVERY WORK SHOP! NEW INVENTION Electroplates by BRUSH



Easy to Plate CHROMIUM
GOLD, SILVER, NICKEL, COPPER

... For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replat worn articles, faucets, tools, fixtures, silverware, etc with a durable, sparkling coat of metal—Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick! Everything furnished—equipment complete, ready for use. By doing a bit of work for others, your machine can pay for itself within a week. So make your shop complete by getting a Warner Electroplater right away! Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE!

- MODEL MAKERS
- MAINTENANCE
- HOBBY SHOPS
- HOME SHOPS
- SALVAGE PARTS

WARNER ELECTRIC CO. Dept. L-23
1512 W. Jarvis Chicago 26, Ill.

FREE Details & Sample!

WARNER ELECTRIC CO., 1512 W. Jarvis, Chicago 26, Ill.
Gentlemen: Send Free Sample and Details to:
Name _____
Address _____
City _____ State _____

From Sweden it is reported that AIR is using 21.510 between 7-8 a.m. (Malmgren) In Australia, this station on announced frequency of 21.510 is heard closing down at 8:30 a.m.; reported as early as 1:30 a.m. with splendid signals "Down Under." (Gillett)

Iran—The new s.w. station at Tabriz, capital of Azerbaijan Province, is heard in Sweden between 9 a.m.-1:45 p.m. on a frequency of about 6.090. (Skoog) Is listed as 6.087. This station is heard by Paul Dilg, Monrovia, California, opening at 9 a.m. with 5 pips; Mr. Dilg first reported it as "unknown," but has since observed that Azerbaijan Province is 8 hours ahead of EST, whereas the remainder of Iran is 8½ hours ahead of EST; sometimes has a good signal on West Coast, Mr. Dilg reports.

EPB, 15.100, Teheran, signs off at 7:32 a.m. (Sutton) Still can be heard weekly in East some mornings at 6:15 a.m. when has *English* news, and later; identifies at 7 a.m. as "Ici Teheran."

Iraq—YI5KG, 7.085, Baghdad, is coming through again mornings to West Coast, but does not now have *English* news at 11 a.m. as has been reported from some quarters in the past. (Dilg)

Italy—Australians report a good signal at around 4 p.m. from *Radio Italiana*, 11.810.

Jamaica—ZQI, 4.700, Kingston, is heard well these early evenings in the Eastern U.S., 4:30-6:30 p.m. weekdays; world news is heard at 5:15 p.m. According to the URDXC, closedown on Sundays is at 5:30 p.m., and a frequency of 2.330 has been brought into use for Sunday only, between 6-8:30 p.m.

Japan—JZK, 15.160, Tokyo, was heard recently in contact with KQZ from tuning at 6:40 to their sign-off at 7:08 p.m.; they mentioned frequencies of 9.295 and 7.815 (probably used mornings); a few mornings later, Tokyo was picked up on 9.295 with transcriptions and a news relay at 8:30 a.m., signal was weak and "mushy." (Ferguson)

JLT3, 15.225 (varying), Tokyo, has a strong signal around 6 p.m. some evenings.

American authorities in Tokyo are expanding their short-wave facilities; in addition to JLR, 6.015, and JCV, 3.075, two further outlets have been added—JLP, 9.605, and another on about 4.880. ("Radio Call") Close-down is at 9 a.m.

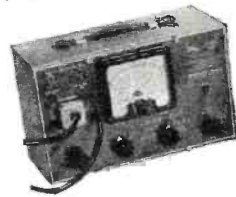
I have recently been hearing JLR, 6.015, relaying AFRS programs around 6-7 a.m.; good signal here in West Virginia; at 7 a.m. EST, they give local time as "9 p.m."

WVTD, "The Voice of the British Commonwealth Occupation Forces in Japan," reported by Australians as heard one or two times some months ago on 15.831, closing at 8:15 a.m., is believed to have been a harmonic of a medium-wave outlet. ("Radio Call")

Java—The new Indonesian station on 10.365 is scheduled daily between

WALTER ASHE GIVES THE WORDS

It pays to deal with one of the best—reliable Walter Ashe! And here's our offer if you want a trade: express your old instrument to us and let us know which new instrument you are interested in. We will quote you a real deal—with no obligation to you.



YOU GET A FINE TRADE-IN ON A FAMOUS NEW VOMAX

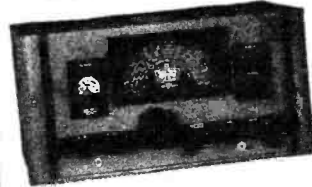
Trade in the old—get a new "Vomax," one of the finest test instruments of its type! Send in your old instrument today. We'll make you a real allowance toward this outstanding VTVM even though its regular price is still only

\$59.85



HANDSOME TRADE ON HICKOK TUBE TESTER

Model 532P. Original Dynamic Mutual Conductance test, standard for laboratories, tube manufacturers and set manufacturers. Deduct our big allowance from its **\$121.20** reg. price of...



TOP TRADE-IN ON YOUR RECEIVER!

Your Ham receiver may be worth an almost fantastic high allowance in a trade! Get our best offer now, while allowances are sky-high on:

RME 45, splendid new model, at **\$198.70**

HAMMARLUND HQ 129-X at only **\$173.25**

WALTER ASHE GIVES THE WORDS

- MEISSNER RECEIVER KITS, 6-tube AC-DC, with tubes. **\$25.20**
- SELSYN MOTORS, type 5G, special per pair **12.50**
- REVERSIBLE MOTOR, ½ to 2 RPM, with conversion instructions for rotary beam drive. "50 in LBS. Torque" **4.95**
- SAM'S PHOTO FACTS, issues 1 thru 12, your choice **1.50**
- RADIO CITY MULTITESTER, Model 447, a value at **17.95**
- HANLAN APPLIANCE TESTER, a real buy **10.95**
- BALLENTINE PHONO MOTOR and turntable, precision made. **4.44**

AMPLIFIER CHASSIS WITH COVERS.			
Deluxe, chrome trim, gray enamel.	Number	Size	Reg. Price Sale Price
	3973	7x17x9	\$4.95 \$3.72
	3974	10x14x9	5.40 4.05
	3975	10x17x9	5.70 4.28

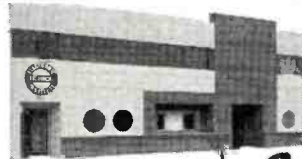
AMPLIFIER CHASSIS WITH COVER.			
Standard style, gray enamel.	Number	Reg. Price Sale Price	
	3983	10x14x9	\$3.51 \$2.64

- WEBSTER RECORD CHANGER, Model 50-1, immediate delivery. **\$21.60**
- WEBSTER AUTOMATIC SHUT-OFF, Model 56-1, immediate. **27.20**
- WEBSTER 10 and 12-INCH INTERMIX, Model 70-1, instant delivery **43.20**

AND WALTER ASHE GIVES THE SERVICE THRU THESE HAMS:
WOLDO WOPIP WOPGI WOULD WOGTF WOYD

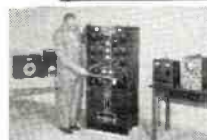
Write For Our New Catalog

WALTER ASHE GIVES THE WORDS



WE TRAIN YOU AT HOME

Learn RADIO SERVICING



ALL CLASS ROOMS HAVE NEW and LATEST EQUIPMENT.

We furnish you, without additional cost, KITS from which you MAKE YOUR OWN TEST EQUIPMENT. Knowledge gained in building and using these KITS helps you to MAKE MONEY as you learn.

Day and Evening Resident Training also available.

WE PREPARE YOU... Earn big money! START your own spare-time business. Soon after enrolling we send you our Added Income job sheets. Radio principles easily learned with our ILLUSTRATED lessons. Soon you can make repairs on radios while still learning. Your FULL TIME radio shop or good RADIO position is but the next step!

MAIL COUPON FOR OUR FREE 1947-1948 YEAR BOOK

Electronic Technical Institute—Dept. No. 1
 771 Venice Blvd., Los Angeles 15, California

Name..... Address.....
 City..... State.....
 Occupation..... Age.....

CUT HOLES

3/4" TO 3 1/2"



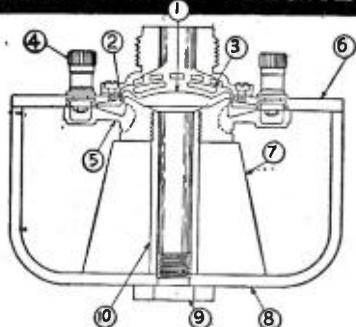
in radio chassis

Punch cuts through chassis, die supports metal to prevent distortion, cap screw is turned with wrench to cut clean, accurate holes for sockets, plugs, and other receptacles. Saves hours of work — no reaming, filing or drilling! 3/4" to 3 1/2" sizes. Get complete data now from Greenlee Tool Co. 1882 Columbia Ave., Rockford, Illinois.

WRITE FOR FREE FOLDER S-119



Inside Facts About ROUTE No. 7 PERMANENT MAGNET



- 1—One-piece metal diaphragm. Voice coil wound on diaphragm.
- 2—Horn mounting accurately centered.
- 3—Perforated die-cast palate.
- 4—Cadmium plated heavy-duty binding posts.
- 5—Flange molded to inner pole piece.
- 6—Outer pole piece of special alloy.
- 7—Heavy ALNICO permanent magnet.
- 8—Bowl of heavy gauge steel.
- 9—Brass assembly nut binds all parts.
- 10—Inner pole piece made of brass.

Write for circular RN-247 giving complete details.

ROUTE Industries
1702 WAYNE ST., TOLEDO 9, OHIO

11-11:30 a.m.; and tests between 8-9 a.m. on Mondays, Wednesdays, Fridays, and Sundays; signs on with "Allo Holland," off with a march, not Dutch National Anthem. (Dilg) Is heard in Sweden. (Skoog)

According to "Radio Call," the 11.010 transmitter opens at 4 a.m. with details of programs originating from "The Indonesian Broadcasting Centre." From 4 to 4:30 a.m., *English* is broadcast for Australian listeners; 4:30-5:30 a.m., Dutch for Netherlands Indies and Australia; 5:30-7:30 a.m., *English* for Australian listeners; 7:30-8:30 a.m., Indonesian for Netherlands Indies and Australia; 8:30-9 a.m., Siamese for Siam; 9-9:30 a.m., *English* for Indian listeners; 9:30-10 a.m., Indian languages for India; 10-10:30 a.m., Arabic; 10:30-11 a.m., Dutch for Holland; and 11-11:30 a.m., *English* for England and Europe. Continues to send a good signal to the Eastern U.S. early mornings; usually *English* news, read by a woman, can be heard around 7-7:30 a.m.

"The Allied Forces' Radio in Batavia" is stated to operate on 4.613 and 2.600; at 9 a.m. is scheduled to take a relay of "The Voice of Britain" period from the British Far Eastern Broadcasting Service, Singapore. ("Radio Call")

A Javanese station on about 6.380 was logged in Australia some weeks ago; announced as Djokakarta; was heard around 6:30 a.m. with a program of English-type recordings. ("Radio Call")

The Javan on 10.060 usually signs off around 11 a.m., but on Saturdays generally runs to 11:30 a.m. or later. (Dilg) It is believed this frequency is not used on Sundays and Mondays. A frequency of about 7.997 parallels this one.

Korea—JODK, 2.510, Seoul, is being heard again early mornings on West Coast. (Dilg) Runs to around 8:30 a.m. sign-off, which is in *English* and other languages. ("Radio and Hobbies," Australia) The singing of "Auld Lang Syne" as a goodnight signature was recently replaced by another vocal tune. ("Radio Call") Opens at 4:30 p.m. ("Radio World," Australia)

Lebanon—Beirut, 8.020, is now audible in the Eastern United States between 3-4 p.m. with fair strength; has Arabic programs between 3:15-4 p.m. sign-off, closes with "La Marseillaise." (Legge)

Madagascar—Australians report this country has provided exceptionally strong signals by putting into service a new transmitter on 6.065, with 6.140 in parallel; sign-off is at 1 p.m. ("Radio Call")

Malaya—Radio Malaya's Blue Network broadcasts on 7.22 from 11 p.m.-1 a.m.; on 4.78, 8:30-11 a.m.; Red Network, 4.82, 11 p.m.-1 a.m.; and on 4.78, 6:45-8:30 a.m. Address, Department of Broadcasting, Cathay Building, Singapore, Malaya. (ISWC, London)

Manchuria—According to the ISWC, London, MTCY, 11.78, Hsinking, is scheduled 4:24-4:50 p.m.; address,

SOME NEW ITEMS IN TELETRON TELEVISION COMPONENTS

YOKE MATCHING TRANSFORMERS:

No. YT-111H. For matching 5 mh. HORIZONTAL windings, such as utilized in TELETRON No. DY-1S and No. DY-2L Deflection Yokes. Output taps for Peaking and Return Trace Time control provided. Utilizes low-loss "HIPERSIL" core, giving very high transformer efficiency. In rounded-corner, black wrinkle can 2 3/4" W. x 2 3/4" D. x 3 3/4" H. Stud mounting. Lug terminals. **\$26.40**

No. YT-113H. Physically and electrically identical to No. YT-111H, but constructed with conventional transformer iron. **\$12.75**

No. YT-12V. For matching the VERTICAL windings of Magnetic Deflection Yokes. Five different output taps giving step-down ratios of 20:1 to 8:1 are provided to accommodate a wide variety of circuit conditions. Housing identical to above transformers. **\$10.95**

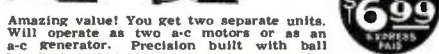
TELETRON Deflection Yokes, Focus Coils, Ion-trap Magnets, and Blocking Oscillator Transformers also available.

The TELETRON Television line is now available at many leading jobbers. Write for latest complete catalog and name of your nearest supplier.

THE TELETRON COMPANY
1988 East 59th Street Cleveland 3, Ohio

110 VOLT 60 CYCLE A-C MOTOR GENERATOR UNITS

TWO BRAND NEW COMPLETE UNITS COST NAVY \$97.50



Amazing value! You get two separate units. Will operate as two a-c motors or as an a-c generator. Precision built with ball bearings, polished aluminum housings. Operate small grinders, fans, polishing heads, etc. Students, schools can use to experiment with fascinating a-c phenomena. Generate a-c electricity, operate as rotary converter, synchronous motor-generator, use as phase shifter, variable transformer, etc. Free with each order—manual of interesting experiments and full instructions. Also SINGLE 110-volt 60-cycle ball bearing precision motor suitable for grinders, fans, etc. With special mounting brackets. Express prepaid, only \$3.99. Send money order, personal check, currency, or will send C.O.D. Order today or send card for more details. LECO ENGINEERING CO., Box 908-RN-2, Lincoln, Nebr.

In the Rocky Mountain Region It's RADIO & TELEVISION SUPPLY CO.

152 Hobson Avenue, Pueblo, Colo.
P.O. Box #892

"If we don't have it, we'll get it—
or it can't be had! Phone 5729"

Come to the famous

COYNE TRAINING SHOPS

where you learn by doing



TRAIN FOR **RADIO-ELECTRONICS**
IN A FEW WEEKS

Prepare For A Good Job Now With A Lifetime Future!

Trained Radio-Electronics men needed now. They will be needed too in the years to come. Don't be caught napping. Get a Radio training now and be ready. Learn by Doing. Free employment service for life after graduation. Many earn while learning. If you are short of money, ask about my Student Finance Plan. Now added Training in Electric Refrigeration. We are also equipped to train those who qualify under G. I. Bill. We also have facilities for men with physical disabilities whether due to war or other causes. Fill in and mail coupon for details.

SEND COUPON FOR FULL DETAILS

B. W. COOKE, Dir., Radio-Electronics Div.
COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 27-1K, Chicago 12, Ill.
Send Big Free Book; also details about Coyne Part-Time Employment and Student Finance Plan.

Send G. I. Bulletin Physical Disability

NAME.....AGE.....

ADDRESS.....

CITY.....STATE.....

Manchuria Telephone & Telegraph Co., Ltd., Hsinking Central Broadcast Station, Hsinking, Manchuria. May now announce as Changchun.

An oriental station heard by West Coast DXers on this frequency early mornings may be Hsinking.

Mozambique—A short *English* news service can be heard from CR7AB, 3.493, at 2:55 p.m.; at 3 p.m., the announcer requests listeners to tune to 9.715 for further *English* broadcasts. ("Radio Call") The 9.715 frequency is scheduled to have *English* news at 2:55 p.m. However, the URDXC reports that the 9.715 frequency is now off the air, and that 9.650 is being used for the period between 2-3:30 p.m. weekdays, with sign-off at 2:30 p.m. on Sundays; may have call of CR7BJ which is listed on 9.645.

New Caledonia—*Radio Noumea*, 6.208, was heard in Australia recently as late as 5:30 a.m. some mornings; may have been tests, normal sign-off is around 4 a.m. ("Radio Call") Is good signal in New Zealand at 2 a.m. (Whitty) I believe 2 a.m. is sign-on time.

Norway—According to the URDXC, Oslo, 6.187, is scheduled weekdays between 3 a.m.-5 p.m., Saturdays to 6 p.m.

In Sweden, the Fredrikstad short-wave transmitter has been heard with special tests on 6.130, at 12 noon-1:30 p.m. and 3:45-5 p.m. (Lindhe)

Palestine—Direct from Tim Heffernan, assistant engineer, P.O. Box 636, Jaffa, Palestine, comes this information regarding Sharqal-Adna: "Present frequencies are 3.325, 2.5 kw.; 6.190, 7.5 kw.; 6.170, 7.5 kw.; 6.790, 2.5 day, 7.5 kw. night; 11.720, 7.5 kw. day. Between 12 midnight-1:15 a.m. all transmitters are used, except 11.720; and between 4:30 a.m.-1:15 p.m. all transmitters are used, but 11.720 goes off at 11:15 a.m., while the 6.790 (7.5 kw.) one closes down at 11:30 a.m.; on Fridays and Sundays all transmitters except 11.720 are heard 12 midnight-1:15 a.m.; and between 5 a.m.-1:15 p.m., all transmitters are in use, other than that 11.720 signs off at 11:15 a.m., and 6.790 (7.5 kw.) at 11:30 a.m. We are also scheduled to do some tests in *English* every Saturday very soon; proposed times are 1:15-6:59 p.m. on all waves." Sample, attractive QSL cards were sent along and Mr. Heffernan stated these are sent all reporters.

Incidentally, although the 6.135 frequency is reported "off the air," I have more recently heard it signing on at 12 midnight along with those listed by Mr. Heffernan.

Panama—Direct from *Radio Central America*, Wilbur T. Morrison, chief engineer, informs me that HOXA, 15.100, has Spanish news at 12:30-12:45 p.m. and 6-6:30 p.m., and that the *English* news is scheduled for 10:45-11 p.m. This station is heard with good signal in most parts of the world.

Philippines—A recent DX broadcast from *Radio Australia* listed a Manila s.w. station as operating on

8.000; schedule was not given. (Dilg) A late flash from Paul Dilg, Monrovia, California, reports he picked up a station on approximately 9.710, signing off at 11 a.m., with a call that sounded like KZ-I (maybe KZRI), believed to be Manila; said would be "back tomorrow at 5:30 a.m.," evidently meaning local (Manila) time; QRM made readability low.

Now that XGOY has left 9.635 (listed, but usually swung to 9.640), KZRH, 9.640, Manila, announcing as "The Voice of the Philippines," can be heard with fair level early mornings here in the Eastern U.S.; has *English* news at 5:30 a.m.

Pitcairn Island—From A. W. Owen, GW2FUD, Radio Officer of a British

ship running between Montreal, New York, and Australia, and who does some commercial work with Radio ZKG, comes this additional information regarding radio on Pitcairn:

"The amateur call of Nelson Dyett, operator of ZKG, is ZL2FR and not ZL2FM. When working on radiotelephony, Dyett says, 'ZL2FR . . . Z-L-2-Fat-Rabbits.' Also, the frequency used by ZKG5 is not 7.270, but 17.270. It is quite true that both ZL2FR and Andrew Young, VR6AY (the Government Secretary of the Island) have so far had no replies to their applications for amateur relicensing. After 7 years' stay on the island, however, Dyett hopes to be home again in the first few months of 1947, and will

Thanks for your Patience!

1001 BUYS

SURPLUS RADIO, INC.

30 MUNSON ST.
PT. WASHINGTON, N.Y.

TUBES
RELAYS
CHOKES
RESISTORS
RECEIVERS
CAPACITORS
TRANSISTERS
TRANSFORMERS
UHF-MICROWAVE

- We know you have been waiting patiently for your copy of the SURPLUS catalog. Now here it is, available to YOU!
- Packed with the latest electronic components and equipment at prices a FRACTION OF THE ORIGINAL COST.
- All equipment strictly BRAND NEW and UNCONDITIONALLY GUARANTEED.
- Are you on our mailing list? Send a postcard for your FREE Copy!

HERE'S AN EXAMPLE

Coming Soon . . .

Contests with prizes worth thousands of dollars. Be sure to get your name on our mailing list NOW to be eligible.

SECONDARY FREQUENCY STANDARD

For precision frequency measurements.

- Complete with spares.
- 1000 KC to 45,000 KC.
- 1000 — 100 — 10 KC Check Points.
- 100 to 250 V., 25-60 cycles.

MAIL THIS COUPON ON A PENNY POST CARD TODAY!

SURPLUS RADIO, INC.
30 Munson St., Port Washington, N. Y.

Please send me a FREE copy of your Bargain Catalog at once, and details of the contests as they are formulated.

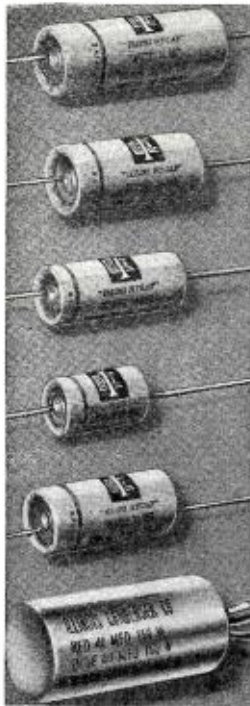
Name _____

Address _____

City _____ State _____

R-2

A Buy at \$29⁵⁰



LOOK TO ILLINOIS FOR

ELECTROLYTIC CAPACITORS

of finest quality!

At Illinois' new plant the accent is, as always, on highest quality Electrolytic Capacitors. "Not how many, but how good" has been the fixed company policy over the years and has been directly responsible for our steady growth. A model of efficiency, our new plant features the very latest in equipment, newest production techniques and air conditioning. These factors combined with the best basic materials, closer, more rigid control and a skilled engineering staff show clearly why Illinois is better geared than ever to produce the finest in condensers.



Your copy of our latest catalog is ready for you. Write for it today.



ILLINOIS CONDENSER CO.
1616 NORTH THROOP STREET • CHICAGO 22, ILL.

RADIO TEST INSTRUMENTS

By RUFUS P. TURNER

The new and revised edition of this valuable handbook is now available. Gives data for building, calibration and use of such electronic test instruments as meters, bridges, impedance testers, capacitance testers, radio frequency and audio oscillators and meters, oscilloscopes and accessories, signal tracers, Q-meters, etc. 219 pages, \$4.50. Order from Ziff-Davis Publishing Company, 185 North Wabash Avenue, Chicago 1, Illinois.

A REAL SCOOP!

- Miniature extra-sensitive headphones—high or low impedance. Complete with matching transformer. Signal Corps type HS 30—wide frequency response... \$ 2.49
- 7 tube AC Superhet Kit—all parts, chassis, tubes, 6" speaker. Instructions, diagrams 26.95
- .003 mica condenser—Sangamo—2500 w.v.25
- .0002 ceramic condenser, wire leads, 700 w.v.07
- Precision carbon resistors—1 me. : 2 me. : 2 W20
- Power transf. 117v. 60 cycles—850v. @ 125 m.a., 6.3v. @ 3A, 5v. @ 3.5A—half-shell mounting 4.25
- Insulated carbon resistors, 1/2W-1W, 10% -100 3.95
- Magic Eye Socket, complete with leads19
- Electronic Designs vacuum tube volt-ohm-meter, model 100 complete with test leads 52.50
- Complete line of FM and Television Dipoles.

Electronic Supply Corp.

40-14 Greenpoint Avenue, Long Island City 4, N. Y.



AMAZING NEW Pocket or Purse Size RADIO!

Small as a Pack of Cigarettes! Weighs only a few ounces—Beautiful black chrome plastic case. Uses new war born crystal diode, Hi-Q slide dial. No tubes—batteries or electric "plugs-ins." Usually receives local broadcasts without outside aerial wires.

GUARANTEED TO PLAY when used according to instructions sent with each radio! You can use it at home, in offices, hotels, cabins, in bed, etc.—lots of fun—real entertainment!

SEND ONLY \$1.00 (cash, money order, check) and pay postman \$2.99 plus delivery fees on arrival or send \$3.99 for postpaid delivery. Complete as shown Ready to Play with self-contained personal phone. For Gifts—children will love it—grown-ups too! An exceptional value—order yours and enjoy the many good radio programs coming! Don't be without your Pa-Kette Radio another day! (All foreign orders \$5.00 U. S. cash.)

PA-KETTE ELECTRIC CO., Dept. RN-2, Kearney, Neb.



RCA Institutes, Inc.

Offer thorough training courses in all technical phases of Radio and Television

WEEKLY RATES **DAYS—EVENINGS**

VETERANS: RCA Institutes is approved under G. I. Bill of Rights

For Free Catalog write Dept. RN-47
RCA INSTITUTES, Inc.
A Service of Radio Corporation of America
75 Varick St., New York 13, N. Y.

again be active as ZL2FR; his home address is 8 Duthie Street, Karori, Wellington, New Zealand. The present population of Pitcairn is only 120 compared to the 1939 figure of 185—the balance are now living in New Zealand and Australia, and cannot return just yet. During the war period when ZKG was a naval station, staffed by personnel of the Royal New Zealand Navy, the population was, of course, increased, but such military personnel have now left the island. Mail arrives there nine times a year, although in the nine months up to September, 1946, thirty ships had called in."

Portugal—CSW7, 9.730, Lisbon, was heard recently signing off at 8:30 p.m. (Norris)

Portuguese Guinea—Radio Bissau is reported again, 5-5:30 p.m. on 7.100. (URDXC) Is listed on 7.094.

South Africa—Mervyn P. Laubscher, Johannesburg, has just forwarded via airmail this data obtained direct from the SABC: "The short-wave station at Durban (6.169) was dismantled when the new medium-wave transmitters were put on the air. It is proposed to erect a new short-wave transmitter at Pietermaritzburg as soon as equipment can be obtained. We can assure you that the Johannesburg station on 11.71 has not been in operation for a long time and it is unlikely that it will be used in the near future." The 11.71 SABC station reported some time ago by several monitors may have been a harmonic.

The SABC harmonic on 11 megacycles is still being heard with strong signal in Pretoria. (Ecksteen)

Sweden—The special DX broadcast on November 24, 1946, dedicated to readers of RADIO NEWS, transmitted over SBT, 15.155, and SDB-2, 10.780, was heard on the latter frequency in South Africa. (Laubscher)

SBU, 9.535, Stockholm, is now scheduled 1-5 p.m. (paralleling 10.780) and 8-9 p.m. (paralleling SBP, 11.705). (URDXC)

Tahiti—FO8AA, 6.980, Papeete, is heard on West Coast, Tuesdays and Fridays around 10-11:45 p.m.; peaks at 11:30 p.m.; has bad c.w. interference. (Balbi, Dilg) This one still eludes your ISW Editor here in the East; it also applies to several other Eastern DXers who are "out to get" Tahiti!

Turkey—TAP, 9.465, recently has been coming in with a good signal in the Eastern U.S. at 12:45 p.m. when has English news. In the 4:30 p.m. English transmissions on Monday, Thursday (to England) and Sunday (Postbag), this station usually has severe CWQRM, sometimes is completely blocked out.

U.S.S.R.—Moscow's announced frequency of 11.72 is best one now in use in the morning transmission in English to North America, 7:20-8:15 a.m., although the 11.63 and 15.18 frequencies are good level some mornings, also; 17.820 parallels. Recently I have observed an echo on about 11.718;

It may be that Kiev is used on this frequency to relay Moscow during this period.

Petrovsvlovsk (Kamchatka), 6 07, has a strong signal on West Coast, 1:45-2:30 a.m. or later daily, and Saturdays between 12 midnight-1:30 a.m.; the 9.565 transmitter, located at Kom-somolsk, Khabarovsk Territory in Siberia, is heard strong from 9 p.m. on; still has *English* news at 4 a.m. Heard in the Home Service at 2 a.m. irregularly are frequencies of 6.11, 6.125, 6.06. (Balbi)

RV15, 5.940, Khabarovsk, has been heard recently after 9:30 a.m. with news in Russian (at dictation speed), read by a woman; has been heard as late as after 10 a.m. (Dilg)

Uruguay—In a verification to Gote Olsson, Sweden, it was stated that CXA-19, 11.835, operates between 6 a.m.-10 p.m. daily. In an attractive brochure now being sent out by this station with its verification card, it is stated: "Under the Southern Cross vibrates in the Voice of 'El Espectador' the fervent wish for and the ratification of the Liberty of Man. From the mast of 'El Espectador,' Hope goes out to the roads of the world in sense of the purest Fraternity."

Vatican City—HVJ, 15.095, has French at 9:30, German at 9:45, and *English* news at 10 a.m.; good level.

(Ferguson) The 9.660 frequency is heard on West Coast at 10:15 a.m., signing off to India, good signal. (Balbi) It is reported that HVJ's 6.190 frequency can be heard in Spanish between 2:50-3:15 p.m.

Acknowledgments

AUSTRALIA—Radio Australia; Gillett, *Radio Call*; Addis; Keast, *Australasian Radio World*; Matthews, Short Wave League of W. Australia. BELGIUM—Salmon. BRITISH COLUMBIA—Verigin, Park. CALIFORNIA—Balbi, Dilg, WestDyke; Norton, URDXC; Anderson, Woodruff. COLORADO—Woolley. DENMARK—Friis. DISTRICT OF COLUMBIA—Eaton, Havlena, U.S.S.R. Embassy, Hay; Harris, WIRN; ENGLAND—*London Calling*, BBC; Atkins, Garrard; Bear, ISWC; Lloyd, Wicks, White, Mitchell, Daniels, Hall, Shankie; Charge, BSWL, *The Short Wave Review*; Norris, Tonks, Friend, McGee, Harris, Muxlow, Brown, Rowden, Harrison, Logan, Hughes, Pearson, P. Hayes. FRENCH INDO-CHINA—Mrs. Margaret Coughlin, Radio Saigon. ILLINOIS—Wajda, Daum. INDIA—AIR, Delhi; Laljee. INDIANA—Flitcraft, Green, Cossell. IRELAND—Levi. ITALY—*Radio Club D'Italia*. KANSAS—Seckler. KENTUCKY—French. LOUISIANA—Crandall, Crites. MASSACHUSETTS—Sternfeld, Harris,

Holzman, Simonian, French, Healey, Kernan. MICHIGAN—Reid, Sekach. MINNESOTA—Ecklund. MISSOURI—James; Kiernski, IRT. NEW JERSEY—Wooley; Williams, American QSL Bureau; Shaw, Stauhs, Crowell. NEW YORK—Legge, BBC, Beck, Taylor, Ignoll, Kentzel, Sink, Gernert. NEW ZEALAND—Gray, Whitty, NZDXC. NORTH CAROLINA—Ferguson. NORWAY—Otnes. OHIO—Berg, Sutton; Jacobs, GNSWLC; Campos. ONTARIO—Smith, Hart, Bromley. PALESTINE—Heffernan, Sharq-al-Adna. PANAMA—Radio Central America. PENNSYLVANIA—Cooley, Jones, Callahan, Conley, Hankins, Starry, Brown. POLAND—*Radio Warsaw*. QUEBEC—Gauvreau, Dunlop. SCOTLAND—Morris, Watson. SOUTH AFRICA—Laubscher, Ecksteen, SABC. SPAIN—Alonso, *Radio Club Espanol*. SWEDEN—Skooog, Skogsberg, Carl-Eric Petersson, Kalderen, Mattsson, Lindhe; Samsoie, *Radiotjanst*; Forsstrom, Swalen, Frick, Ohrwall, Persson, Gillbert Andersson, Gimby, Malmgren, Rundblad, Gustafsson, Bengt Andersson, Olsson. TENNESSEE—Seaton. TEXAS—Giles, Rice, Thompson, Lyerly. VIRGINIA—Norris. WALES—Owen. WEST VIRGINIA—Rupert, Reese, Gonder, McLaughlin, Arthur. WISCONSIN—Reed, Thomka, Walz.

-30-



Hams' Paradise

EVERYTHING IN RADIO, ELECTRONIC, AND COMMUNICATIONS SUPPLIES

Sensational Clearance!

of War Surplus Equipment
at a Fraction of Its Original Cost

We offer hundreds of "hard-to-get" items in amateur radio supplies along with the best in "HAM" equipment—all at a great saving to YOU.

Our stock includes a wide assortment of tubes, plate transformers, filament transformers, swinging chokes, filter chokes, filter capacitors, variable transmitting and receiving condensers, trimmers, padders, relays, sockets, switches, conductors, power supplies, vibrators, dynamotors, rectifiers, resistors, dials, plugs and crystals.

We also have a wide selection of microphones and accessories, amplifiers, transmitters, receivers, converters, antenna equipment, volume controls, speakers and numerous other items.

The lack of space prevents us from listing the hundreds of specific items and prices. However, we solicit your requirements. Our staff of fully qualified personnel is ready to help you with all problems.

ALSO IN STOCK

Such Standard Lines As:

- Cardwell
- B & W
- Shure
- Temco
- Westline
- I. C. A.
- Workshop Associates
- Atlas
- Waterproof Electric Co.
- S. C. Labs
- Telegraph Apparatus Co.
- Premax Antenna
- Many Others

Catalogs upon request

W2BNW is in charge of our Ham Department

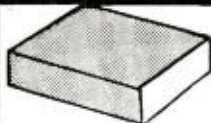
Our latest bulletin is just off the press giving complete descriptions, specifications and bargain prices. Come in and get your copy today or drop us a card asking for BULLETIN 1 RN.

IMMEDIATE DELIVERY ON ALL ITEMS

N IAGARA RADIO SUPPLY

160 Greenwich St., New York 6, N. Y.

IT'S RESCO FOR CHASSES!



5 1/2 x 10 x 3	.....	.84
5 x 13 x 3	.....	.99
7 x 9 x 2	.....	.84
7 x 11 x 2	.....	.90
12 x 17 x 2	.....	1.71
4 1/4 x 8 1/2 x 1 1/2	.....	.60
5 x 9 1/2 x 1 1/2	.....	.63
5 x 9 1/2 x 3	.....	.84
12 x 17 x 3	.....	1.86
7 x 12 x 3	.....	1.05
7 x 17 x 3	.....	1.23
8 x 12 x 3	.....	1.23
8 x 17 x 2	.....	1.32
13 x 17 x 2	.....	2.07
8 x 17 x 3	.....	1.41
10 x 14 x 3	.....	1.38
11 x 17 x 2	.....	1.65
11 x 17 x 3	.....	1.86
10 x 17 x 3	.....	\$1.50
13 x 17 x 3	.....	2.31
13 x 17 x 4	.....	2.64
7 x 13 x 2	.....	.99
7 x 15 x 3	.....	1.23
7 x 9 x 2	.....	.84
5 x 7 x 2	.....	.63
7 x 7 x 2	.....	.78
10 x 11 x 2 1/2	.....	1.32
10 x 12 x 3	.....	1.32
10 x 23 x 3	.....	1.86
10 x 17 x 4	.....	1.98

Prices quoted are for Black-Crackle Finish
Prices for Cadmium Plated Finish slightly higher.

MANY OTHER SIZES ALSO IN STOCK

AMPLIFIER CABINETS

10 x 17 x 9	.....	\$3.69	8 x 12 x 9	.....	\$3.15
10 x 14 x 9	.....	3.51	5 1/2 x 10 x 9	.....	2.16
7 x 17 x 9	.....	\$3.24			

BLACK CRACKLE FINISH

UTILITY CABINETS

4 x 2 x 4	.....	\$.78	9 x 5 x 6	.....	\$1.50
4 x 3 x 5	.....	.84	10 x 8 x 7	.....	1.89
6 x 6 x 6	.....	.93	10 x 8 x 10	.....	2.31
12 x 11 x 8	.....	\$2.49			

6-sided, closed—black crackle finish

Radio Electric

SERVICE CO. OF PENNA., INC.

77H AND ARCH STREETS, PHILA. 6, PENNA.
Branches: 5133 Market St. and 3145 N. Broad St. in Phila.
Also in Wilmington, Del., Easton, Pa., Allentown, Pa., Camden, N. J.

HAMS! WATTS CURRENT?

- 807 Tubes NEW JAN, each 1.49, Per Pair 2.50
- 1 mfd 5000 Volt Oil Cond., each 7.50, Per Pair 12.95
- 2 mfd 1000 Volt Oil Cond., each 1.95, Per Pair 3.49
- 300 Watt Multi Match Modulation Trans., 27.00
- Dual 110 mmfd Variable Cond. .050 Spacing Ceramic Ends, each 1.95, Per Pair 3.49
- 10 Hy 350 Ma Smoothing Choke, each 2.95, Per Pair 5.31
- Bud JC 1543 Variable Cond., 18 mmfd .175 Spacing, each 1.59, Per Pair 2.76
- 0-200 DC. Milliameters. 2 inch triplert, each 2.95, Per Pair 5.31

UNIVERSAL

RADIO SUPPLY CO.

1404 VENICE BOULEVARD
LOS ANGELES 6, CALIF.

Manufacturers' Literature

Readers are asked to write directly to the manufacturer for the literature. By mentioning RADIO NEWS, the issue and page, and enclosing the proper amount, when indicated, delay will be prevented.

CONTROL CATALOGUE

Spencer Thermostat Company of Attleboro, Massachusetts have announced the availability of their new catalogue covering Klixon Thermo-Snap Built-In Temperature Controls. These controls are applicable to equipment ranging from electric and gas heaters to radio equipment.

The catalogue includes information on the various types of automatic and manual reset thermostats. It provides dimension data, specifications, ampere rating and other pertinent information which facilitates and simplifies the selection and application of the devices.

Copies of this catalogue will be sent upon request to *Spencer Thermostat Company*, Attleboro, Massachusetts.

TV ANTENNA DATA

The Workshop Associates Incorporated are currently offering a single page data sheet covering their 3-element high-gain television receiving antenna.

In addition to pertinent information regarding this equipment, the data sheet features an exploded diagram of the antenna and specifications for the various parts.

This particular receiving antenna comes in five different models covering the video channels 2, 3, 4, 5, and 6.

A copy of this data sheet will be furnished by *The Workshop Associates Incorporated*, 66 Needham Street, Newton Highlands, 61, Massachusetts.

EQUIPMENT CATALOGUE

Of particular interest to schools and laboratories is the new catalogue No. 6S issued by *Radiolab Publishing & Supply Co., Inc.*

In addition to listing television kits suitable for laboratory projects, the catalogue carries information on available multi-testers, signal generators, oscilloscopes, sound amplifier systems and student construction kits.

Free copies of this catalogue may be obtained by writing to *Radiolab Publishing & Supply Co., Inc.*, 652 Montgomery Street, Brooklyn, 25, New York.

TUBE DATA BOOK

The new "Easy Guide to Electronic Tube Data" recently announced by *Westinghouse Electric Corporation* has been designed to facilitate the selection of replacement tubes for electronic devices.

The data book lists tubes according to classes and gives all essential technical data on each tube. A separate index is arranged numerically

by type number and lists the class to which each tube belongs, its warranty class and list price. An interchangeability chart shows the company's equivalent for competitive type numbers.

Copies of this guide, designated as booklet 86-020, may be secured from *Westinghouse Electric Corporation*, P.O. Box 868, Pittsburgh, Pennsylvania.

DEALER HELPS

Because of the increased need for accurate and up-to-date business records, the Systems Department of *Uarco Incorporated*, are making available to firms in the radio equipment and servicing industry a series of new sample portfolios which contain business forms and cost-reducing systems used by comparable business organizations.

To receive your portfolio without obligation, address your request on your business letterhead to Systems Department, *Uarco Incorporated*, 5000 South California Avenue, Chicago 32, Illinois.

NEW CATALOGUE

Radionic Equipment Company, New York distributors of various types of electronic parts, have just issued their new complete catalogue, designated No. 47.

Included in the listing are radio and electronic parts, radio receivers, record changers, p.a. systems, test instruments, meters, tubes, amateur equipment, recording apparatus, intercom systems, etc.

Distribution will be made free of charge to service dealers, engineers, schools and institutions, government agencies, laboratories and amateurs. Requests should be made direct to *Radionic Equipment Company*, 170 Nassau Street, New York 7, New York.

CERAMIC CATALOGUE

Centralab of Milwaukee, Wisconsin has just issued a new catalogue entitled "Fine Ceramics by Centralab" which includes 28 pages of information on standards, design criteria, body characteristics and a listing of certain established shapes and sizes in common use.

Special features of the catalogue include a comparative table of average characteristics, a listing of ceramic tolerances and ceramic design data. Groupings include male and female bushings, special bushings, single entry, double entry, cup type and conical feed thrus, round, square, conical, butterfly and strain insulators, coil forms, extruded stock,

RADIO NEWS

WATCH Radiomart for Values . . .

Adjustable Fluorescent
DESK LAMPS



A hard-to-get item
available now for
quick profits.

Here is the world's finest utility light. No eye strain when you work with fine parts. All metal construction. U.L.-approved electrical parts. Gooseneck construction, flexible as your wrist. Operates anywhere on AC or DC. Guaranteed against defects for 1 year.

No. 1 (Illustrated). Handsome antique English bronze finish. 2-bulb. Instant lighting. Tray for pencils and clips. Complete with 2 bulbs. Suggested list price \$24.00.
Lots of 6 or more . . . \$14.05 each
Lots of 1 to 5 . . . 15.30 each
No. 2 Crackle finish. Single bulb. Tray for pencils and clips. Complete with 1 bulb. Suggested list price \$11.70.
Lots of 6 or more . . . \$7.15 each
Lots of 1 to 5 . . . 7.90 each

Radiomart INC.

VARIABLE CONDENSER
2-Gang Superheterodyne



.013 air space;
Section 1-19
plates, 162 mmf;
Section 2-27
plates, 420 mmf.
2 1/4" L by 1 3/16"
W by 1 5/8" H
(overall); 1/2"
Shaft. \$1.49 ea.

Midget I.F. Coil—Slug Tuned Top and Bottom
—Iron Core—High Q—456 KC—Case is 2"H
by 7/8" Sq. only 95c ea.

Electrolytic Condensers

10-10 mfd, 450 WV; Gudeman; Metal Case;
Inverted Lug Mtg; 2 1/2" L by 1" Dia. . . .
. only .69 ea.
100 mfd, 50 WV; Cornell Dubilier; Metal
Case; Solder Lugs each end; Mtg. Bracket;
2" L by 3/4" Dia. only .49 ea.
3-3 mfd, 150 WV; C. D. & Sprague; Metal
Case; 3 top Terms; Mtg. Brackets; Oil
Filled; 4 3/8" L by 1 1/2" W by 1" th.
. only .89 ea.

20% with order—Balance, including postage, C.O.D. Reliable, Prompt Service.

Resistor Kits of Chosen Values

Each Kit contains 100 Insulated Carbon Resistors. All RMA color coded. All standard brands. Every one is a popular replacement size.

KIT No. R050L—1/2 and 1/2 WATT; RANGE
FROM 10 to 10000 OHMS; 5 each of 20
good sizes. Price per kit. \$3.50

KIT No. R050H—1/2 and 1/2 WATT; RANGE
FROM 14000 to 20 MEGOHMS; 4 ea. of 25
good sizes. Price per kit. \$3.50

KIT No. R120—1 and 2 WATT; RANGE
FROM 10 OHMS to 2.2 MEGOHMS; 5 each
of 20 good sizes. Price per kit. \$5.50

Tricolor Solder

The best—1 lb. roll. 79c

Sensational!!!!

52 SILVERED MICAS—List price \$63.50; 2 each
of 26 types ranging from 27 to 2700 mmfd.
Your Special Price. \$4.95

No. 22 Hook-up Wire—50' Roll. \$0.29
Kit of 12 Rolls—6 colors. 1.69

RADIOMART, Inc., Dept. RN 247, 149 Riverdale Ave., Yonkers, N. Y.

Gentlemen: Please rush my copy of your latest Bulletin containing a thousand and one bargains in radio parts.

Name

Address

CHECK ONE

- Service Dealer Ham
 Laboratory School

FIX ANY RADIO

Amazing New Invention



Find radio faults with a new simplified method. Repair all radios in minutes instead of hours. Revolutionary, different *Comparison* technique permits you to do expert work almost immediately. Most repairs can be made without test equipment. Simplified point-to-point, cross-reference, circuit suggestions locate faults quickly and easily.



CHARTS, BLUE-PRINTS, TESTS, PICTURES, HINTS, JOB-SHEETS



Learn time-saving trouble-shooting short-cuts; find any radio fault with ease. Follow the tests shown on 24 large circuit blue-prints. Over 1,000 practical repair hints. For all types of radios. Hundreds of simplified tests using a 5c resistor and any filter condenser. Introductory material for beginners and to serve as review for experienced radio men. Several chapters on test equipment. Complete plan in manual form, 64 job sheets, data on all tubes, large size: 8 1/2 x 11 inches. Schematics, pictures, charts. Sold on no-risk trial. Use coupon to order.

NO TESTERS NEEDED REPAIR ANY RADIO IN MINUTES

This newly developed method tells you how to locate the source of trouble in any radio set without equipment. Make needed tests, measure voltage, trace the signal, by using only a 5c resistor, small condenser, and a crystal detector. Inject signals without any signal generator. Test parts by the new *Comparison* method. Test tubes without equipment. Repair any radio expertly following simplified picture plans. Improve your radio servicing ability. Data on all sets, portables. AC-DC, FM, recorders, intercoms, P.A. Examine and apply the plan for 10 days without obligation or risk. Send trial coupon today →

NO RISK TRIAL ORDER COUPON

SUPREME PUBLICATIONS

9 S. Kedzie Ave., Chicago 12, Illinois

Ship postpaid the new complete Simplified Radio Servicing by Comparison Method manual for 10 days' examination. I am enclosing \$1.50, full price. I must be entirely satisfied or you will refund my total remittance.

NAME:

ADDRESS:



HIGH VOLTAGE KIT

2500 V. DC
Up to 50 MA.

\$1400

Contains following list of three (3) hermetically sealed components, made by outstanding firms.

- 1 ea.—Trans. Pri.—115 V 60 V. Sec. 3000 V—50 MA.....\$7.50
- 1 ea.—Trans. Pri.—115 V 60 V. Sec. 6.3 V & 2.5 @ 3 amps Hi-insul.....\$3.80
- 1 ea. Condenser, oil 3 sec.—2 mfd ea. 4000 VDCW.....\$4.60

Dynamic Microphone
100-125 ohms impedance high level output—use with any multiple line to grid input Transformer. Excellent speech Freq. response—rugged—use in your favorite mike stand. Famous mfr. Dimensions 1 3/4" diam. x 1 1/2" deep.....\$2.40

I.F. Transformers
Television Type—Iron core—Trap tuned—Shielded. 30 M.C.—2" x 3/4" x 3/4".....\$1.95

Motors—Aircraft—28 V. DC
Single ended shaft 3/4" x 1" long—Reversible. Over-all 2" x 1 1/2" Bendix.....\$4.75

2 Mfd.—2,000 V.—Oil.....\$2.25

With mounting—ceramic standoffs.....\$2.25

1-1-1 Mfd.—Oil—1,200 W.V. DC
3,000 V. Test. C-D 4" L x 2 1/2" D x 3" H.....\$1.45

IR 5—IS 5—IT 4.....89c each

Milliammeter 0-200 Full Scale
0-5 MA Movement 2 1/2" sq. case—TRIPLETT.....\$2.95

Audio Output Xformer
High quality. Freq. response flat to 8,000 cycles. Push-pull plates to voice coils. Variable impedances Amertran J-871.....\$1.50

ALL MERCHANDISE FULLY GUARANTEED
F.O.B. N.Y.C.—Remit 20%—Balance C.O.D.
No Orders Accepted Under \$3.00

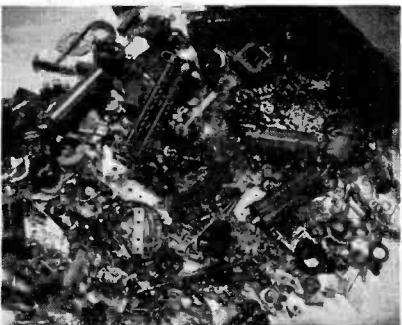
KELVIN ELECTRONICS
74 Cortlandt Street, New York 7, N. Y.



BIG SAVINGS

Hundreds of specials
for RADIO SERVICEMEN

- CATHODE RAY TUBES
- POWER & TRANSMITTING TUBES
- HEADPHONES, etc.
- HARD-TO-FIND TEST METERS



7 LB. EXPERIMENTERS RADIO PARTS ASST.
A "gold mine" for the experimenter, radio serviceman, handyman and repairman. Hundreds of valuable radio, radar and electronic parts, screw machine parts, bushings, sub assemblies, etc. More than your money's worth every time. An amazing value. Money-back guarantee.

K130R—FULL 7 POUNDS ONLY \$179

War Surplus Bargain Book
Page after page of war surplus and other bargains for the radio serviceman; also specials for home, shop and outdoors.

IT'S FREE! WRITE TO-DAY

FREE CATALOG

STARK'S Dept. RN-2 509 So. STATE STREET CHICAGO 5, ILLINOIS

metallized ceramics, printed circuits and miscellaneous steatite pieces.

Those interested in obtaining a copy of this catalogue should address their requests to *Centralab*, 900 E. Keefe Avenue, Milwaukee, 1, Wisconsin. Ask for form No. 720.

RELAY MANUAL

Wells Sales Inc. of Chicago has recently issued a comprehensive manual covering hundreds of relays which they have available for immediate shipment.

Representative of the products of many well-known manufacturers, the listing includes telephone relays, slow action d.c. relays, aircraft service relays, midget d.c. relays, hermetically sealed relays, keying relays, and many others.

A copy of this manual "Relays for Every Purpose" will be sent free of charge to those requesting it from *Wells Sales Inc.*, 4717 W. Madison Street, Chicago 44, Illinois.

SYLVANIA BULLETINS

The Radio Tube Division of *Sylvania Electric Products Inc.* has just announced the availability of three new bulletins describing electronic test instruments manufactured by the company's Electronics Division.

The bulletins cover the Types 139 and 140 Tube Testers, the Type 134 Polymeter and the Type X-7018 Modulation Meter.

In addition to describing these instruments, the bulletins list operating characteristics and special features of the test equipment.

Copies of any or all of these bulletins will be forwarded promptly to readers who make their requests direct to *Sylvania Electric Products Inc.*, Emporium, Pennsylvania.

REFERENCE CHART

Originally designed to facilitate engineering procedures, *E. F. Johnson Company* has now made available a handy reference chart which identifies the proper sockets and cap connectors for each of some 800 transmitting, control, regulator, rectifier, receiving and miscellaneous tubes.

This easy-to-use and practical chart will be distributed free of charge by the company to readers of *RADIO NEWS* who may obtain their copies either from the company's distributors or by writing direct to *E. F. Johnson Company*, Dept. Z, Waseca, Minnesota.

RESISTOR CATALOGUE

Resistors, Incorporated of Chicago have just released a new catalogue containing resistor data on their full line of resistors and windings.

Included in this catalogue is data on fixed and adjustable resistors, r.f. and choke plates, ferrule resistors, heating elements, special windings and accessories. This data consists of pictorial diagrams, complete specifications and application information on each product.

The resistors feature the "silver-soldered" connection construction,

ORDER NOW

- BC 312 Army Receivers (New Condition)...\$59.95
- Signal Corps 1-222A Signal Generator Range 8-15 MC, 150-230 MC.....\$69.95
- 300 Ohm Amphenol Twin Lead, per 100 ft. \$ 2.90
- 75 Ohm Amphenol Twin Lead, per 100 ft. \$ 2.00
- Kilowatt 72 Ohm Amphenol Twin Lead, per 100 ft. \$ 7.20
- 5 Volt, 26 Amp. Trans. (20,000 V. ins. uncased) \$ 4.95
- 3 Gang 410 Mmfd. Per Sect. Cond. Excellent quality \$ 2.95
- 2" PM Speaker (Bakelite Cased) Used in Walkie Talkie \$ 1.95
- Signal Corps Telegraph Key \$ 1.10
- VT 127 Tubes (Equivalent to 100 TL) \$ 3.50
- Jan 6 AK5 Tubes \$ 1.95
- Jan 832-A Tubes \$ 5.95
- 5" RM Army Communications Speaker, Metal Case, 4000 Ohm Output. Matches Exactly BC 312, BC 348, etc. \$ 2.95

Send for Our Special Bulletin of Government Surplus Items

DOW RADIO

1759 E. COLORADO PASADENA 4, CALIF.

Pasadena Phone—Sycamore 3-1195
Los Angeles Phone—RYan 16683

Radio Men Needed

The Finest in Radio Training

Train for well-paid positions in Radio Engineering, Television, Electronics. Thorough courses in frequency modulation, math, mechanical drawing, construction, repair, aviation and police systems, sales and service, broadcasting.

APPROVED FOR VETERANS UNDER G. I. BILL

Low Tuition and Living Costs. Fine Climate—Hunting and Fishing.

New classes start each month. Write

COL. H. C. WASHBURN

Dept. I Clovis, New Mex'co

Benson Radio Institute

300 Printed Name & Address Labels 50¢



IN IMITATION LEATHER FABRIC CASE

1001 diff. uses for these appealing, sparkling, 2 Color GUMMED Labels nicely printed with your name & address. Stick 'em on Letters, Envs. Books, Pkgs, etc. 300 Labels bound in neat Imit. Leath. fabric CASE; easily removed as needed. Just 50c postpaid. Money back immediately if not pleased!

ANNUAL PRESS BOX 591-QF LYNN, MASS.

RADIO SERVICEMEN'S SPECIALS

- SELENIUM RECTIFIER—Replaces 117Z6, etc....\$0.99
- SAPPHIRE PHONO NEEDLE (10,000 Plays)..... .99
- DIAL KIT—60 Ft. Ass'd & 8 Springs..... .99
- KNOB KIT—20 Ass'd Screw & Spring..... .99
- RESISTOR KIT—100 Ass'd 1/2 to 1 Watt..... 1.95
- BY PASS COND. KIT—35 Ass'd .005 to .1..... 1.95
- SPEAKER GRILLE CLOTH—6 Ass'd 6"x6"..... .49
- ANT. & OSCIL. or ANT. & RF COIL SETS..... .49
- SPEAKERS—4" or 5" PM. ALNICO 5..... 1.99
- TUBE SHIELDS or FP. COND. MFG. PLATES..... .04
- RADIO-S TUBE SUPER '47 MODEL.....

NATIONALLY KNOWN BRAND NET 18.95

Write Today for Bargain Bulletin

RADIO DISTRIBUTING CO., Pasadena 18, Cal.

RADIO COURSES

Servicing, Broadcast Engineering, Commercial Operating, Television

INDIVIDUAL LABORATORY WORK!—LEARN BY DOING! DIY AND EVENING CLASSES

Approved by the Maryland State Department of Education and the Veterans Administration
FREE TO VETS—TEXTBOOKS, TOOLS, TEST SET
Write for Bulletin

BALTIMORE TECHNICAL INSTITUTE

1425 Eutaw Place—Dept. R. Baltimore 17, Maryland

ELECTRONICS

Fully equipped laboratory and communications room. Uncrowded facilities. Engineer-instructors provide superior practical training in Radio Communications (for FCC exams) and in Radio-Television Servicing. New classes monthly. Write for latest bulletin—no obligation. Approved for Veterans.

Member: Los Angeles Chamber of Commerce.

WESTERN RADIO COMMUNICATIONS INSTITUTE
C31 West Ninth Street, Los Angeles 15, Calif.

RADIO NEWS

which consists of resistance wire silver-soldered to the solder lug to assure a more permanent electrical bond.

Free copies of Catalogue No. 87 are being distributed upon request to *Resistors, Incorporated*, 2241 South Indiana Avenue, Chicago 16, Illinois.

-30-

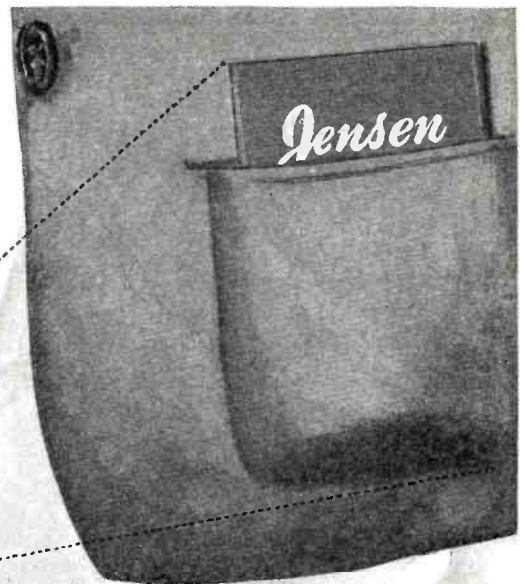
Spot Radio News
(Continued from page 22)

are as broad as the imagination of the public and the ingenuity of equipment manufacturers." Latest ideas in the field include using units for communication between mountain climbers. FCC also predicts that the units—and their operators—will probably make headlines in times of national disaster, such as floods, hurricanes, or earthquakes, when all wires are down.

RADAR'S USE to study the stars is proving successful, we learn from scientists at the Bureau of Standards. Biggest experiment in this type of radar work so far took place in October, during the huge meteor shower. Overcast weather would have prevented accurate observations but radar made the meteor fragments "clearly visible," the investigators reported. Their work, which is to be continued, is aimed, among other things, to determine the effect of meteors on radio waves, particularly important in FM broadcasting and long-range radio communication and navigation. Radar is also expected to be helpful in astronomy as a method of observing both on overcast nights and during the day, when meteors are not visible. The scientists are tending after preliminary work toward the theory that "bursts" on local station programs from long-distance stations are caused by meteors. One way in which meteors may affect radio waves is to cause these "bursts" on FM channels, it is thought. Out of the research on the effect of such phenomena will come decisions as to which frequencies are the best for the various types of radio services. Whatever the result, radar would seem to be in this type of work to stay. "The tests," declare the Bureau of Standards experts, "indicate that radar, besides being a plane locator and navigation device, is a valuable tool for the study of radio-wave propagation and is finding a place as an observing instrument in the field of astronomy."

HAMS ARE ALSO DOING YEOMAN SERVICE in the meteor field. When skies are overcast, many have been enlisted to check up on meteor fragments, which register their presence clearly with a "bump" on short-wave sets. On the big meteor nights last October hams counted thousands. The shortwave "sound" of meteor fragments, one Princeton professor declared afterwards, may make it possible in time to set up automatic

More
MONEY
in your
POCKET



when you carry the handy Jensen Saleskit.

Radio Servicemen who take the Jensen Phonograph Needle Saleskit on service calls say they would not be without it. This handy kit, shown above, helps demonstrate fine needles, sells on sight, adds \$\$\$s to your income.

Contains 3 Jensen Concert Needles retailing at \$1 each, and 3 Jensen Genuine Sapphire Needles

at \$2.50 each. Needles are beautifully packaged. Adds profit to every call. What's more, Jensen phonograph needles augment your work, assure full, clear tone of the instruments you repair, make all records sound better.

Generous discounts to servicemen boost your income. **WRITE TODAY** for complete details.

JENSEN INDUSTRIES, Inc., 331 SOUTH WOOD ST. • CHICAGO 12, ILL.

WARD

WORLD'S FINEST
AND FASTEST SELLING

Aerials

Here's Your Newest Profit Builder!
A striking, three-dimensional display which catches the eye of every customer. It's completely assembled, ready to place on your counter and bring in easy, extra sales. You pay only for the four fast moving models mounted. The display itself is FREE!

**Model 61-7
PROFIT BUILDER**

LIST \$22.00

Each of these models is engineered and equipped to fit every car!

WARD

Aerials

THE WARD PRODUCTS CORPORATION • 1523 E. 45th STREET, CLEVELAND 3, OHIO
EXPORT DEPARTMENT: C. O. BRANDES, MGR., 4900 EUCLID AVENUE, CLEVELAND 3, OHIO
IN CANADA: ATLAS RADIO CORP., 560 KING STREET, WEST, TORONTO, ONTARIO, CANADA



Every Ward model has been tested and approved by car and radio set manufacturers—your proof of quality inside and out.

**WE OFFER FOR SALE
AT BARGAIN PRICES
VACUUM TUBES
GUARANTEED**

9002-0003-0006-954-958-6Y6 Ea. \$0.65
 1R 150, Ea. 85c; 1R 105, 1R 75, 1R 90, Ea. 1.20
 E1148 (HY615), Ea. \$1.00; 2x2/879 Ea. 1.00
 6L16—Ea. 65c; 6C1—Ea. 75c; 6AC7—Ea. 90c;
 6AK5 Ea. 1.00
 6AG5—Ea. \$1.25; 6J6 Ea. 1.00

SPECIAL 866/866A Brand New Jan.85
 872A Brand New Jan. 2.50
 5B171 Brand New Jan. 5.00

ROTARY SWITCH—0 wafers, 4 shields, wafer dia. 1 1/2" switch 1 1/2" long, each deck multi-contact; brand new, individually packed. 1.00

ULTRA HI FREQ DIPLOD ANTENNA with single coax connector on mounting bracket. 1 1/2" L x 3/8" dia. spacers 5 1/2" L x 5" W. brand new, 2 in a package; complete. 1.50

CONTROL BOX ASSEMBLY—Seven 6 foot color coded wire lengths in copper shield. Hooked to control box containing 1 H.D. dup'd toggle switch, 3 phone jacks, 2—10.000 ohm pots with knobs; brand new, complete. . 1.75

A KIT FOR A Battery Charger or Auto Radio Checker or As a Supply for Dynamotor in Surplus Equipment. Consists of

115 Volt Primary—6 or 12 Volt Secondary at 5 Amp Xformer
 Selenium Stack—6 Volt @ 4 Amp, or 12 Volt at 3 Amp.
 Smoothing Capacitor 1000 Mfd.
 Chassis Black Cracks
 Binding Posts. Instructions Furnished.

COMPLETE AND GUARANTEED— **\$10.00**

Write for specials on other kits.

25% deposit required on all C.O.D. orders. Prompt delivery assured.

GREENWICH SALES CO.
 59 Cortland St., Whitehall 3-3052, New York 7, N. Y.

BARGAINS

2" PM Speaker with Output \$ 1.58
 Generator Condensers
 Solar .1—, .25 or .5 MFD19
 Solar 30 MFD 450 Con.
 Plugs into Octal Socket78
 Signal Generator—All Wave 49.95
 Tube Checker—Latest Portable 39.50
 LEACH Break-in, Keying Relay
 6 or 12 V. DC \$20.13 list, Net 2.50
 Superior CA-11 Signal Tracer 18.75
 V.M. Record Changer (Complete) \$18.95 ea. 2 for 35.00

Send for Latest Bulletin. 25% Deposit on C.O.D. Orders

MAC'S RADIO SUPPLY

8320-22 LONG BEACH BLVD.
 SOUTH GATE, CALIF.
 Telephones — KIMBALL 4111-4112

Vasco
 SUPREME QUALITY
 TRADE-MARK REG. U. S. PAT. OFF.

ELECTRIC SOLDERING IRONS
 4116 AVALON BLVD., LOS ANGELES 11, CALIF.

RADIO ENGINEERING!

COMPLETE Radio Engineering Course. Bachelor of Science Degree. Courses also in Civil, Electrical, Mechanical, Chemical, Aeronautical Engineering, Business Administration, Accounting, Secretarial, Science, 64th year. Enter Mar., June, Sept., Jan. School now filled to capacity. No applications can be accepted until further notice.

DEGREE IN 27 MONTHS

TRI-STATE COLLEGE 1827 College Ave., ANGOLA, INDIANA

counters, but until that day hams are enlisted by scientists to help estimate the number of fragments when a big meteor shower goes on. Big showers are rather frequent—next one is scheduled for April 21. But if you want to know how they sound—you probably do already—there are little showers almost every week. It's when an otherwise well-modulated voice you are listening to bawls one syllable extra loud. Only he doesn't, really. It's a meteor fragment passing by in the neighborhood.

—30—

Retailing Basics

(Continued from page 43)

dealer a good start on his advertising program by making certain brands household words through extensive consumer advertising. Some of these organizations have cooperative advertising plans which will focus area attention on both the products and the dealer handling the line.

Small town dealers, or dealers in large cities who have access to neighborhood newspapers, can use such media to publicize their name and merchandise. Handbills can be used effectively to cover the dealer's immediate territory. Local movie houses and radio stations can be used to advantage in some locations.

Another form of advertising is the show window. The dealer can gain publicity by installing "live" or action windows, to demonstrate merchandise. A transparent washing machine can be used to show the action of the unit in washing the family clothes. A demonstrator could be used to show the ease with which the ironing can be done with an electric ironer. A live window demonstration will always draw a crowd. A roast or some other baked product could be prepared in an electric range set up in the show window. Demonstration cards, explaining the advantages of this form of cooking, should be set up and details of the experiment under way explained. Numbered tickets could be passed out and the holder of the lucky number would be entitled to the food which had been prepared during the demonstration.

Direct mail advertising is still a very effective means of telling your story to a select audience. Mailing pieces should be dignified, yet attractive. They should tell a simple story about one or two items and should include a sincere invitation to the prospective customer to visit the store and inspect the merchandise. Be sure the name and address are included. The letter should be addressed to the lady of the house, by name, and should be sent by first class mail in order to receive the attention usually reserved for her personal correspondence.

When conditions indicate, house-to-house canvassing can be used to advertise and sell the dealer's line. In case the dealer selects this form of merchandising, it is of utmost impor-

**Guaranteed Factory Rebuilt Radio
VIBRATORS—\$1.00**

6 volt Non Synchronous Vibrators \$1.00 ea. 6 volt Synchronous, 12, 32, and 110 volt Vibrators \$1.25 ea. Defective parts replaced. 48 HOUR SERVICE. For the very prompt service enclose remittance and return postage. We rebuild any make or kind of radio vibrator. C.O.D. orders accepted. Send your sick vibrators to

BEST VIBRATOR CO.

Box 5802, Cleveland 1, Ohio

RADIO

RADIO Technician and Radio Communications courses. Register now for new classes starting first MONDAY of each month. Day and Evening Classes.

AMERICAN RADIO INSTITUTE

101 West 63d St., New York 23, N. Y.
 Approved under GI Bill of Rights.

CONDENSERS

50 paper and mica condensers \$1.00. Brand new, fine assortment, popular sizes. Wt. app. 1 lb. f.o.b. Cash, check or M. O.

Kensington, P.O. Box 91, Bklyn. 18, N. Y.

RADIO TUBES

Most Critical Types in Stock
 50L6, 1A7, 35Z5, etc.
 Brand New, in Sealed Cartons
 100% Guaranteed

Repairmen and Dealers, Write For List at Trade Discounts

RADIO-EXPERTS

178 E. 33rd Street Paterson 4, N. J.

**BUILD YOUR OWN
FAST FREEZER**

It's easy to build this household appliance and profitable to use. Save up to 75%. Operates on 110 or 32 volts. Plans show 5 sizes and are easy to follow. ENJOY MAKING ONE OF THESE FREEZERS from new or used parts. No expert knowledge needed. Mail \$1.00 bill or check for complete plans and catalog.



LE JAY MFG. CO., 454 LeJay Bldg., Minneapolis 8, Minn.

**FILMGRAPH PAT'D
Conference Recorders**

UNINTERRUPTED Longtime (up to 12 hours) Conference & Telephone Recordings on Safety Film Models for Dictation "TALKIES"

ECONOMICAL PERMANENT INSTANTANEOUS PLAY-BACK

MILES REPRODUCER CO., INC. 812 BROADWAY, N.Y. 2 RN-2

SOUND RECORDING SCHOOL

A practical 9 months' course in Sound Fundamentals, Recording, and Sound Transmission measurements; in a laboratory containing transmission sets, oscillators, square wave generator and intermodulation analyzer, and other equipment.

Two complete recording studios assimilating broadcast, motion picture and commercial sound recording, under the direction of H. M. Tremaine.

Approved for Veterans
DOON MARTIN SCHOOL OF RADIO ARTS
 1655 Cherokee St., Hollywood, Calif.

PEN-OSCIL-LITE

Extremely convenient test oscillator for all radio servicing; alignment • Small as a pen • Self powered • Range from 700 cycles audio to over 600 megacycles u.h.f. • Output from zero to 125 v. • Low in cost • Used by Signal Corp • Write for information.

GENERAL TEST EQUIPMENT
 38 Argyle Buffalo 9, N. Y.

tance that the persons chosen for this work be trained carefully for their job. To many customers, the salesman who calls on them in their homes will be the only contact they have with the dealer's store. Because of this feature of house-to-house selling, salesmen must be neat, courteous, enthusiastic and fully informed on the line of radios and appliances carried by the store.

Some dealers have found that telephone selling is profitable, but if this program is adopted, a carefully thought out plan must be made before tackling the telephone list. Unless this procedure is set up carefully, it can be make more enemies than friends for the store. Care must be taken not to call at hours which are obviously inconvenient to the housewife, i.e. just before mealtime when she would be working in the kitchen, or very early in the day when she might be upstairs making the beds, etc.

Basic to all of these advertising promotion schemes is the fact that demonstrations, explanations and advertising copy must be simple and non-technical. The average customer cannot understand a technical discussion of horsepower, three-line service entrance, etc. The customer *does* want to know how much the unit will cost to operate, what it can do for him in terms of comfort, convenience, safety, and family welfare. All of these points can be explained and demonstrated by the use of homely analogies and without resorting to highflown technical data from the service manual prepared by the manufacturer.

6. *The manufacturers' responsibility.* Make a thorough study of what manufacturers and national distributors have to offer in the way of sales helps. Manufacturers of "brand" merchandise who advertise extensively assume some responsibility for the relation between their dealer and his customers. Because of this close tie-in, the manufacturers will welcome suggestions from dealers on how they can be of assistance in making the selling job easier, and keeping the customer sold. This assistance can materially reduce the dealer's cost of doing business. It can take several different forms; cooperative advertising, the loan of demonstrators, mailing pieces with the dealer's name imprinted, window displays and point-of-sales material.

7. *Becoming community conscious.* It is important that a dealer become a real force in the community. Nothing is more detrimental to his success than for him to assume the attitude that what happens to his community is of no interest to him. If a dealer makes a living in a city or town, he owes it to himself and his business to become community conscious. If possible, the dealer should live in the community that gives him his bread and butter; he should go to the church there; he should join clubs and civic groups and contribute to accepted "worthy causes."

8. *Customer relations.* In conclusion,

February, 1947

Presenting **The New Improved**
JFD REMOTE-O-CABLE REPLACER



The Most Efficient Auto Radio Tuning Cable-Servicing Machine in Use Today!

Completely redesigned to meet MODERN Servicing requirements, the NEW JFD REMOTE-O-CABLE REPLACER is a vital necessity in the workshop of every auto-radio serviceman

- 1 SWEDGES SHAFTING TO PREVENT UNRAVELLING.
- 2 CUTS SHAFTING TO EXACT LENGTH.
- 3 REPLACES OLD FITTINGS ON NEW SHAFTING
- 4 CASING GROOVE MAKES CUTTING EASY

J. F. D. MANUFACTURING CO., 4111 FT. HAMILTON PKWAY, B'KLYN, N. Y.

WITH
SILVER "VOMAX"
YOU CAN—



Measure every type and kind of voltage in receiver design and servicing. "VOMAX" increases your efficiency and profits by equipping you to measure r.f., i.f., a.f.—actual signal volts—a.v.c., a.f.c., discriminator—a.c. and d.c. volts. Input resistance is so astronomically high you can measure directly even in the highest resistance circuits. "VOMAX" is also your output db. meter; measures direct current up thru 12 Amp. auto set range; resistance up to 2,000 megohms.

Post-war design and construction at pre-war uninflated price is the secret of overwhelming demand for "VOMAX", the true v.t.v.m. Unequaled at any price, it is bought and used by the Bureau of Standards, Navy, F.C.C., C.A.A., schools, universities, research laboratories—and by thousands of experience-wise service technicians. You, too, will find "VOMAX" your greatest profit meter. Only \$59.85 at your favorite jobber.

OVER 35 YEARS OF RADIO ENGINEERING ACHIEVEMENT
McMurdo Silver Co., Inc.
1240 MAIN ST., HARTFORD 3, CONNECTICUT

Send postcard for new catalog of measuring instruments, communication receivers, transmitters, kits and parts. See them at your favorite jobber.

NEW PORTABLE ELECTRIC MEGAPHONE



Projects Clear Audible Speech To Long Distances... Instantly!

Completely portable. Operates any time, any place. No installing, no wiring, no speakers, no headphones. Just press trigger switch and amplified voice is beamed to area desired. Reproduction is crisp, clear, undistorted. Self-powered. Standard batteries. Quality constructed throughout. Simple to operate. Low-priced.

A Good Profit Item For Dealers

Dealers will find this new item an excellent profit-making addition to their line. Sell it! Rent it! Attractive discounts.

Write For Complete Details NOW!

International Industries, Inc.

6519 N. Clark Street Chicago 26, Illinois

Get your Crystals from FEDERATED'S



Your Choice of Frequencies
40-Meter Fundamental Crystals
6798 to 7416 Kc in 1-Kc steps, in stock. Perfect for 20-meter doublers, and quadruplers for 10-11 meter band. All brand new, made to our order (not war-weary surplus!). New type holder fits octal socket. Specify frequency desired, together with alternate choice. **EXCEPTIONAL BUY!** Your Choice, any frequency, each **99c**

10 MFD—1000 DC W.V.
Oil-Filled Condenser
In rectangular can. Porcelain insulators, mounting flanges. Made by well-known manufacturer. **UNUSUAL VALUE** **\$1.29**
Your Cost, Each

**FINE HAM GEAR IN STOCK
for IMMEDIATE DELIVERY**
New Meck Transmitter T60-1—RME-48
Hammarlund HQ-129-X—Hammarlund Super-pro
National 240-D—National HRO
National 100-ASD—National NC-46
Millen ECO-90700

MAIL ORDERS: 25% Deposit, Balance C.O.D.

Federated Purchaser
INCORPORATED
distributors of RADIO—ELECTRONIC
and SOUND EQUIPMENT
80-88 PARK PLACE, N. Y. 7
Phone: WH 4-2080

there are a few important points which should be mentioned in connection with the dealer's relations with his customers. For one thing, a great many customers will probably want to buy on credit. Arrangements should be made well in advance so that when this type of request is made a complete and definite plan for handling such extensions of credit can be laid before the customer.

Another point which looms large in the customer's mind is that of promises made and kept. Don't tell your customer that a product will be delivered, serviced, etc. or that one of your employees will call at a certain time unless you are prepared to fulfill that promise 100%.

Be sure every item that you sell is properly installed and is in perfect working condition before you consider the transaction concluded. New merchandise which needs demonstration, such as ranges, refrigerators, certain radios, etc. should be explained and operated in the customer's home after installation in order to insure that the housewife or member of the family who will use the equipment is thoroughly familiar with the item. It is well to make a "follow-up" call or visit a week or ten days after the installation has been completed in order to intercept any complaints at the source and make the correction. Bad news travels fast and a customer who is dissatisfied with merchandise bought at your store is a carrier of ill tidings for your reputation.

When it becomes necessary to service merchandise which you have sold

Pages	Credit
35 (top)	Lake Carriers Assn.
35	Raytheon
36	Sperry Gyroscope
37, 145	Westinghouse
38	General Electric
40, 41	Federal Telephone & Radio Corp.
42, 43, 53	Arthur Haug, Staff Photographer
49 (bottom)	Walter Steinhart, Staff Photographer
52	National Radio Service
57, 58, 59 (left), 106	RCA
58 (top right), 59 (right)	U. S. Navy
60, 61	Packard-Bell
64	Radio Centro Americana
84, 86	Fairchild Camera & Inst. Corp.
104	Barker Brothers
122	Acme
123	Sun Radio & Electronics Co.
140	Sylvania Electric Products Inc.
Cover	Allied Advtg. Agency, Inc.

to the customer, be sure that the best possible job is done on the unit; that it is operating satisfactorily, and that it is re-installed carefully and promptly.

Finally, a very small but important item. Customers who come into the store and buy small items which they propose to carry with them will appreciate receiving well-wrapped parcels. If you are handing good-looking packages to your customers to carry, you can earn an extra measure of free advertising by using distinctive paper which will tell the world at large that the item was purchased at your store.

In the last analysis, the best advertising that a dealer can receive is "word of mouth advertising." You can't gain a worthwhile reputation without working for it. By following the suggestions included in this article you have started on the road to becoming a successful business man because the principles stated are as old as successful business.

-30-

RCA's newly developed mobile television unit has been designed to facilitate news coverage and other remote pickup operations. This unit is mounted on a standard 1½ ton truck chassis, and can be used to transport all the equipment necessary for picking up, monitoring, and relaying remote television events to the studio. Mounted in the rear of the vehicle, facing two large shatterproof windows, is a specially constructed operating desk for the monitoring, control, and power supplies used with the Image Orthicon Camera. Immediately below the rear windows are six cable reels mounted on crane-like arms to permit easy winding and unwinding of camera cable. The roof of the unit is reinforced.



Classified

Rate 20c per word. Minimum, 10 words

RADIO ENGINEERING

RADIO Engineering Broadcasting, Aviation and Police Radio, Servicing, Marine Operating and Electronics taught thoroughly. Expenses low. Write for catalog. Valparaiso Technical Institute. Dept. N. Valparaiso, Ind.

FOR SALE

SUPREME Audolyzer, practically new, \$75.00. A. Joltin, 285 Hawthorne St., Brooklyn, N. Y.

INTERVALOMETERS. Used by Air Corps in actual bombing. Convert to dark-room timer, train controller, expander, etc. This seven pound instrument contains silver plated relays, switches, resistors, high capacity condensers, knobs, pilot light, plug, heater, thermostat, etc. Postpaid anywhere in States, \$5.50. (Two for ten dollars.) No C.O.D.'s. Send money order, postal note or check. Hunter Heath Co., 1634 18th, Lubbock, Texas.

PR 16 COMMUNICATIONS receiver with Jensen baffle and 12" speaker. Also portable play-back recording assembly. F. F. Knapp, 6508 Montgomery Rd., Cincinnati 13, Ohio.

AUTOMATIC wireless record changers, \$32.95. Wireless phono oscillator complete with tube, \$4.95. Quantity and dealer discount. K&G Sales, P. O. Box 53, Cincinnati 13, Ohio.

ST. CLAIR Electronic Volt Ohmmeter 6 DC ranges, 20 meg. imp., 0 to 3, 10, 30, 100, 300, 1000. 6 AC ranges, Imp. 5 meg. shunted by 5 Mmfd. Electronic Ohmmeter, 6 ranges 0.1 to 1000 megs. With instructions & circuit. Price \$47. Auto Radio Service, 915 4th St., Three Rivers, Mich.

QSL CARDS that stand out! Individualized, original. Cartoon by W2EA (ex-SEA) incorporating your ideas, personality, etc. Reasonable, but not cheap. Send stamps for specimens. Harrison Radio Corp., 9 West Broadway, New York, N. Y.

ELECTRONIC bargains. Free lists. Gifts 'n' Gadgets, 518 Hilton, Catonsville 28, Maryland.

PRIVATE Parties, amateurs and dealers may now buy radio tubes, parts, equipment, transmitters and receivers direct from the U. S. Government Signal Corps at huge savings. Individual items, small or large quantities as you choose. Complete set of instructions, \$5.00. Postpaid anywhere in U. S. A. Send money to Ramboll Distributing Co., 719 North 4th Street, Grants Pass, Ore.

FREE wholesale bulletin. Tubes. Parts. Bargain prices. Henshaw Radio Supply, 3313 Delavan, Kansas City, Kansas.

250 BACK issues Short Wave Craft, Radio Craft, etc., complete NRT course (1944); 2 SW Receivers. Mueller, 77 W. 181, Bronx 53, N. Y.

HAM Specials, SCR 522 Unit—\$50.00. Replacement Part line for SCR 522, RF-Oscillator Sections, \$8.00 per set, 12 MC. ironcore IF Transformers, \$1.00 each. 50 feet RG8/U \$2.00, RG59/U—6c per foot. Meter Insurance Kit, 20 assorted tubes, \$1.00. Bayonet Base, 10 1/2 watt Neons, \$2.25. Throat Microphones, \$1.25. HQI29X complete, \$173.25 delivered. Service Supplies. Just send us your order. Castle Radio Supply, W2JBM, 677 Euclid Ave., Brooklyn 8, N. Y.

RADIO Sales and Service business in fast growing western city, health and resort area. Well established doing both wholesale and retail Service. Owner has other interests. Box 442, % Radio News.

DESK type carbon microphones, new, \$3.50. Radio City Roller Chart Tube checkers, new, \$52.50. Advance Appliance Shop, 10505 W. 7 Mile Rd., Detroit 21, Mich.

NINE Hexagon Keys for Hollow Head Set Screws with Holder, 75c postpaid. Drill and Tap Sets with Holder, \$4.08 up. Write for folder. Riverside Tool Co., P. O. Box 87, Riverside, Ill.

SELENIUM Rectifiers, full wave, 1/2 ampere, \$1.85; 1 ampere, \$2.50. Half wave 5 amperes, \$4.50; 2.2 amperes, \$2.25; 1.5 ampere, \$1.85. Bulletin. Bursma Radio, Route 5, Grand Rapids, Mich.

LOWEST Prices. Radio Tubes, parts. Bargain lists 3c. Potter, 1314 McGee, Kansas City 6, Mo.

RADIO Tubes—Dealers, order your needs—be surprised at prices. Address Radio Tubes, Box 108, Elizabeth City, N. C.

ELECTRIC Windshield Defroster, 2 for \$1.00, Postpaid. Size 6x18. Brooks, 777 W. Adams, Chicago 6, Ill.

WIRE Recorder, high fidelity, suitable school, broadcaster, musician, etc. Trial privilege. P. O. Box 18, Station G, Brooklyn 22, N. Y.

SURPLUS radio parts. Free circular. Alco Electronic Lab., Box 214, Lawrence, Mass.

APA-10 PANORAMASCOPE, with tubes, case and manual, but less panel and knobs, \$65.00; BC645 VHF IFF Conversion Instructions, \$22.50; APR-5A VHF Receiver, 1000-6000 Mc., 60cy, 115v., \$57.50; C-1 Servo, ideal rotary beam drive, used, \$15.00; 5SDG Selsyns, \$4.00 pair; Indicator Selsyns, \$3.00 pair; SCR284, 211, BC348, free descriptive list. Engineering Associates, Far Hills Branch Box 26, Dayton, Ohio.

NEON Window signs you install. Complete with transformers and all wiring ready to plug in 110 AC. "Radio" \$19.50; "Radio Service" \$31.50. 5 inch letters, color choice. "Radio-Appliance-Repair" in modern design, \$52.50; Radio and Repair, Pink; Appliances and trim Green. Safely boxed F.O.B. Inter-State Laboratories, 4049 Minnehaha Ave., Minneapolis 6, Minn.

MISCELLANEOUS

RADIO wholesale repairs. Just send us the radio prepaid, we repair and return C.O.D. You add markup and deliver. Complete stock. We fix them all. 48 hrs. service. Our low prices mean more markup profits for you. Ship to Elkins Radio, Elkins, W. Va.

THIS is it—your big opportunity. Become independent—operate as you please—spare or full time—right from your own home. Great Booklet "How to Build Your Own Mail Order Business." Only 25c. Satisfaction or money back. Merit Products, 216-32 132 Ave., Springfield Gardens 13, New York, N. Y.

ELECTRICAL instruments. Meters repaired and converted. Inquiries solicited. Haledon Electrical Instrument Co., 319 Belmont Ave., Haledon, N. J.

RAILWAY telegraphy. Be a railroad telegrapher. Operators are in great demand. Salaries from \$3,200 up. For information write to Bell Telegraph Ry. Institute, 10 Parker Ave., Suite 9, San Francisco 18, Calif.

EXPORTERS! We are desirous to import anything and everything in the Radio and Electrical line. Complete sets, receivers, transmitters, kits, parts, also electrical household appliances. Send catalogues, price lists, and full particulars to Radio Service Station (Pty) Ltd., 18a Second Ave., Springs (Tvl) South Africa.

WRITE S&G Instrument Co. for sheet metal work, engraving, machining; for fine equipment to your specifications. Box 1461, Tulsa, Okla.

WANTED

WIRE Recorder. Player for sermons, music. Rev. Richard Sneed, Rockford, Illinois.

CORRESPONDENCE COURSES

CORRESPONDENCE Courses and self-instruction books, slightly used. Sold. Rented. Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete information and 100-page illustrated bargain catalog FREE! Write Nelson Company, Dept. 59, Chicago 5, Ill.

USED Correspondence Courses and Educational Books sold or rented. Inexpensive. Money-back guarantee. Write for Free Catalog listing 4000 bargains.—(Courses Bought.)—Lee Mountain, Pisgah, Ala.

AMATEUR radio licenses. Complete code and theory preparation for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

USED Correspondence Courses and Educational Books Bought, Sold, Rented. Catalog free. Educational Exchange, Henagar, Ala.

PATENT ATTORNEYS

INVENTORS—Send today for "Detailed Patent Information" outlining preliminary steps to be taken toward Patent Protection, also convenient "Evidence of Invention" form. Victor J. Evans & Co., 282-B Merlin Building, Washington 6, D. C.

PATENT and Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 414, 815-15th Street N.W., Washington 5, D. C.

SITUATIONS WANTED

RADIO Radar technician. Graduate 60 weeks Navy-Marine, and Army technical schools. Position in radio or electronics. F. P. Fifield, Pittsfield, Vt.

AMERICAN CAPACITORS

All standard types,
Write for the new
Amcon catalog.

Amcon precision engineering
means dependable, unflinching
Capacitor performance.

AMERICAN CONDENSER CO.

4410 N. Ravenswood Ave., Chicago 40, Illinois

RADIO ENGINEERING
TELEVISION
ELECTRONICS

Courses in every phase of radio and electronics open to high school graduates. Thorough training, modern courses. Enrollments limited. Approved Veteran Training.

VALPARAISO TECHNICAL INSTITUTE
Dept. RS Valparaiso, Indiana

Specify SAUERISEN
ACIDPROOF CEMENTS—COMPOUNDS
FOR

Tanks, Sewers, Stacks, Floors
Technical cements for all purposes.

Send sketches or samples
Sauerisen Cements Company · Pittsburgh 15, Penna.

RADIO PARTS SOUND SYSTEMS ELECTRONIC APPARATUS

★ Depend on **RADOLEK** ★

Radolek's big Free Profit Guide Catalog and Profit Bulletin supplements keep you abreast of the rapidly changing radio situation. Buying from Radolek means greater values, better service and more profits. Make Radolek your buying headquarters.



RADIO PARTS
SOUND SYSTEMS

Large Stocks
Fast Service



FREE CATALOG

SEND TODAY!

RADOLEK CO., Dept. B-123
601 W. Randolph St., Chicago 6, Ill.
Please send your FREE Profit Guide Catalog.

Name.....
Address.....

SAVE AT RADOLEK

RECORDS

LATEST & HARD-TO-GET BACK NUMBERS

Some slightly used and some brand new—Victor, Bluebird, Columbia, Okeh, Decca, Capitol, etc. Such artists as Glenn Miller, Benny Goodman, Harry James, Bing Crosby, Frank Sinatra, Gene Autry, Duke Ellington, Fats Waller, Guy Lombardo, Andrews Sisters, Kate Smith, Ink Spots, Mills Bros., etc.

BIG PROFITS Your opportunity to cash in on this new field that is sweeping the country. Specify the type of music that sells best in your territory such as Swing, Sweet Music, Cow-boy, Hill-billy, Polkas, Blues, etc. Your price \$13.90 per 100 records, f.o.b. Chicago, 2% off for cash with order. All shipments made within 48 hours.

CHAS. HOODWIN CO.
4419 Broadway, V-15, Chicago 40, Illinois
World's Largest Dealers in Used Records

WIRELESS PHONO OSCILLATOR

NO LICENSE REQUIRED
Transmits recordings from phono pickup or voice from mike to radio without use of wires up to 500 ft. Neatly Designed.
Complete Kit, less tubes.....\$3.49
Above Kit assembled and tested.....\$4.49
A Kit of tubes, 12SA7, 35Z5.....\$2.49
Immediate delivery.
CONSTANT ELECTRIC
112 Cornelia Street Dept. 10 Brooklyn 21, N. Y.

ELECTRICAL TRAINING

Intensive 82 weeks' residence courses in (fundamentals of industrial electrical) engineering, including radio, electronics. Prepares for technician, engineering aides. Approved for veteran training. 54th year. Catalog.

BLISS ELECTRICAL SCHOOL
7698 Takoma Ave.
Washington 12, D. C.

INDEX OF ADVERTISERS February 1947

Almo	142	General Electric Company	32
F. L. Brown, Advertising	142	General Industries, Inc. The	111
Abell Distributing Co., The	138	Fuller & Smith & Ross, Inc.	164
Brodtz Advertising Agency	138	General Test Equipment Co.	164
Air King Radio	16	Suzanne Hayman, Advertising	164
Henry A. Loudon, Advertising	16	Greenlee Tool Co.	156
Allied Radio Corp.	9, 72	Howard H. Monk & Associates	164
George Brodsky, Advertising	167	Greenwich Sales Co.	5
American Condenser Co.	167	Bass & Weber Co., Inc.	34
Campbell & Reynolds Advertising Agency	33	Hallcrafters Co., Inc. The	153
American Phenolic Corp.	164	Burton Browne Advertising Agency	22
Burton Browne Advertising Agency	154	Hammarlund Mfg. Co., Inc. The	168
American Radio Institute	162	Roeding & Arnold, Inc.	168
Sternfield-Godley, Inc.	105	Harrison Radio Corporation	153
American Sales Company	155	Altomari Advertising Agency	168
Signet Corporation, The	162	Harvey Radio, Inc.	117
Annual Press	105	Shappe-Wilkes, Inc.	117
Chicago Union Advertising Agency	105	Henry Radio Stores	117
Arrow Sales, Inc.	155	Burton Browne Advertising Agency	117
Sander Rodkin Advertising Agency	155	Herschel Radio Company	117
Ashe, Walter, Radio Co.	155	Hugh-Allen, Advertising	117
Atidel Publishers	94	Highbridge Radio-Television & Appliance Co.	143
Grant & Wadsworth, Inc.	144	Purke & Wayburn Advertising Agency	169
Autocrat Radio Co.	164	Hollywood Sound Institute, Inc.	168
Turner Advertising Agency	164	Nelson Advertising Service	168
Baltimore Technical Institute	93	Hoodwin, Chas., Company	158
Bell Telephone Laboratories	120	Illinois Condenser Co.	114
N. W. Auer & Son	162	Roy D. Zeff & Associates	128
Bendix Radio	162	Instructograph Company	166
MacManus John & Adams, Inc.	120	Turner Advertising Agency	108
Benson Radio Institute	162	Instrument Service Co.	128
Gunn-Mears Advertising Agency	162	Purrier & Associates	166
Best Vibrator Company	120	International Industries, Inc.	166
Bill's Radio Repair Shop	162	Edward C. Kennedy, Advertising	166
Billie Electric Company	162	Joseph, Irving	108
Hardy Advertising Agency	SECOND COVER	Schram Company, The	163
Bliss Electrical School	168	Jensen Industries, Inc.	163
N. W. Auer & Son	168	Allan D. Parsons, Advertising	163
Bonahe Radio & Electronics Co.	154	Jensen Radio Manufacturing Co.	163
Sternfield-Godley, Inc.	136	Burton Browne Advertising Agency	165
Brooks, George & Associates	136	J. F. D. Mfg. Co.	165
Schram Company, The	71	Herman-Jarrett Company	170
Bud Radio, Inc.	101	David, Inc.	132
Allied Advertising Agency	143	Kayline Distributing Co.	162
Buffalo Radio Supply	101	Kelvin Electronics Company	162
International Advertising Agency	143	Sternfield-Godley, Inc.	162
Burnell & Co.	125	Kenyon Transformer Co., Inc.	124
Mitchell Advertising Agency	122	Jasper, Lynch & Fisher, Inc.	70
Burstein-Applebee Co.	122	Lake Radio Sales Co.	120
Frank E. Whalen Advertising	122	Sander Rodkin Advertising Agency	120
Buyers Syndicate	152	Lectrohm, Inc.	154
Edwin Baldwin, Jr., Inc.	152	Merchandising Advertisers	154
Candler System Co.	131	Le-Hi Electrical Company	164
Rand-Ries Advertising, Inc.	21	Leday Mfg. Co.	164
Cannon Electric Development Co.	130	Frizzell Advertising Agency, Inc.	102
Dana Jones Company	142	Leonard Radio, Inc.	102
Capitol Radio Engineering Institute	148	Sternfield-Godley, Inc.	76
Henry J. Kaufman, Advertising	114	Altomari Advertising Agency	92
Chicago Industrial Instrument Company	98	Sternfield-Godley, Inc.	112
Turner Advertising Agency	148	Lifetime Sound Equipment Co.	156
Chicago Wheel & Mfg. Co.	114	Miler Advertising Agency	128
Weston-Barnett, Inc.	148	Lincoln Engineering School	164
Chief Electronics	114	Buchanan Thomas Advertising Co.	164
Christy Supply Company	98	Lyle Hdw. Co.	164
E. H. Brown Company	142	Mac's Radio Supply	142
Clarion Sound Engineering Co.	153	Maedel Publishing House	26, 27
Clark Radio Equipment Company	78, 139	Maguire Industries, Inc.	14
Turner Advertising Agency	67	City Advertising Agency	100
Cleveland Institute of Radio Electronic	134	Mallory, P. R., & Co., Inc.	150, 164
Kenneth H. Kolpen, Advertising	144	Atkins-Kynett Co., The	100
Collins Radio Company	95	Maritime Switchboard	164
McCann-Erickson, Inc.	136	Martin, Don, School of Radio Arts	148
Columbia Wire & Supply Co.	136	Meier, Joshua, Company	148
Sander Rodkin Advertising Agency	106	Malcolm Advertising Agency	74
Commercial Radio	106	Setdel Advertising Agency	20
Goulston Co., Inc., The	133	Merrill Symonds Advertising Agency	24
Communications Equipment Co.	136	Metropolitan Electronic & Instrument Co.	148
Borough Advertising Agency	146, 150	Bass & Weber Co., Inc.	148
Concord Radio Corporation	99	Mid-America Co., Inc.	148
E. H. Brown Company	133	E. H. Brown Advertising Agency	164
Constant Electric	168	Miles Reproducer Co., Inc.	164
Coyne Electrical School	136	Altomari Advertising Agency	136
McJunkin Advertising Agency	146, 150	Milo Radio & Electronics Corp.	28, 29
Coyne Electrical School	99	Burke & Wayburn Advertising Agency	97
Phil Gordon Agency, The	106	Murray-Hill Books, Inc.	146
Crabtree's Wholesale Radio	106	Harry P. Brinkley, Advertising	81, 166
DeForest's Training, Inc.	134	McGee Radio Co.	23
Laussen & Salomon, Advertising	162	Clyde H. Smith Advertising Co.	148
Bruce Lundeke Advertising	148	McGraw-Hill Book Co., Inc.	148
Dilks, Incorporated	148	McMurdo Silver Co.	19
Shappe-Wilkes, Inc.	92	National Company, Inc.	148
Dow Radio Supply Company	144	Graydon Smith & Co.	144
Dymac, Inc.	110	National Radio Distributors	102, 144
Harold Warner Company, Advertising	102	Burke & Wayburn Advertising Agency	3
Editors & Engineers, Ltd.	158	National Radio Institute	104
Electro-Motive Mfg. Co., Inc. The	155	VanSant, D'Agade & Co.	104
Cory Snow, Inc.	144	National Schools	19
Electronics Institute, Inc.	102	Stodel Advertising Agency	69
Electronic Manufacturing Co.	110	William N. Scheer	152
Business Service Company	144	Newcomb Audio Products Co.	118, 119
Electronic Parts, Inc.	102	Stevens-Hall Advertising	159
Campbell & Reynolds, Advertising	158	New York Technical Institute of New Jersey	142
Electronic Supplies	155	Schools & Beauty, Inc.	115
Electronic Supply Corp.	144	Niagara Radio Supply	147
Regent Advertising Service	144	Burke & Wayburn Advertising Agency	127
Electronic Technical Institute	90, 91	Ohmeyer Engineering Labs.	115
Erie Supply Company	6	Fensholt Company	147
Esse Radio Company	68	Olson Radio Warehouse	147
Gary A. Ruben, Advertising	166	Jessop Advertising Agency	74
Fada Radio & Electric Company, Inc.	86	Onan, D. W. & Sons	127
Sternfield-Godley, Inc.	126	Graves & Associates	74
Fahnestock Electric Company, Inc.	130	Oxford Radio Corp.	158
Federated Purchaser, Inc.	82	Signet Corporation, The	94
Bergman-Jarrett Agency	86	Arrow Advertising Agency	120
Feller Engineering Co.	126	Potter Radio Company	120
George Brodsky, Advertising	130	Precision Electronics, Inc.	79
Flanagan Radio Corp.	130	Campbell-Reynolds, Inc.	158
Stewart-Jordan, Advertising	82	Presto Recording Corp.	158
G & E Equipment Supply Co.	130	Ray S. Durstine, Inc.	158
Jones Frankel Company	130	RCA Institutes, Inc.	158
General Cement Mfg. Co.	82	R-L Electronic Corp.	152
Sander Rodkin Advertising Agency	82	R. S. Wittenberg, Advertising	73
		Radio City Products Company, Inc.	
		Retss Advertising Agency	

Radio Corporation of America J. Walter Thompson Company.....	89
Radio Dealers Supply Co. Burke & Wayburn Advertising Agency.....	78
Radio Distributing Co.....	162
Radio Electric Service Co. of Penna., Inc. David Zelman.....	160
Radio Equipment Distributors Ross, Gardner & White Co.....	110
Radio Experts.....	164
Radio Ham Shack, Inc. J. R. Kupskic Advertising Agency, Inc.....	87
Radio Kits Company Hamburger Advertising Agency.....	96
Radiolab Publishing Supply Bass & Weber Co., Inc.....	145
Radio Maintenance Magazine Shappe-Wilkes, Inc.....	65
Radiomart, Inc. Perwerda-Boone, Inc.....	161
Radio Parts Company Sidney S. Lovitt.....	81
Radio Press Radio Shack, The Engineered Advertising.....	80
Radio Shack, Inc. The Schram Company, The.....	151
Radio Supply & Engineering Co., Inc. Karl G. Weber Advertising.....	66
Radio Television Supply Company Radio & Television Supply Co. Thomas H. Stevenson.....	130
Radio Wire Television, Inc. Rets Advertising Agency.....	129
Radiologic Equipment Co. Republic Advertising Agency.....	113
Radolek Co. Turner Advertising Agency.....	168
Reed Mfg. Co. Borg Advertising Agency.....	150
Rider, John F. Publishers, Inc. Lansford F. King Advertising.....	17
Rowe Industries Muller Advertising Agency.....	156
Sams, Howard W., & Co., Inc. Aikin-Kinnet Co., The.....	31
Sauersisen Cements Co. McCarty Co.....	167
Scenic Radio & Electronics Co.....	154
Shelby Instrument Company.....	139
Shure Bros., Inc. H. M. Gross Company.....	123
Sigmond's Radio Supply Advertising, Inc.....	160
Snap-On-Tools Corporation Scott-Telander Advertising Agency.....	107
Sound Products Company Kameny Associates.....	151
Sprague Products Company Harry P. Bridge Company.....	85
Sprayberry Academy of Radio Harry P. Bridge Company.....	7
Stahl, Michael, Inc. Bass & Weber Co., Inc.....	140
Standard Parts Corp. Bass & Weber Co., Inc.....	84
Standard Radio & Electronic Products Co. Mount Printing Co.....	141
Standard Transformer Corp. Burnet-Kuhn Advertising.....	25
Stark's A. L. Addison, Advertising.....	162
Sterling Electronic Company.....	136
Stevens Walden, Inc. Howard Wesson Co.....	8
Sun Radio of Washington, D. C. Kal, Ehrlich & Merrick.....	30
Superior Instruments Company Bass & Weber Co., Inc.....	15
Supreme Instruments Corp. O'Callaghan Advertising Agency.....	94
Supreme Publications Henry H. Teplitz Advertising.....	137, 161
Surplus Radio, Inc. Bass & Weber Co., Inc.....	157
Sylvania Electric Products, Inc. Newell-Emmet Company.....	FOURTH COVER
T. A. Bass & Weber Co., Inc. Taybern Equipment Co. Warren Advertising Agency.....	112, 128
Telectron Company, The.....	156
Thor Electronics McGibern-Chid Company.....	169
Transvision, Inc. H. J. Gold, Advertising.....	116
Triplet Electrical Instrument Western Advertising Agency.....	75
Tri-State College Clem J. Steimyer, Advertising.....	164
Trutone Products Co. Juitus J. Rowen & Company.....	124
U. S. Radio Supply R. S. Wittenberg, Advertising.....	134
Union Radio Corporation Sander Rodkin Advertising Agency.....	169
Universal Radio Supply Company Stevens-Hall, Advertising.....	160
Utica Drop Forge & Tool Co. Devereux Co.....	114
Valparaiso Technical Institute Smith, Benson & McClure, Inc.....	167
Variety Electric Company Bass & Weber Co., Inc.....	110
Vasco.....	164
Vertrod Corporation Bass & Weber Co., Inc.....	145
Vision Research Laboratories Abner Robbins Advertising Service.....	135
Ward Products Co. Burton Browne Advertising Agency.....	163
War Assets Administration Feller & Smith & Ross, Inc.....	10, 11, 12, 13
Warner Electric Company Mason Warner Company.....	154
Warren Distributors.....	149
Warwick Mfg. Co. Agency Service Corp.....	109
Waterman Products Co. Gerula Associates.....	112
Weber Radio Labs. Bass & Weber Co., Inc.....	152
Webster-Chicago Corp. William Hoffman & Associates.....	124
Weller Manufacturing Co.....	82
Wells Sales, Inc. Turner Advertising Agency.....	83
Western Radio Communications Institute.....	182
World Radio Laboratories, Inc. Preiffer Advertising Agency.....	88
Wright, Inc. Key Advertising, Inc.....	128
YMCA Trade & Technical School Cecil Presbey, Inc.....	136

—SET BUILDERS— TWO-TUBE SUPER HET KIT



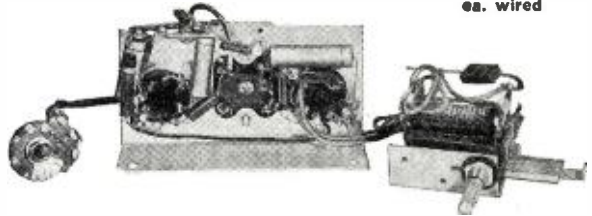
Upright model

Completely wired ready to connect into any AC-DC or 6 volt filament with 125 V or more B supply—plate current drains—2 mils

High gain and selectivity—plays with 6 ft. of wire—excellent for PA systems, radio tuners and for making combination kits for set builders—tunes police calls

\$795
ea.
unwired
\$995
ea. wired

Layout model where space is essential



Escutcheon plate with knobs as illustrated goes with each unit—wired or unwired.

Consists of:

- 1 312-1 Perm. Tuners
- 1 322-2 I.F. Coils
- 1 263-5034-4 Tub. Cond. .05 mfd.
- 2 263-1034-5 Tub. Cond. .01 mfd.
- 1 232-2815-2 Mica Cond. 250 mmt.
- 1 232-5015-4 Mica Cond. 470 mmt.
- 1 232-5015-3 Mica Cond. 500 mmt.
- 1 111-22312 1/2 W. Car b. Resistor. 22K
- 1 111-33512 1/2 W. Car b. Resistor. 3.3M
- 1 111-10612 1/2 W. Car b. Resistor. 10M
- 1 111-27412 1/2 W. Car b. Resistor. 270K
- 2 558-1 Octal Sockets
- 2 727A1 Tube Shields
- 1 571-3 Tube Clips
- 1 chassis
- 1 12SA7
- 1 12SQ7
- 1 Vol. Control
- 1 phono switch
- 1 on-off switch
- 2 knobs
- 1 escutcheon plate

Quantity unlimited
20% deposit with orders

UNION Radio Corporation
328 S. Paulina • Chicago 12, Ill.

Immediate delivery, Dept. A

U. S. SIGNAL CORPS 2-WAY TALKING SYSTEM



Western Electric product. Use them for inter-office communication, house to garage, living room to baby's room, on the farm, and many other places. Sensitive enough to pick up baby's whimper. Sturdy all-steel construction. Has push-to-talk switch, built-in speaker, 5Y3-6SJ7-6K6 tubes. The small unit is a speaker-receiver. Connect as many as 10 speakers in parallel. Comes ready to operate. 100 ft. of speaker cable supplied. Complete with master speaker-receiver



\$3250
\$495

Extra speaker-receiver unit



RADIO PARTS ASSORTMENT

Hundreds of valuable and useful radio parts. Transformers, coils, condensers, wire sockets, escutcheons, lugs, etc., etc.
A Better Buy
10 lbs. \$1.69

BROADCAST BAND CONVERTER

100 KC to 1550 KC

For owners of Army-Navy surplus receivers. Adapter supplied uses a 6SA7 tube mixer-oscillator. Beats BC signal against 3 Megs. Tune in on short wave. Tested with BC-312, 342, NC100-ASD, BC-348 and others. In ordering state model.

\$1500



SPECIALS

- BC-312, 342 I.F. Crystal Transformer, resonant at 470 KC. Replace that 1st I.F. with this unit and separate those crowded ham-bands **\$ 6.49**
- Double Button Mike-to-Grid Trans..... **.59**
- Kit of 10 R.F. & Osc. Coils..... **.98**
- Pwr-Trans. 350-0-350, 60 Mils, 6.3v @ 3a, 5v @ 2a..... **2.15**
- H-S-30 Hearing Aid type Head Phone—a close out..... **1.98**
- H-S-16 Noise-proof Headset—Superior..... **2.98**
- RA-20 Power Supply—For Signal Corps Receiver BC-342. Replace battery pack on BC-312 to convert to 110v, AC operation..... **14.89**
- Output Transformer—Pri. 10,000 Ohms, Sec. 4,000, 250, 4 Ohms..... **.69**
- Tube Tester. Fil. Trans. All tubes..... **1.98**

Cash, Check or M.O. Write Dept. N

THOR ELECTRONICS
5051 N. Clark St., Chicago 40, Ill.

RADIO-TELEVISION TECHNICIAN'S COURSE

- New Classes starting every 5 weeks.
- Either morning or afternoon classes. Full or Part time.
- Approved for veterans—Public Law No. 346 and No. 16.

Write for Free Bulletin on Courses

HOLLYWOOD SOUND INSTITUTE, Inc.

1040 N. Kenmore Ave., Los Angeles

—3—

MO 1-2345

JOHNSON

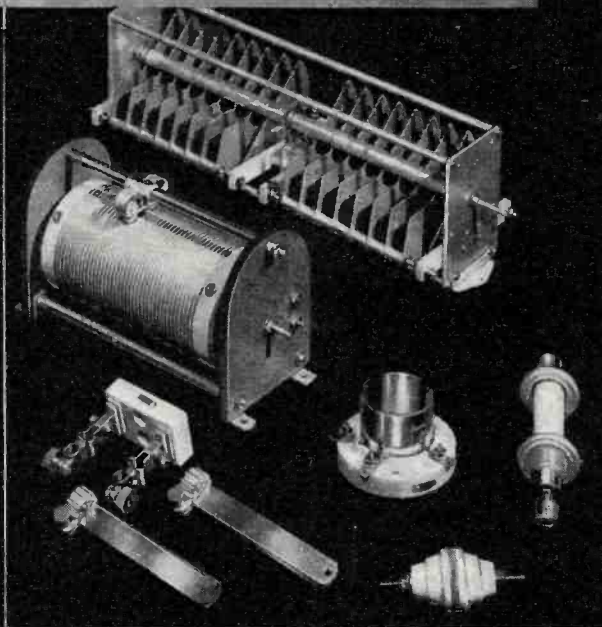
COMPONENTS

for the voice that

WHISPERS

for the voice that

SHOUTS



If you design or build electronic equipment no smaller than a handy-talkie, no larger than a 50 KW transmitter there are JOHNSON components "your size." Many of the small parts above find application in circuits operating at battery voltages. The miniature socket for instance is a modification of a predecessor that floated down over Europe in a handy-talkie with the paratroopers. They're catalog items with the exception of the terminal boards which typify JOHNSON ability to manufacture special assemblies quickly, easily and economically. The miniature condenser is an inch and half overall, has .015" spacing,

12 mmf. maximum and 3 mmf. minimum capacity. On the large side of the condenser family are the pressurized nitrogen-dielectric condensers offering RMS voltage ratings to 30,000 V capacities to 10,000 mmf., and highest capacity to mounting space ratios. Similar comparisons might be made with the other JOHNSON components.

Between the large and small above there's a big JOHNSON line from which to choose. Check the list below for parts you need. You'll find them carefully designed, skillfully manufactured. For more information write department Z today.

Johnson Products Include

Condensers • R. F. Chokes • Connectors • Pilot and Dial Lights
Directional Antenna Equipment • Inductors • Q Antennas • Plugs & Jacks
Broadcast Components • Tube Sockets • Insulators • Hardware

JOHNSON



a famous name in Radio

E. F. JOHNSON CO.,
170

PRINTED IN U.S.A.

W A S E C A, M I N N E S O T A

RADIO NEWS

THESE WORDS MEAN PREMIUM QUALITY

APPROVED
PRECISION
PRODUCTS

... at no extra cost!



You don't *pay* more for Mallory parts—but you *expect* more and *get* more from them. That fact has been proved for over fifteen years—by performance that has constantly justified the Mallory slogan, "Approved Precision Products."

Why, for instance, have most servicemen found Mallory FP capacitors "tops" in quality? Because, for one thing, chlorides and other impurities are kept to *less than one-half of one part per million*. This is accomplished by a system of rigid controls that

insists upon capacitor gauze actually purer than hospital gauze... that compels plant operators to wear rubber gloves... that assures production under scientifically air-conditioned surroundings.

As a result, Mallory FPs are eminently dependable. They have a nationwide reputation for premium quality. Like other products sold by Mallory's carefully selected, conveniently located distributors, they really *are* approved... they really *are* precise.

You Expect More and Get More From Mallory

P. R. MALLORY & CO., Inc.
MALLORY

VIBRATORS... VIBRAPACKS*... CAPACITORS... VOLUME
CONTROLS... SWITCHES... RESISTORS... FILTERS
... RECTIFIERS... POWER SUPPLIES.

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

TIMED FOR TOMORROW...

TIME-TESTED ALREADY!

"NO TOP CAP CONNECTION!"



**"PROVED IN RADAR—
TOPS FOR FM
AND TELEVISION!"**



**LOOK AHEAD WITH THE
LOCK-IN TUBE**

Sylvania Electric's war-proved Lock-In Tube anticipated the current trend to higher frequencies—and to compact set design. Time-tested in radar and secret radio equipment during the war, the Lock-In Tube is ideal for FM and television. And its lower overall height makes important space savings possible. The Lock-In Tube is here today—and ready for tomorrow!

**"RUGGED
MOUNT SUPPORT—
SHORT, DIRECT
CONNECTIONS!"**



**"ALL-WELDED
CONNECTIONS—AND A
LOCK-IN LUG THAT
STAYS PUT!"**



SYLVANIA ELECTRIC



Emporium, Pennsylvania

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